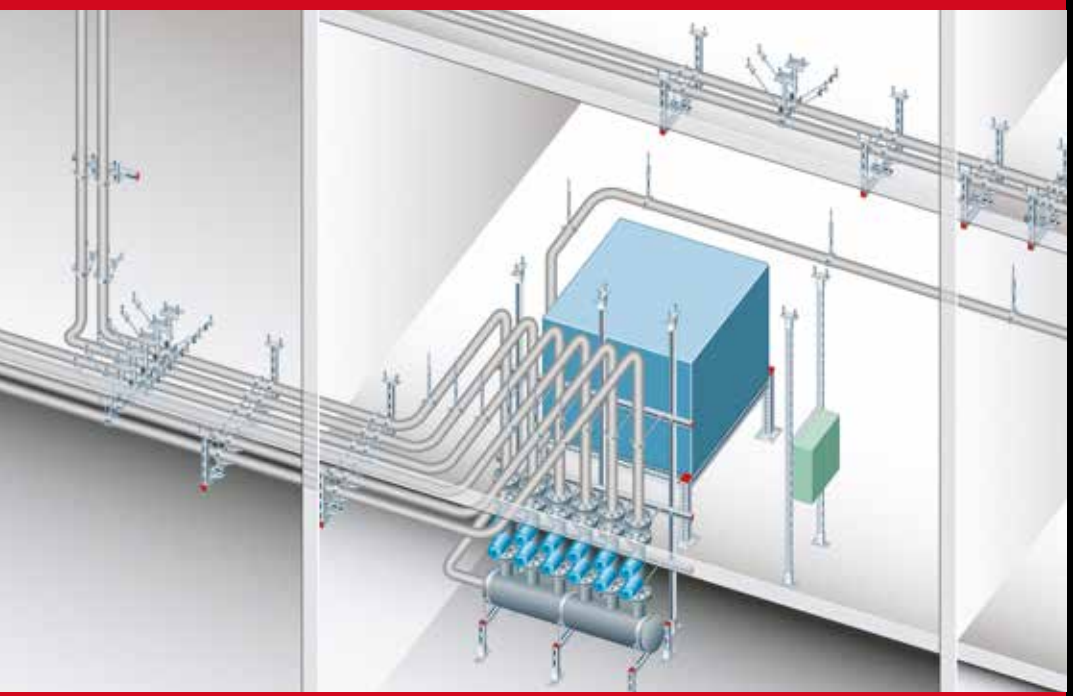
HILTI

Installation Technical Manual

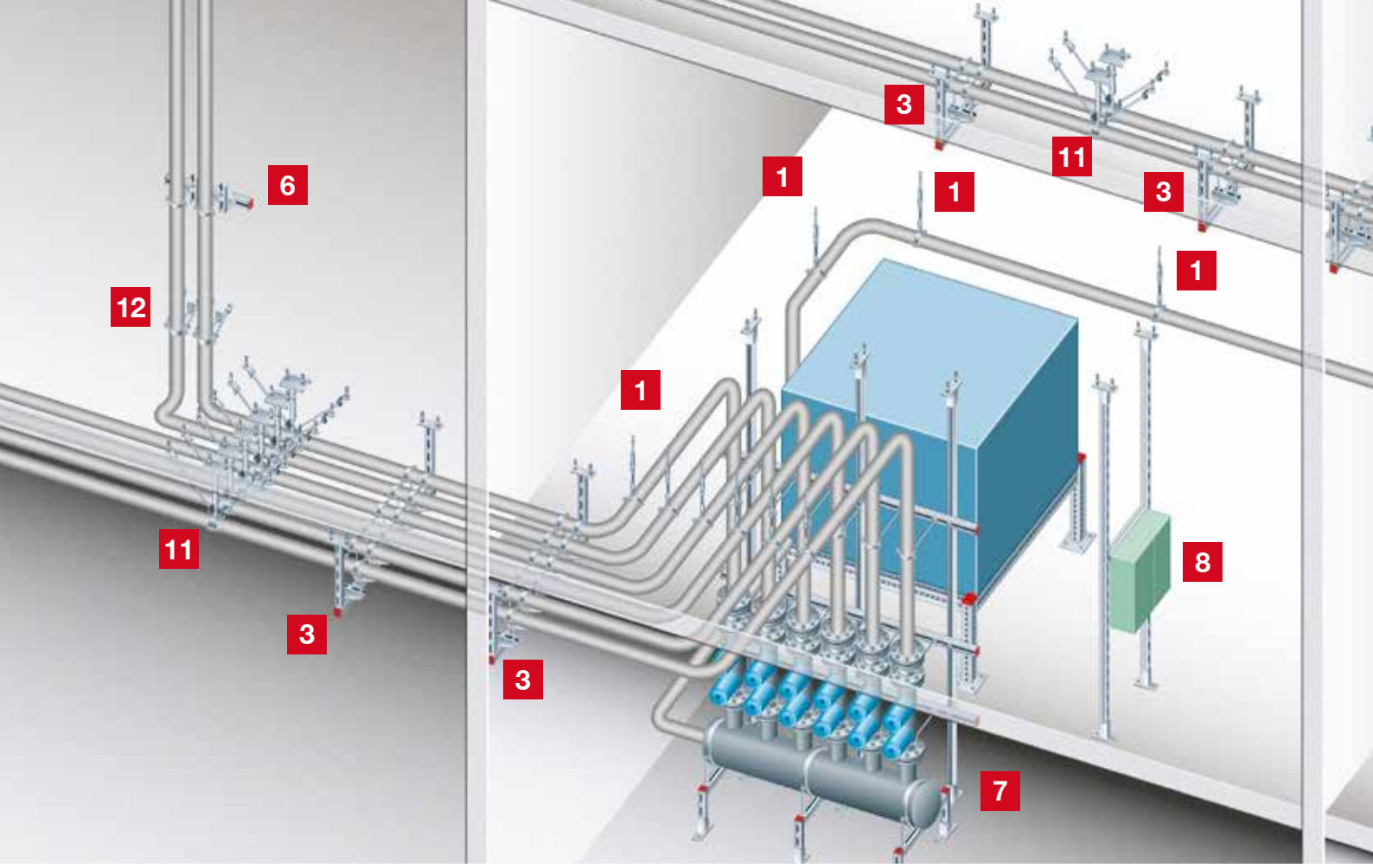
Typical Applications

Typical Sub-trade Applications

Heating Applications



Version 1.0 I February 2016

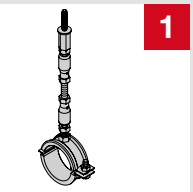


Heating is the general term applied to the system used to raise and maintain the ambient temperature inside a building at a comfortable level. Several different principles are employed. Most widespread in central Europe are systems where heat is produced locally in a unit located in the plant room or associated room in or adjacent to the building. This heating unit (e.g. gas heater) heats the heating media directly, which is then distributed through the piping system to the places of final radiation (e.g. radiators or floor heating).

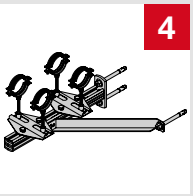
Other principles employed in large building complexes include the use of centralized district heating (either purpose-built heating plants or those designed to utilize waste energy, e.g. from a power plant or waste incineration plant) with a primary heating media such as steam. This primary heating media is distributed through underground pipes to local plant rooms in the buildings to be heated. The primary heating media then passes through a heat exchanger, thereby raising the temperature of the secondary heating media. The system used to distribute the secondary heating media in the building is exactly the same as in the local system described above.

Several other principles are in use mainly in Northern Europe, where local heating units are combined with air conditioning and ventilation systems. Advanced technologies associated with green building and passive building are also gaining acceptance for use in heating systems, but still on a very limited scale and generally only where very local or just-in-case back-up solutions are required.
The system described in this manual reflects the most widespread solutions found in the commercial building segment in Central Europe. The heating media begins its journey in a local heating unit or boiler in a plant room before passing through a splitter, from which various branches then continue on into pipe corridors and rising shafts for final distribution to the places of final consumption or radiation.

Heating pipes running along corridors are typically installed on common supports together with other services.

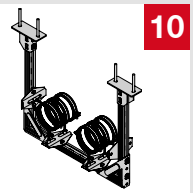


1 Single fastening
Pipes are typically suspended from the ceiling on a pair of swiveling elements or other extension elements.

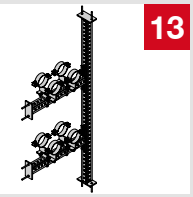


4 Cantilever arm
Cantilever pipe support arm (pipes standing or suspended) in the form of a preassembled / pre-welded unit or assembled from individual parts with vertical or pipe axial braces.

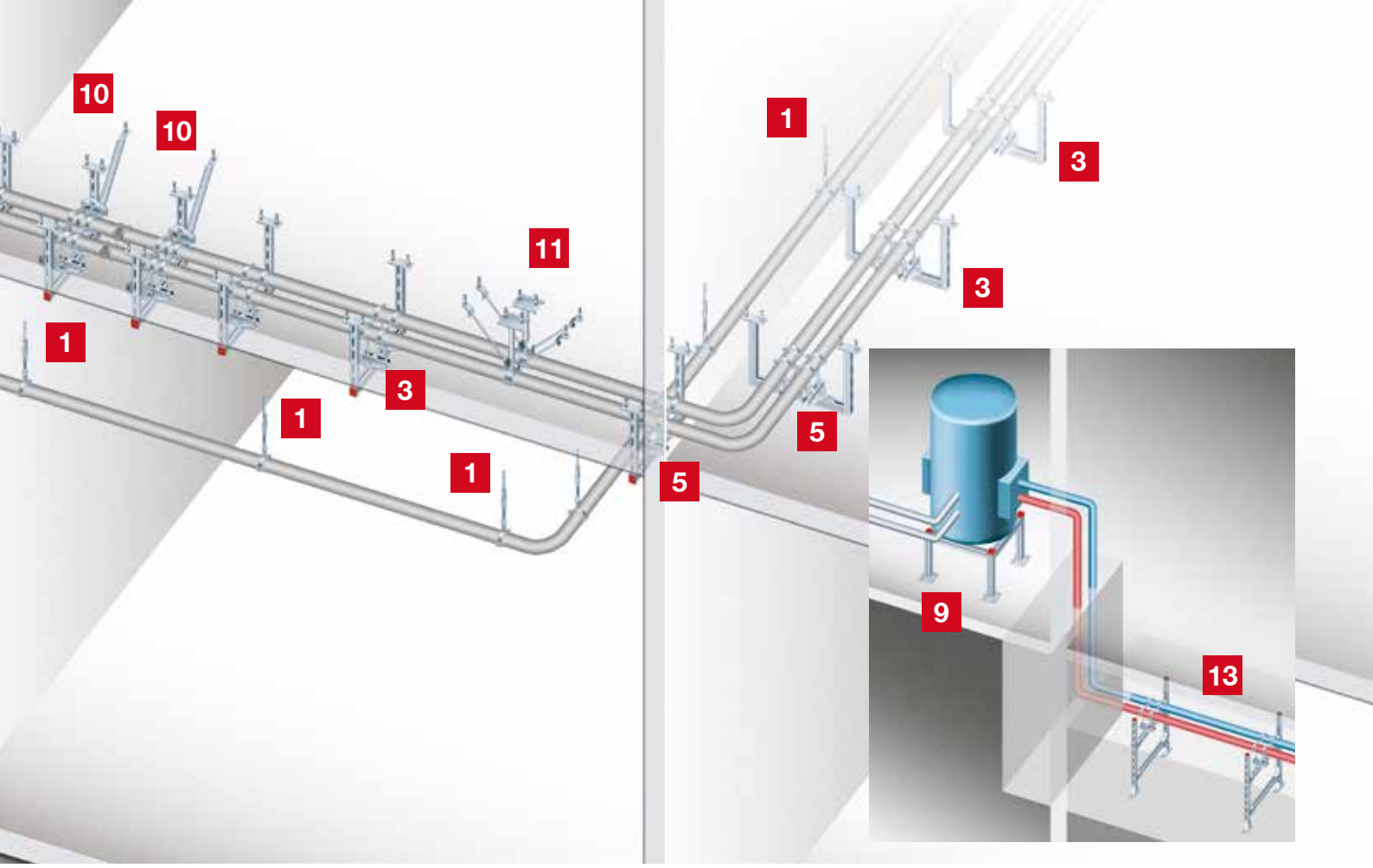
7 Splitter frame
A frame made from channels supporting splitters or measuring and regulation devices of various dimensions or supporting both types of plant room equipment together.

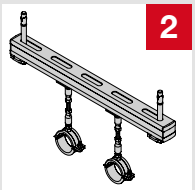


10 Axial guide support frame
Frame structure designed to provide axial guidance to the pipes before and after technical compensation of expansion.

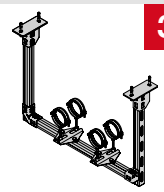


13 Primary heating media collector bracket
Typical solutions for underground collectors or various special pipe corridors. Frame structures suitable for various geometries and loading conditions.

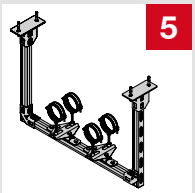




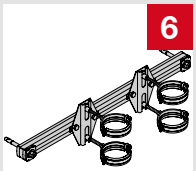
2 Head rail
A channel directly attached to the ceiling, typically using anchors, either through bolting the channel or fixing the channel from the bottom directly. The pipes are suspended either on swiveling or expansion elements.



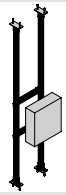
3 Trapeze frame
A length of channel fastened to two or more vertical upright channels supporting a group of suspended or standing pipes mounted on expansion elements



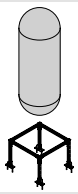
5 Natural compensation zone trapeze
The same as application 3, but subjected to axial and lateral pipe loads on transverse (cross) sliding elements.



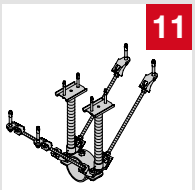
6 Riser guides
A length of channel directly anchored to the wall using anchors. Pipe rings mounted on expansion elements provide guidance for rising pipes.



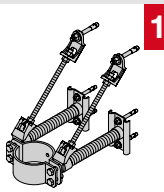
8 Plant room equipment / switch box support frame
Frame structure typically braced between the floor and ceiling, supporting various devices, e.g. switch boxes.



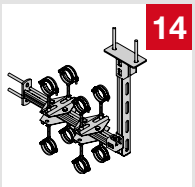
9 Plant room framing – 3D frame
3D frame structure supporting heavy plant room equipment e.g. boilers in various sizes and dimensions.



11 Fixed points
Standard fixed point set ensuring control of the pipe expansion.



12 Riser fixed points
Standard fixed point sets to take up riser pipe loads.



14 Various other applications
Includes various hybrid structures designed to support particular parts of heating systems.

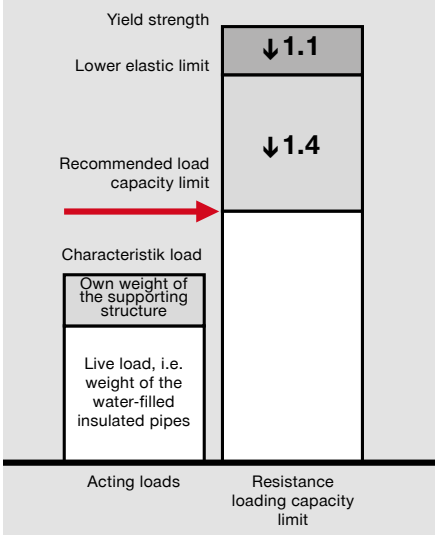
Terms of common cooperation / legal disclaimers

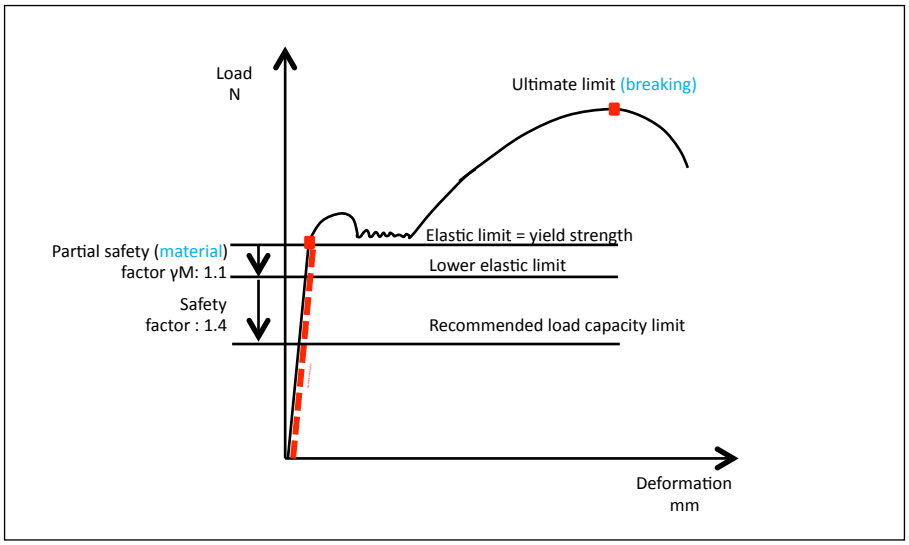
Hilti strives to achieve continuous development and innovation. This manual is thus subject to change without notice. Hilti strongly advises customers to verify the respective product application for the intended use by consulting a structural engineer and making the necessary calculations to ensure compliance with the applicable norms and standards. It is essential that the product is used strictly in accordance with the applicable Hilti instructions for use and within the application limits specified in the Hilti technical data sheets, technical specifications and supporting product literature. Due to the fact that construction materials and environmental conditions vary widely, information given in this manual is solely based on principles and safety factors believed to be correct at the time they were established. The customer is ultimately responsible for checking the present condition of supporting materials and the applicability of the selected product application. Hilti shall not be liable for direct, indirect, incidental or consequential damages, losses or expenses in connection with any information contained in this manual or in connection with, or by reason of, the use of, or inability to use the products for any intended purpose. This limitation of liability does not apply to personal damages culpably caused by Hilti. Implied warranties of merchantability or fitness of the products are herewith expressly excluded.

Loading capacity limit

All loading capacity limits in this manual are to be considered as recommended values. Recommended values are calculated from the elastic limit equal to yield strength, with an applied material safety factor of 1.1 and an applied additional safety factor of 1.4.

Recommended load approach





Contents and overview of this manual

Applications

Heating applications - application options

An explanation of the information provided on each page

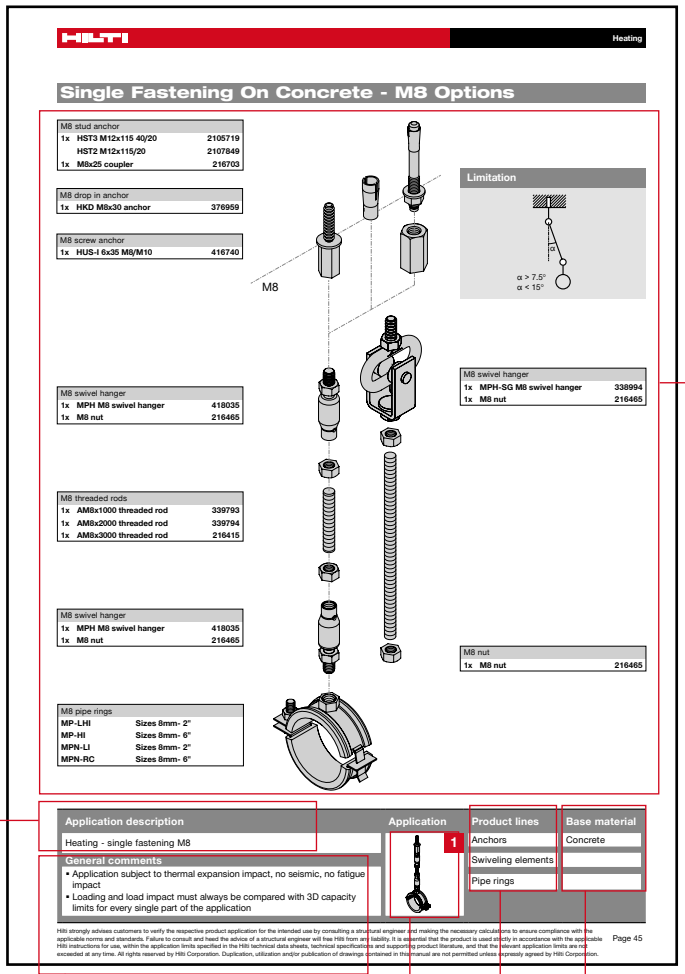


Illustration showing options for the application
Shows the different possible combinations including the bill of materials for each solution. Some of the solutions include practical tips, e.g. tools required for installation.

Application description
The general name of the application and a list of the typical situations it covers.

General comments and disclaimers

Type of application
Illustration showing the type of application.

Product lines
The main products used for this application.

Base material limitations
This combination of products may be used only on the base materials listed.

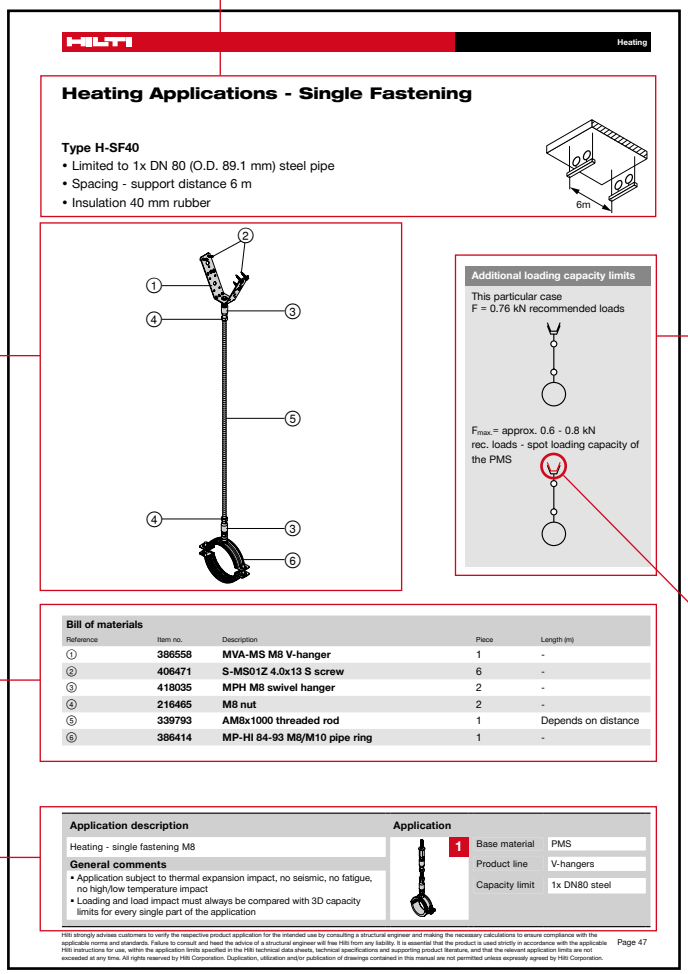
Heating applications - typical applications and examples

Type and limitations of the application
Max. sizes of particular pipes associated with the span and size of channel used.

ACAD 3D design
with references to the bill of materials.

Bill of materials for 1 unit
All item numbers and number of pieces of each item necessary to assemble 1 unit for this application.

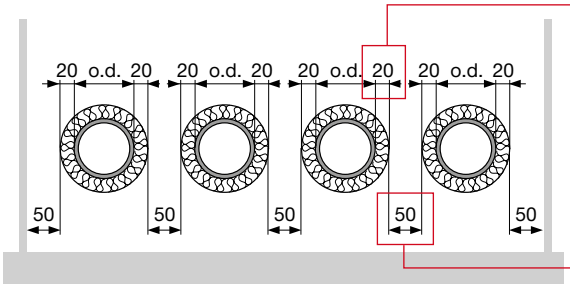
Data for the typical situation
Name, reference in PROFIS Installation, base material, system capacity limit.



Loading capacity information
- Typical loading case
- Maximum loading capacity of the same structure with a single load acting in the center of the span

Red color indicates the part that limits the entire application when maximum capacity is reached.

General design rules for typical situations



Insulation thickness
rubber 20 mm

Manipulation space 50 mm
- for welding the pipe
- for wrapping the insulation around

Technical background information

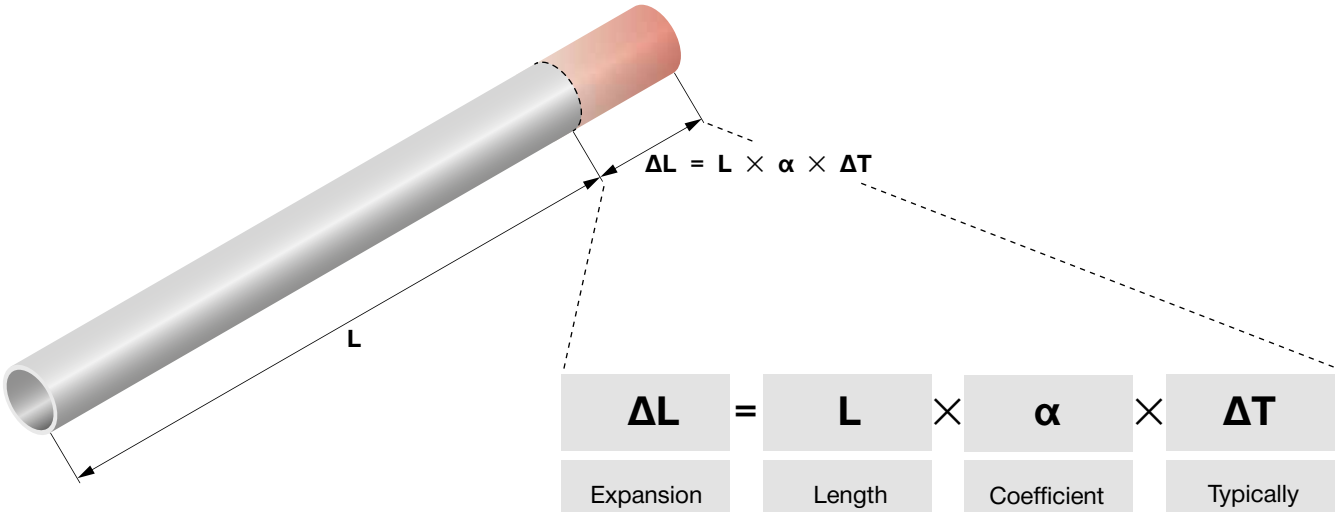
1.0 Thermal expansion

Technical challenges and how these dictate the product requirements

Heating

The major challenge when fastening heating pipes is thermal expansion of the pipe and its impact on pipe supports and the surroundings.

Thermal expansion leads to extension of the length of the pipe and depends on three basic parameters:



ΔL	=	L	×	α	×	ΔT
Expansion		Length of the original element		Coefficient of expansion (depends on material) 12.10-6		Typically operational (-) minus mounting temperature

Examples of materials and their coefficients of expansion

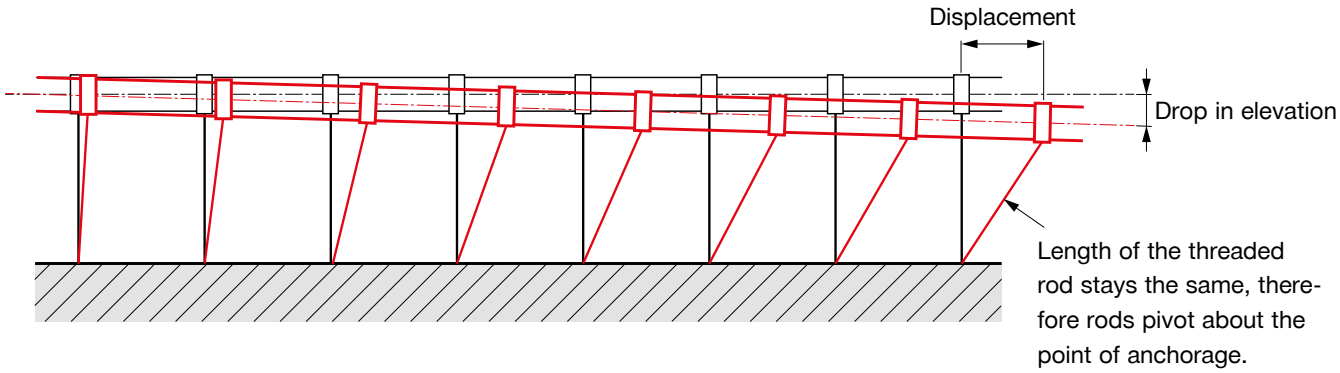
Material	Coefficient of expansion	Example for 10m, ΔT 50°C
Steel St 37-2	0.0000111	5.55 mm
Stainless steel	0.000016	8.00 mm
Cast iron	0.0000105	5.25 mm
Copper SF-Cu	0.0000168	8.40 mm
Polyethylene PE 100	0.00018	90.0 mm

2.0 Controlled expansion

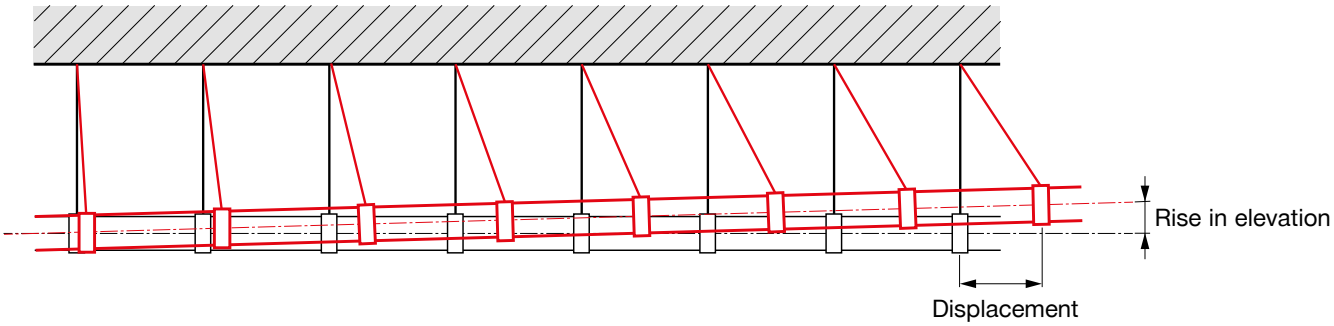
Expansion must be controlled

What can happen in the event of uncontrolled expansion – the impact of expansion on pipe supports

Example showing pipes on standing supports



Example showing suspended pipes

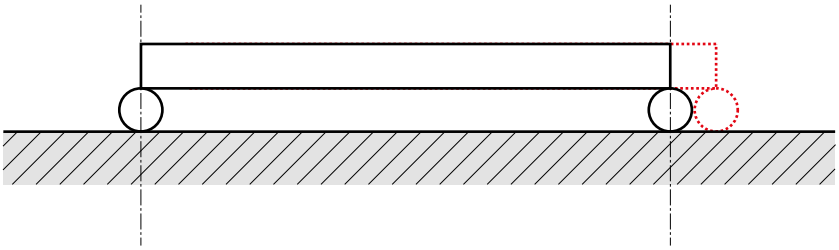


Both cases may lead to irreversible deformation, huge displacements, wrong load re-distribution and ultimately to chain reactions causing pipe collapse.

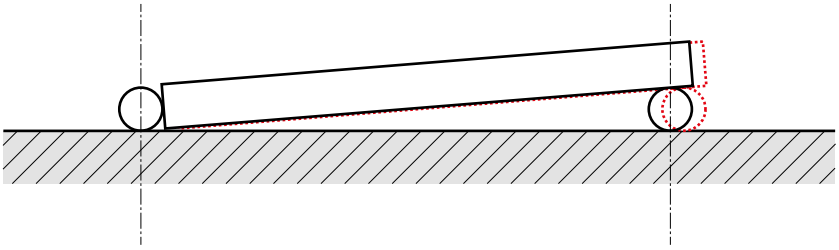
Uncontrolled expansion – impact on supports and surroundings

What can happen in the event of uncontrolled expansion – the impact of expansion on pipe supports

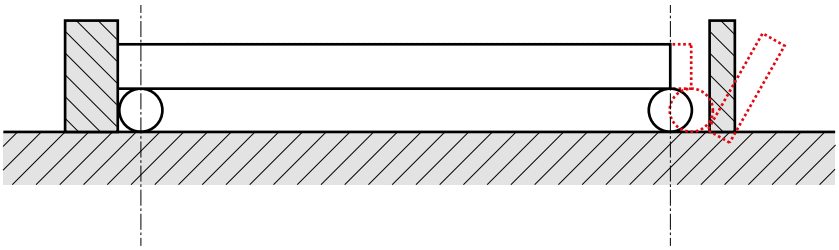
It may, by coincidence, have little effect, i.e. the pipe system is able to take up the movement.



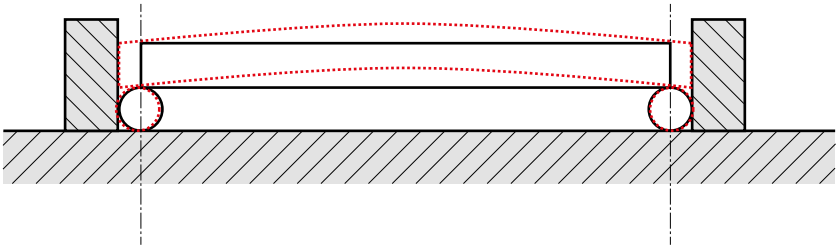
Some of the supports may detach.



An expanding element may exert pressure against the surrounding structure, which is not designed to carry these loads.



The expanding element exerts pressure between two rigid structures, thereby subjecting it to inner stress, possibly leading to breakage.

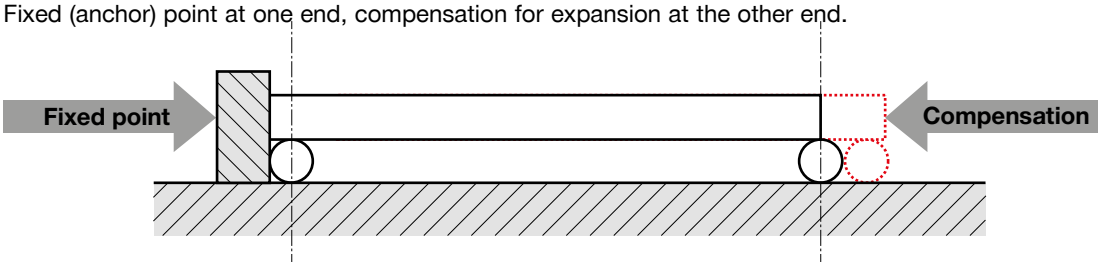


Ignoring the control of thermal expansion can have many more negative effects. The cases above represent the majority of the problems encountered in the installation of pipes.

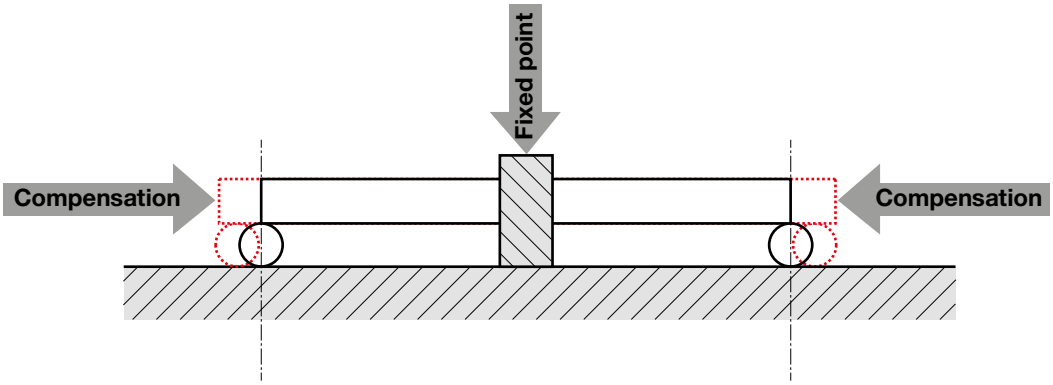
Controlling expansion – methods used to control expansion

Expansion must be controlled. Its impact can then be predicted and calculated.

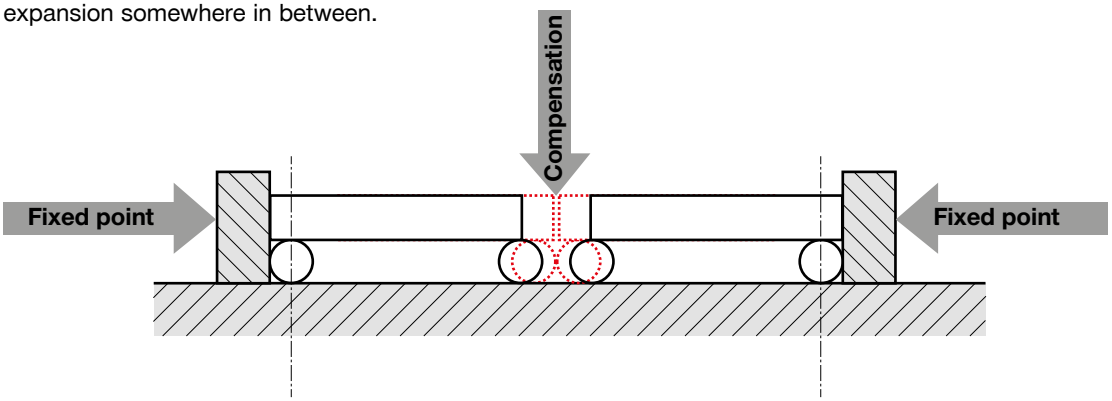
Fixed (anchor) point at one end, compensation for expansion at the other end.



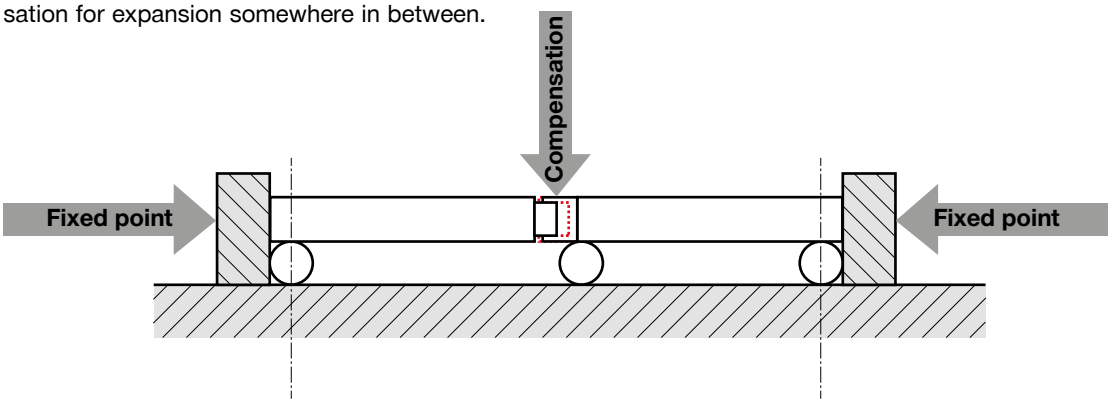
Fixed (anchor) point in the middle, compensation for expansion at both ends.



Fixed (anchor) points at the ends and space designed to provide compensation for expansion somewhere in between.



Fixed (anchor) points at the ends and a mechanism designed to provided compensation for expansion somewhere in between.

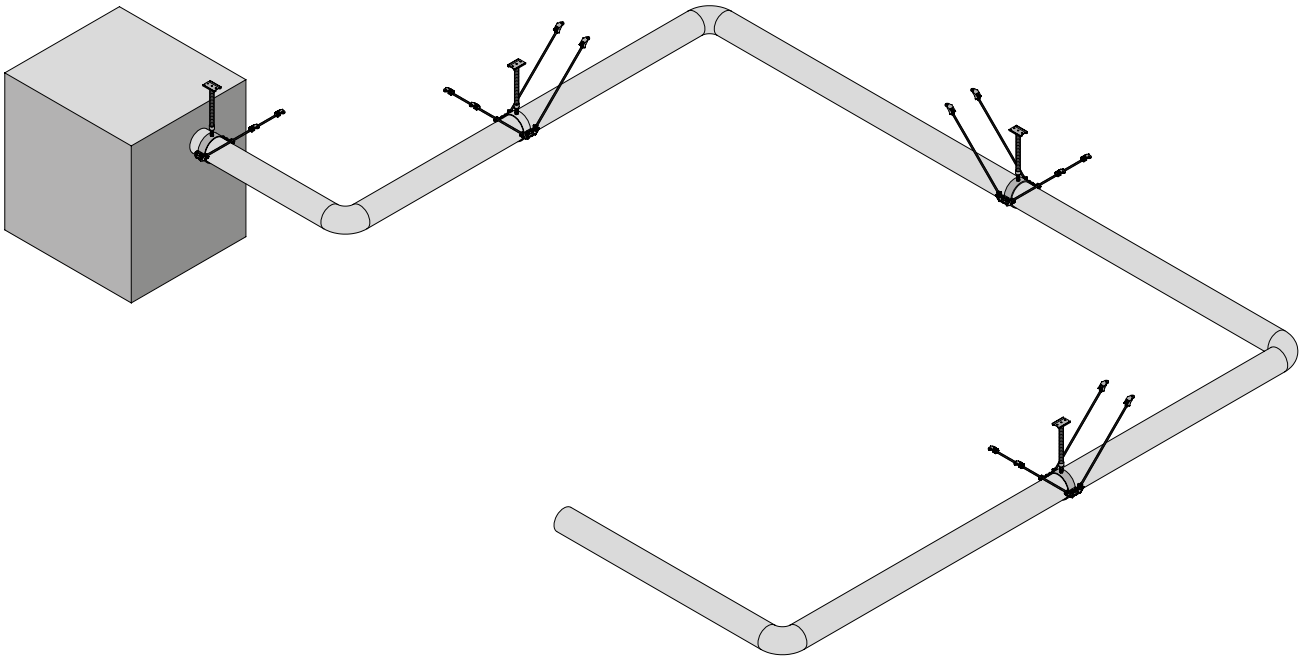


A system for controlling expansion always consists of a set of fixed points and a means of compensation.

3.0 Fixed point

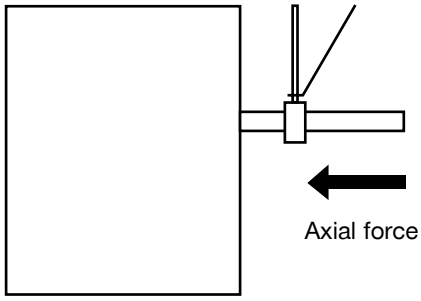
Fixed points – placement

Generally, a good starting point is the following basic rule: For every straight section of pipe with a diameter of 2 ½" (76.1 mm) or more and a length of 10 m or more, expansion must be controlled by a fixed point in the middle of the run.



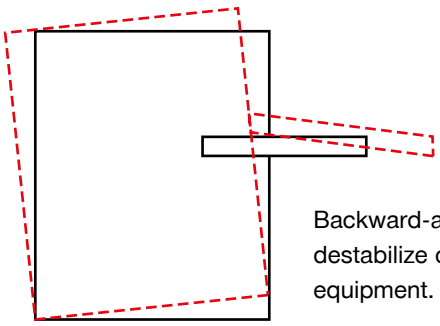
Some plant room equipment may be subject to a risk of destabilization or damage by pipe axial forces. Protection at the start of the run is therefore required in some cases.

Plant room equipment with fixed point protection



Axial force caused by expansion

Plant room equipment without fixed point protection



Backward-acting forces may destabilize or damage the equipment.

Fixed points – loads

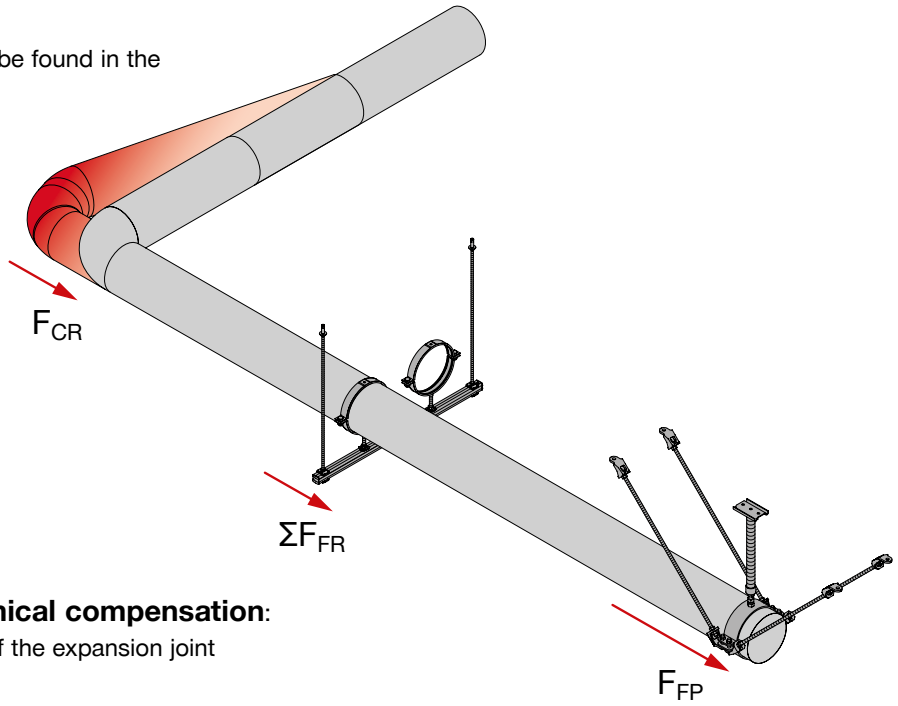
The basic function of a fixed (anchor) point is to anchor the pipe in a place where the building structure is designed to carry loads generated by expansion and to thus ensure zero movement of the pipe. This control of the pipe will generate certain loads due to several factors, depending on the type of compensation used:

Loads generated at a fixed point by **natural compensation**:

F_{CR} - Resistance of compensation (elbow, u-bend..)

ΣF_{FR} - Friction at all pipe supports

Information about detailed calculation can be found in the "Natural compensation" section.



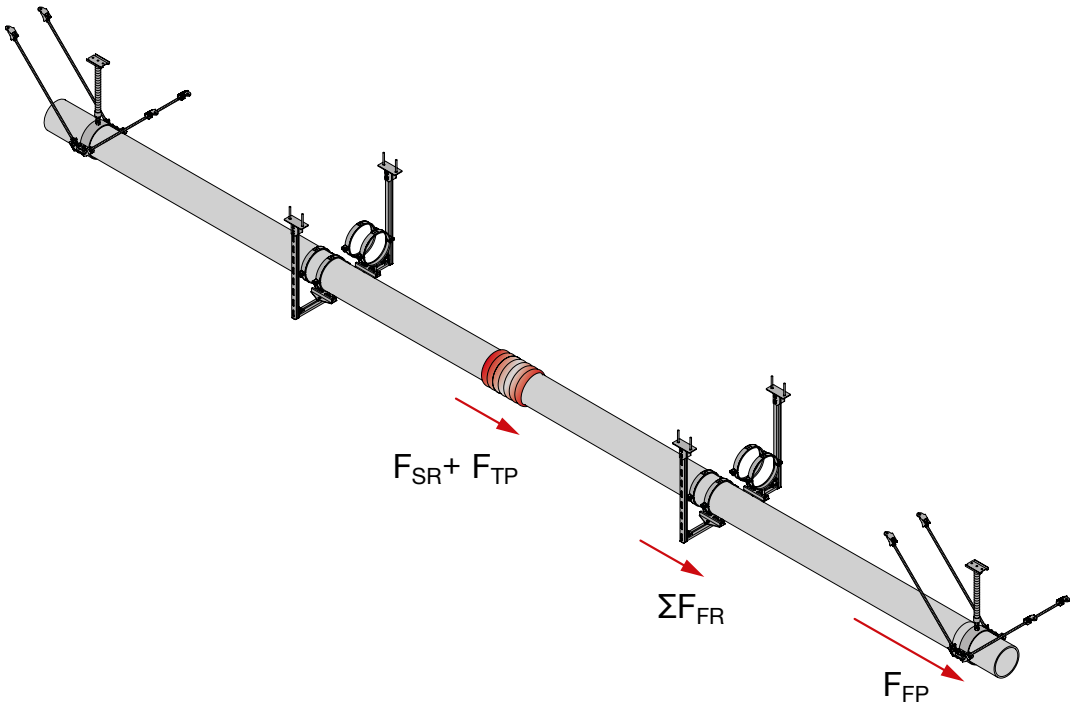
Loads generated at a fixed point by **technical compensation**:

F_{SR} - Load generated by spring rate of the expansion joint

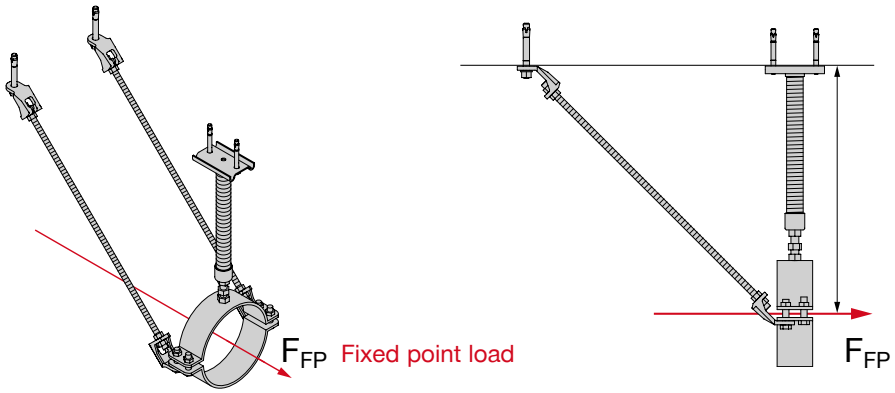
F_{TP} - Media pipe pressure

ΣF_{FR} - Friction at all pipe supports

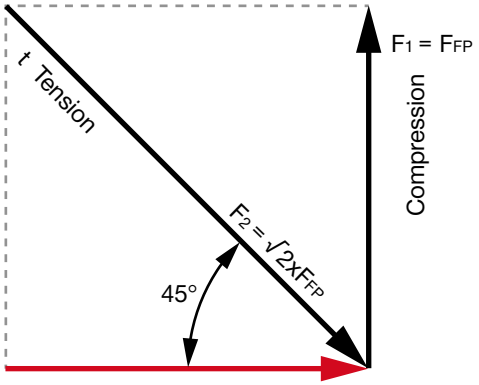
Information about detailed calculation can be found in the "Technical compensation" section.

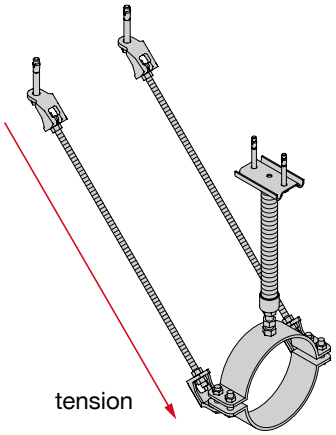


Fixed point load transfer principles

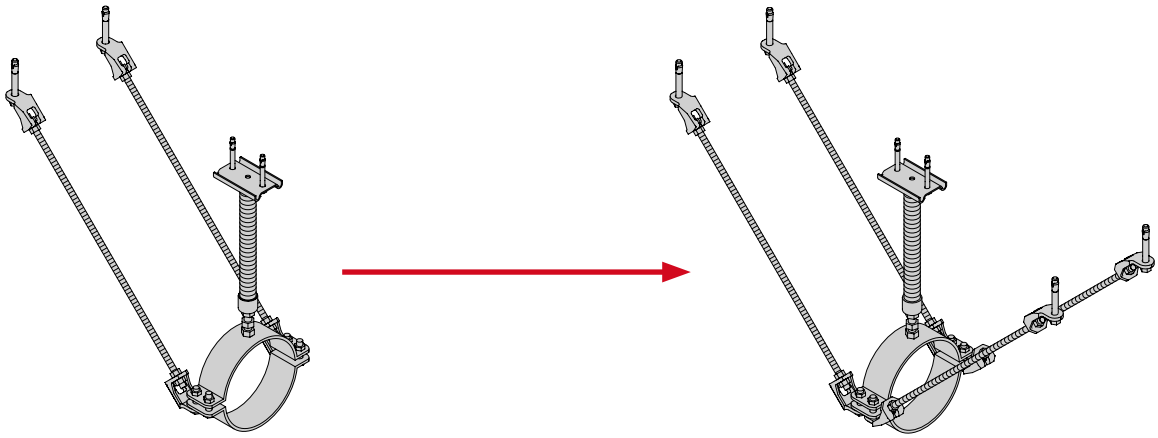


Most of the Hilti fixed point sets work on the stand and brace principle, thereby splitting the load into two parts on a triangular principle.

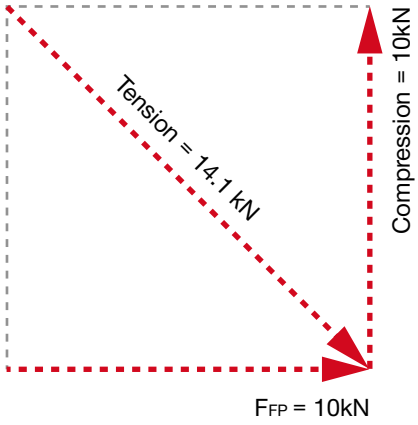




Braces in Hilti fixed point sets are made from M16 threaded rods.
The threaded rod must be subjected to tension only.
The orientation of the brace must reflect this.
The brace must be subjected to tension only.
In cases where you are not sure, or the brace can be even temporarily subjected to opposite loads (when the system is heating up or cooling down), we recommend that braces are fitted on both sides.



Fixed point versus loading capacity of the structure

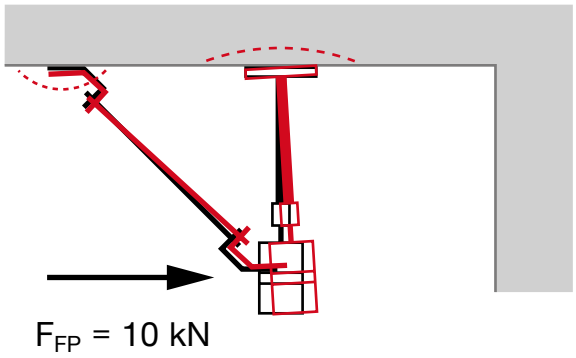


Placement of fixed points should always take the loading capacity of the building structure into account. The structural engineer responsible for the structure must always be consulted about the impact of the fixed point.

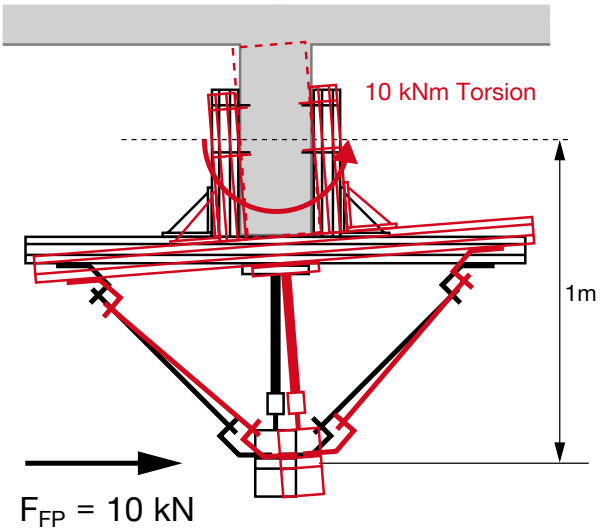
The cases mentioned below are examples of situations that could present a risk to the stability of the building structure or any other sub-structures.

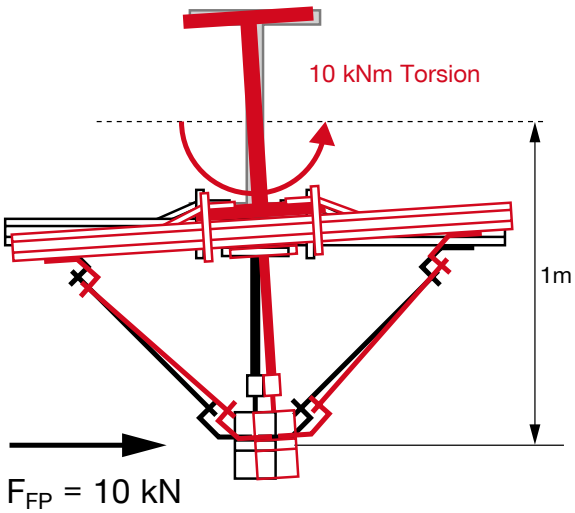
The cases are explained on the basis of a fixed point load of 10 kN acting on an arm at a distance of 1m from the supporting material.

10 kN may exceed the spot loading capacity of a concrete slab and the loads acting in this way may pull out the entire anchor (on the brace of the fixed point).

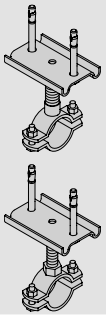
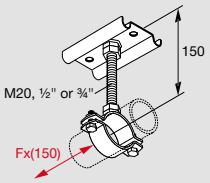
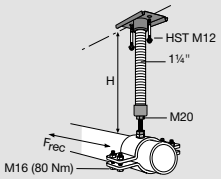
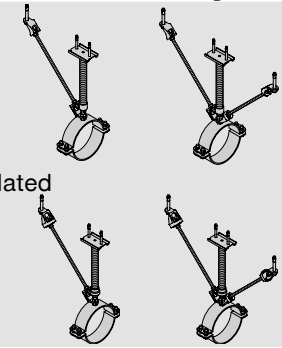
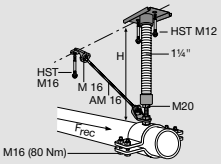
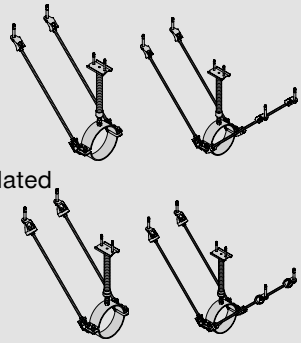
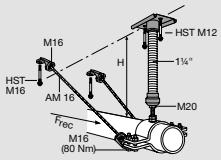
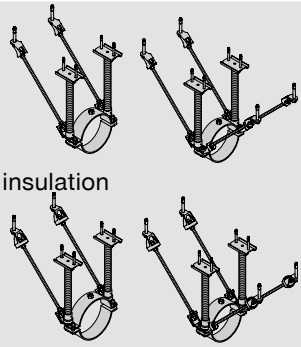
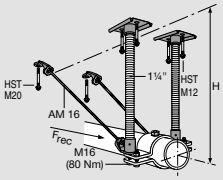


Load transfer to the girder may subject it to torsion or other mechanisms that could impact its stability.



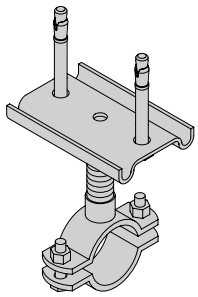


Hilti fixed points – product selector

Type of fixed point	F_{FP}	Pipe run		Distance from supporting surface		
	Recommended max. (kN)	Horizontal	Vertical (risers)	Min. (mm)	Max. (mm)	
MFP-L inch MFP-L metric 	up to 2 kN	yes	yes	56	150	
MFP-1a Sound-insulated MFPI-1a 	up to 3 KN depending on distance from base material	yes	yes	140	800	
MFP-1 Sound-insulated MFPI-1 	3 kN	yes	yes	170	1200	
MFP-2 Sound-insulated MFPI-2 	10 kN	yes	yes	140	1200	
MFP-3 With sound insulation MFPI-3 	20 kN	yes but only with welded stoppers	yes but only with welded stoppers	250	1200	

Hilti fixed points sets – product solutions for light-duty fixed points

≤ 2.0 kN



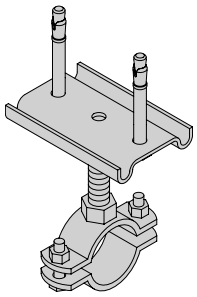
MFP-L light duty fixed points, imperial sizes
From DN 15 - DN 25
Bill of material

Description	Designation	Item no.	Axial loading capacity at 150mm distance	Calculated
1x fixed point pipe ring	**per pipe dimension**			
	MFP-L NW 15 ½"	**310307**	**1.0 kN**	
	MFP-L NW 20 ½"	**310308**	**1.0 kN**	**per formula depending on distance from supporting surface** **Frec = 95 Nm/H (mm) ≤ 3 kN**
	MFP-L NW 25 ½"	**310309**	**1.0 kN**	
1x base plate	**MFP-GP ½"**	**310318**		
1x threaded pipe ½"	**GR-GP ½" x 2m**	**56428**		
2x anchor M12	**HST3 M12x105 30/10**	**2105718**		

From DN 32 - DN 125
Bill of material

Description	Designation	Item no.	Axial loading capacity at 150mm distance	Calculated
1x fixed point pipe ring	**per pipe dimension**			
	MFP-L NW 32 ¾"	**310310**	**1.5 kN**	
	MFP-L NW 40 ¾"	**310311**	**1.5 kN**	
	MFP-L NW 50 ¾"	**310312**	**1.5 kN**	
	MFP-L NW 68/72 ¾"	**310313**	**2.0 kN**	
	MFP-L NW 65 ¾"	**310314**	**2.0 kN**	**per formula depending on distance from supporting surface** **Frec = 225 Nm/H (mm) ≤ 3 kN**
	MFP-L NW 80 ¾"	**310315**	**2.0 kN**	
	MFP-L NW 4 ¾"	**310316**	**2.0 kN**	
	MFP-L NW 125 ¾"	**310317**	**2.0 kN**	
1x base plate	**MFP-GP ¾"**	**310319**		
1x threaded pipe ¾"	**GR-GP ¾" x 2m**	**56429**		
2x anchor M12	**HST3 M12x105 30/10**	**2105718**		

The loading capacity for distances other than 150 mm may be calculated with the aid of the formula.



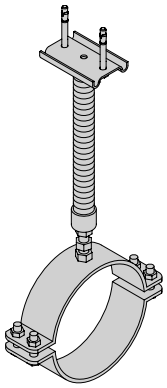
MFP-L light-duty fixed point, metric
From DN 15 - DN 125
Bill of material

Description	Designation	Item no.	Axial loading capacity at 150mm distance	Calculated
1x fixed point pipe ring	**per pipe dimension**			
	MFP-L NW15 M20	**313223**	**1.0 kN**	
	MFP-L NW20 M20	**313224**	**1.0 kN**	
	MFP-L NW25 M20	**313225**	**1.0 kN**	
	MFP-L NW32 M20	**313226**	**1.0 kN**	
	MFP-L NW40 M20	**313227**	**1.5 kN**	
	MFP-L NW50 M20	**313228**	**1.5 kN**	**per formula depending on distance from supporting surface** **Frec = 225 Nm/H (mm) ≤ 3 kN**
	MFP-L NW68/72 M20	**313229**	**2.0 kN**	
	MFP-L NW65 M20	**313230**	**2.0 kN**	
	MFP-L NW80 M20	**313231**	**2.0 kN**	
	MFP-L NW4“ M20	**313232**	**2.0 kN**	
	MFP-L NW125 M20	**313233**	**2.0 kN**	
1x base plate	**MFP-GP M20**	**257001**		
1x threaded rod M20	**AM20x1000**	**216425**		
2x anchor M12	**HST3 M12x105 30/10**	**2105718**		

The loading capacity for distances other than 150 mm may be calculated with the aid of the formula.

≤ 3.0 kN

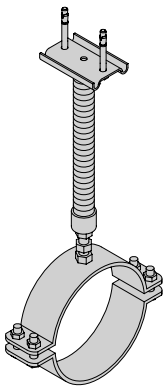
Hilti fixed points sets – product solutions for medium-duty fixed points



MFP-1a
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Axial loading capacity	Calculated
1x fixed point pipe ring	**per pipe dimension**			
	MFP NW15	**243521**		
	MFP NW20	**243522**		
	MFP 28/30	**243523**		
	MFP NW25	**243524**		
	MFP NW32	**243525**		
	MFP NW40	**243526**		
	MFP NW54/56	**243527**		
	MFP NW50	**243528**		
	MFP 63/66	**243529**		
	MFP 68/72	**243530**		
	MFP NW65	**243531**		
	MFP NW80	**243532**		**per formula depending on distance from supporting surface Frec = 480 Nm/H (mm) ≤ 3 kN**
	MFP NW100	**243533**		
	MFP NW4“	**243534**		
	MFP NW 125/127	**243535**		
	MFP NW125	**243536**		
	MFP NW150	**243537**		
	MFP NW6“	**243538**		
	MFP 193/200	**243539**		
	MFP NW 200	**243540**		
	MFP 244/250	**243541**		
	MFP NW250	**243542**		
1x basic set	**MFP-B20**	**247827**		
1x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
2x anchor M12	**HST3 M12x105 30/10**	**2105718**		

≤ 3.0 kN



Distance from supporting surface
min 140 mm
max. 800 mm

MFP-1a sound-insulated
From DN 15 - DN 250
Bill of material

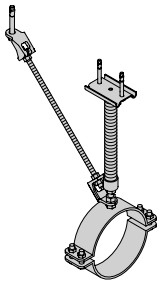
Description	Designation	Item no.	Axial loading capacity	Calculated
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			**per formula depending on distance from supporting surface Frec = 480 Nm/H (mm) ≤ 3 kN**
1x basic set	**MFP-BPI 20**	**254460**		
1x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
2x anchor M12	**HST3 M12x105 30/10**	**2105718**		

Hilti fixed points sets – product solutions for medium-duty fixed points

≤ 3.0 kN

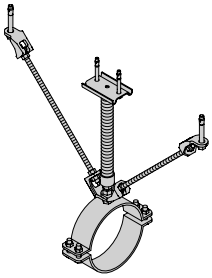
MFP-1
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BP 20**	**247827**	**2083241**	**3 kN**
1x bracing set	**MFP-AP1**	**247829**		
1x threaded rod M 16	**GST M 16 x 1m**	**216422**		
1x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
1x anchor M 16	**HST3 M16x135 35/15**	**2105858**		
2x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



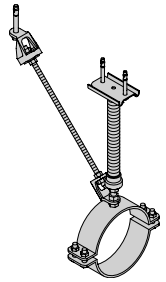
MFP-1 2x
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BP 20**	**247827**		**3 kN**
2x bracing set	**MFP-AP1**	**247829**		
2x threaded rod M 16	**GST M 16**	**216422**		
1x threaded pipe 1 ¼"	**GRST 1 ¼"**	**248532**		
2x anchor M 16	**HST3 M16x135 35/15**	**2105858**		
2x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



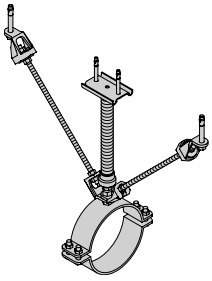
MFPI-1 sound-insulated
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BPI 20**	**254460**	**2083244**	**3 kN**
1x bracing set	**MFP-API 1**	**254461**		
1x threaded rod M 16	**GST M 16 x 1m**	**216422**		
1x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
1x anchor M 16	**HST3 M16x135 35/15**	**2105858**		
2x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



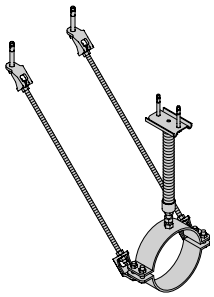
MFPI-1 2x sound-insulated
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BPI 20**	**254460**		**3 kN**
2x bracing set	**MFP-API 1**	**254461**		
2x threaded rod M 16	**GST M 16 x 1m**	**216422**		
1x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
2x anchor M 16	**HST3 M16x135 35/15**	**2105858**		
2x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



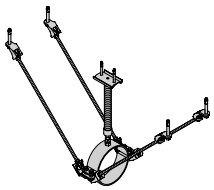
≤ 10 kN

Hilti fixed points sets – product solutions for medium-duty fixed points



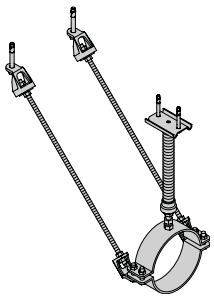
MFP-2
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	per pipe dimension see MFP-1a set			
1x basic set	MFP-BP 20	247827	2083242	10 kN
1x bracing set	MFP-AP2	247830		
2x threaded rod M 16	GST M 16 x 1m	216422		
1x threaded pipe 1 ¼"	GRST 1 ¼" x 2m	248532		
2x anchor M 16	HST3 M16x135 35/15	2105858		
2x anchor M 12	HST3 M12x105 30/10	2105718		



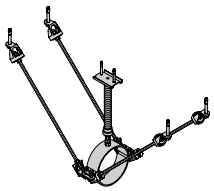
MFP-2 2x
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	per pipe dimension see MFP-1a set			
1x basic set	MFP-BP 20	247827		
2x bracing set	MFP-AP2	247830		10 kN
4x threaded rod M 16	GST M 16 x 1m	216422		
1x threaded pipe 1 ¼"	GRST 1 ¼" x 2m	248532		
4x anchor M 16	HST3 M16x135 35/15	2105858		
2x anchor M 12	HST3 M12x105 30/10	2105718		



MFPI-2 sound-insulated
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	per pipe dimension see MFP-1a set			
1x basic set	MFP-BPI 20	254460	2083245	10 kN
1x bracing set	MFP-API2	254462		
2x threaded rod M 16	GST M 16 x 1m	216422		
1x threaded pipe 1 ¼"	GRST 1 ¼" x 2m	248532		
2x anchor M 16	HST3 M16x135 35/15	2105858		
2x anchor M 12	HST3 M12x105 30/10	2105718		



MFPI-2 2x sound-insulated
From DN 15 - DN 250
Bill of material

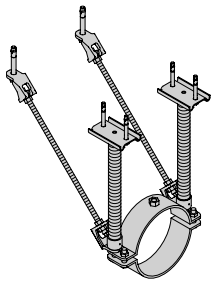
Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	per pipe dimension see MFP-1a set			
1x basic set	MFP-BPI 20	254460		
2x bracing set	MFP-API2	254462		10 kN
4x threaded rod M 16	GST M 16 x 1m	216422		
1x threaded pipe 1 ¼"	GRST 1 ¼" x 2m	248532		
4x anchor M 16	HST3 M16x135 35/15	2105858		
2x anchor M 12	HST3 M12x105 30/10	2105718		

Hilti fixed points sets – product solutions for medium-duty fixed points

≤ 20 kN

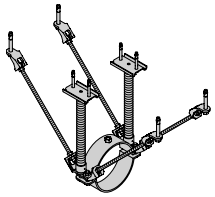
MFP-3
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BP 16**	**247826**	**2083243**	**20 kN**
1x bracing set	**MFP-AP3**	**247831**		
2x threaded rod M 16	**GST M 16 x 1m**	**216422**		
2x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
2x anchor M 20	**HST3 M20x170 -/30**	**2105891**		
4x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



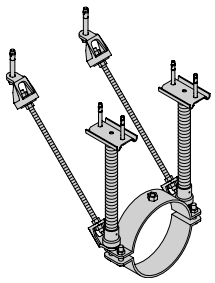
MFP-3 2x
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BP 16**	**247826**		**20 kN**
2x bracing set	**MFP-AP3**	**247831**		
4x threaded rod M 16	**GST M 16 x 1m**	**216422**		
2x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
4x anchor M 20	**HST3 M20x170 -/30**	**2105891**		
4x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



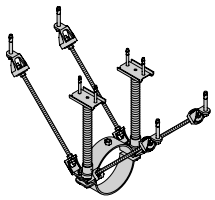
MFPI-3 sound-insulated
From DN 15 - DN 250
Bill of material

Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BPI 16**	**254459**	**2083246**	**20 kN**
1x bracing set	**MFP-API3**	**254463**		
2x threaded rod M 16	**GST M 16 x 1m**	**216422**		
2x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
2x anchor M 20	**HST3 M20x170 -/30**	**2105891**		
4x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



MFPI-3 2x sound-insulated
From DN 15 - DN 250
Bill of material

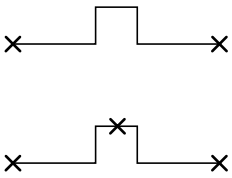
Description	Designation	Item no.	Set	Axial loading capacity
1x fixed point pipe ring	**per pipe dimension see MFP-1a set**			
1x basic set	**MFP-BPI 16**	**254459**		**20 kN**
2x bracing set	**MFP-API3**	**254463**		
4x threaded rod M 16	**GST M 16 x 1m**	**216422**		
2x threaded pipe 1 ¼"	**GRST 1 ¼" x 2m**	**248532**		
4x anchor M 20	**HST3 M20x170 -/30**	**2105891**		
4x anchor M 12	**HST3 M12x105 30/10**	**2105718**		



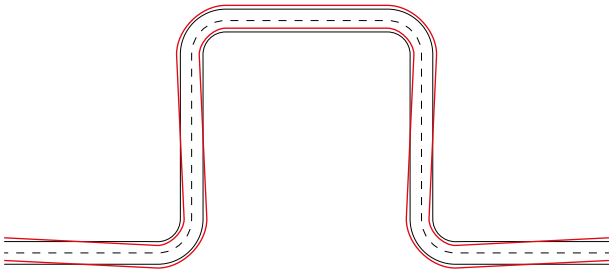
4.0 Compensation

Types of compensation – natural compensation

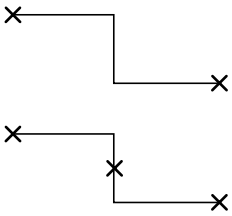
U-bend and fixed points



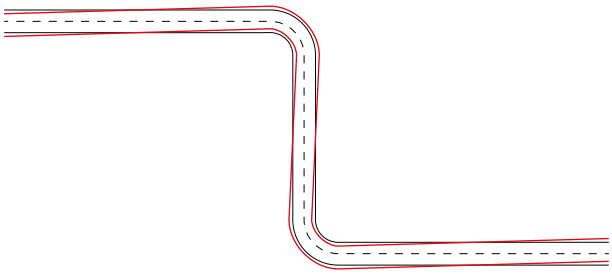
U-bend



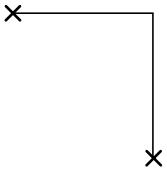
Z-bend and fixed points



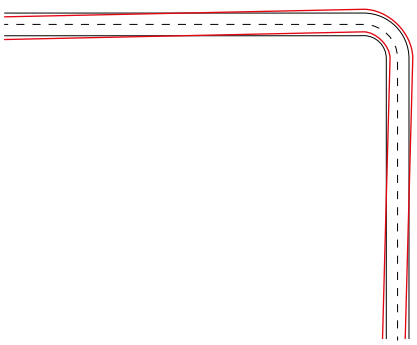
Z-bend



L-bend and fixed points



L-bend

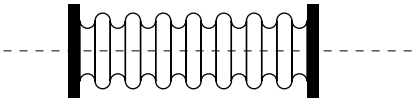


Types of compensation – technical compensation

Important notice

The expansion joint supplier must be consulted about placement of fixed points and the accommodation of expansion. His instructions regarding design and installation must be strictly followed.

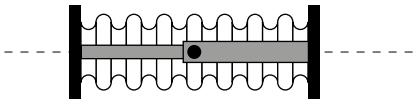
Axial expansion joints



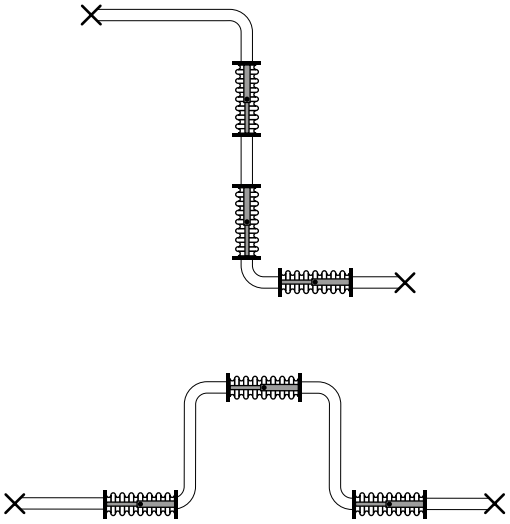
Axial expansion joints and fixed points

Angular expansion joints

Two types of angular expansion joints:
1. Planar – one axis of rotation
2. Spatial – gimbal types



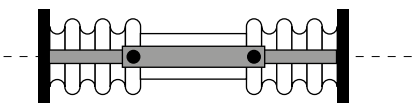
Angular expansion joints and fixed points



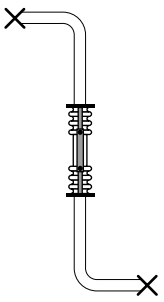
Lateral expansion joints

Two types of lateral expansion joints:
1. Planar – one axis of rotation with own control of pipe pressure
2. Spatial (circular) – multidirectional with own control of pipe pressure

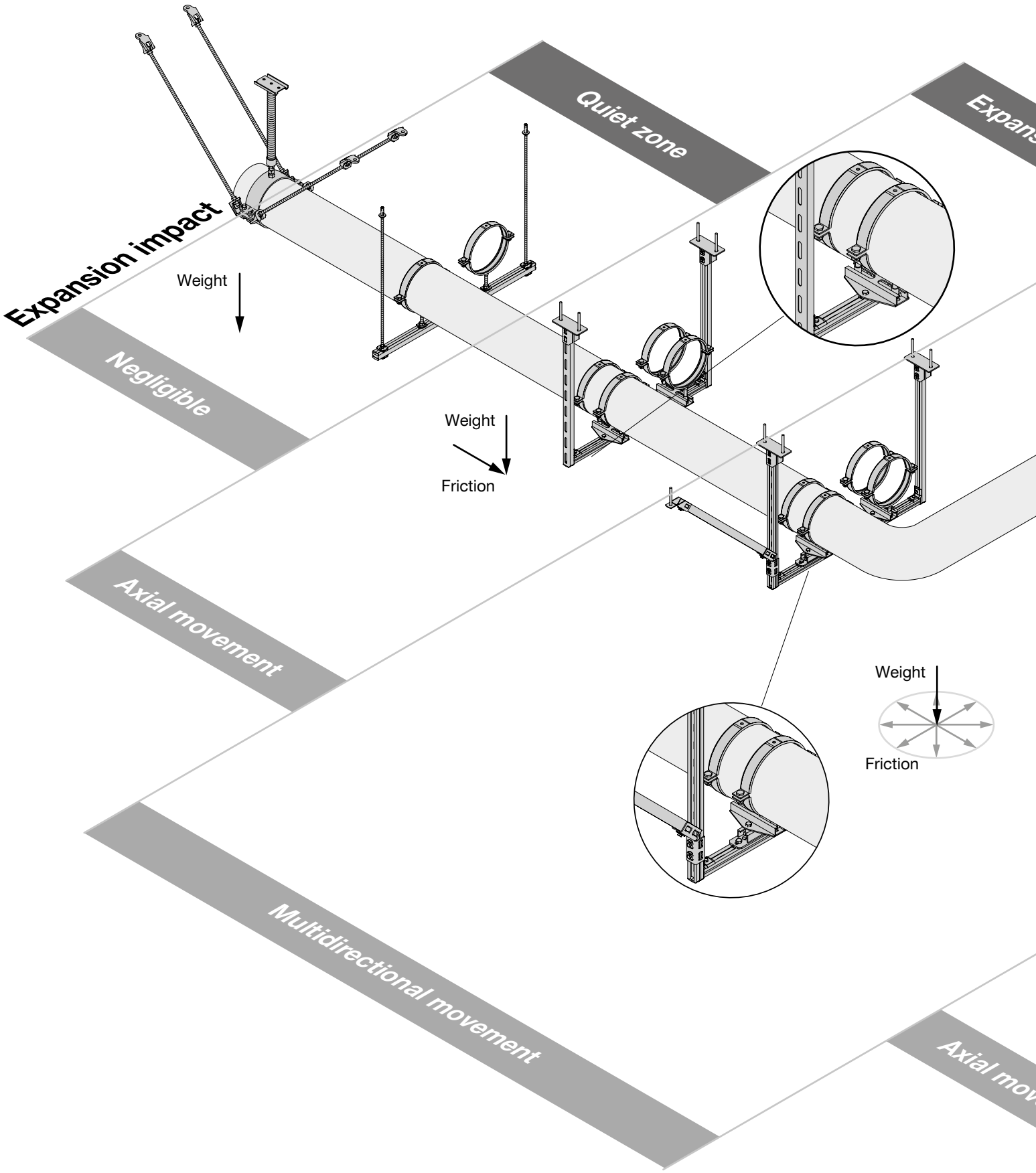
Able to absorb multidirectional lateral movement

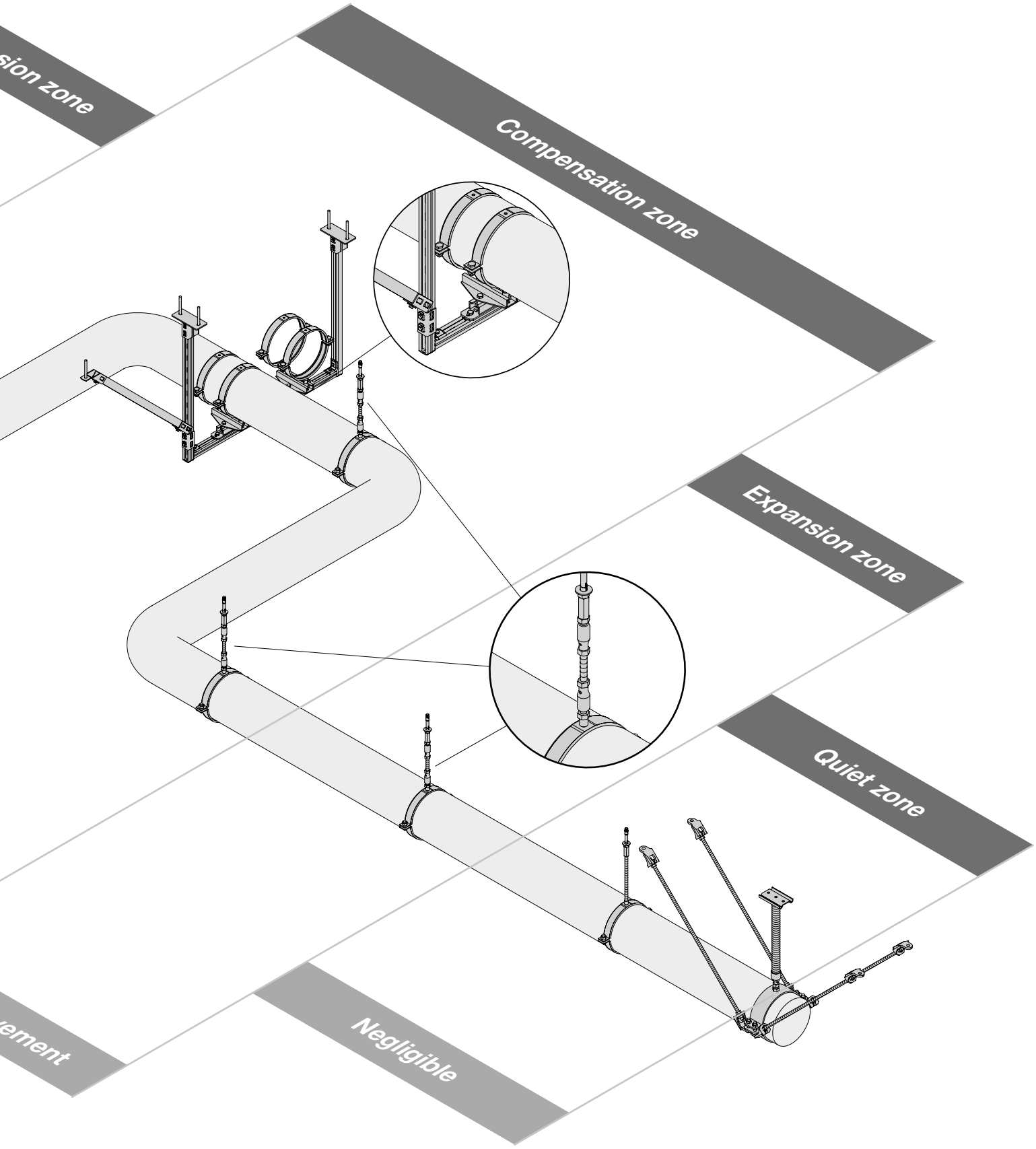


Lateral expansion joints and fixed points



Natural compensation – zones and typical solutions



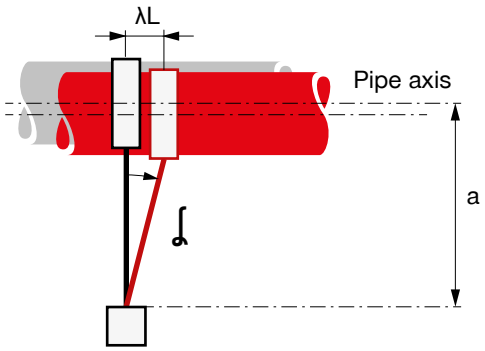


Natural compensation – zones

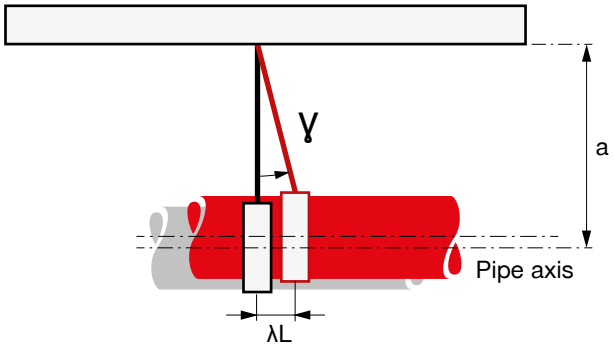
Expansion impact zones

Pipe runs can be divided into zones according to the impact of expansion on the pipe supports. The zones are defined differently for pipes on standing supports and for suspended pipes.
The main factors are expansion along the pipe axis and distance from the upper surface of the channel (in the case of pipes on standing supports) and expansion along the pipe axis and distance from the underside of the supporting structure (in the case of suspended pipes).

Upper surface of channel



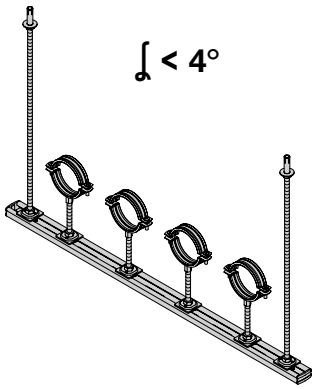
Underside of the supporting structure



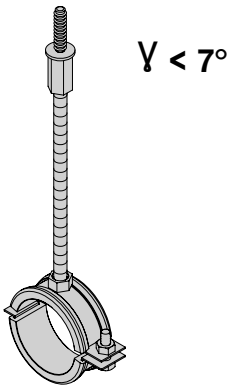
Quiet zone

At this pipe zone the impact of expansion is negligible – no special measures are required.

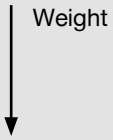
Pipes on standing supports



Suspended pipes



Loading scheme



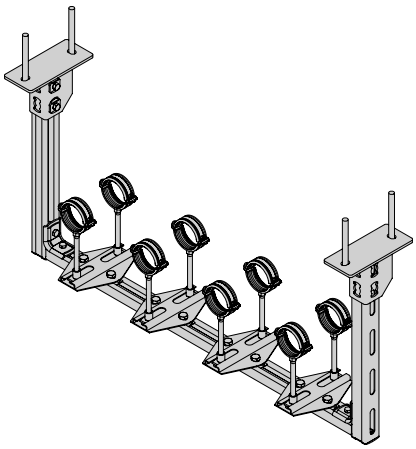
The pipe supports must be designed to take up the vertical load resulting from the weight of the pipe section (only for relevant applications). See section “Typical plumbing applications”.

Expansion zone

This is the zone in which expansion begins to have an impact in axial direction. Traditional methods of pipe installation begin to run out of options and use of special expansion elements becomes necessary.
Ignoring expansion would result in torque moment in channels, significant displacement of threaded rods and irreversible deformation of several parts. All of these impacts could lead to a chain reaction and, in extreme cases, to collapse of the pipe support system.

Pipes on standing supports

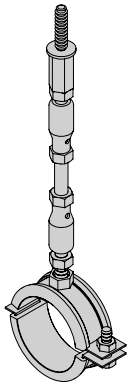
∫ > 4°



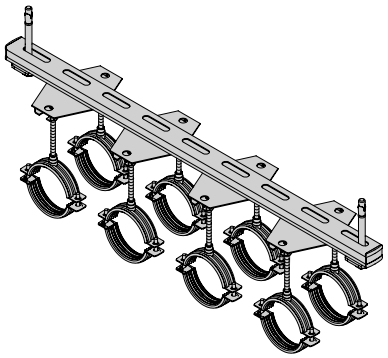
Suspended pipes

Y > 7°

Y < 15°

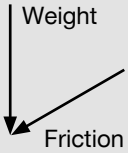


Y > 15°



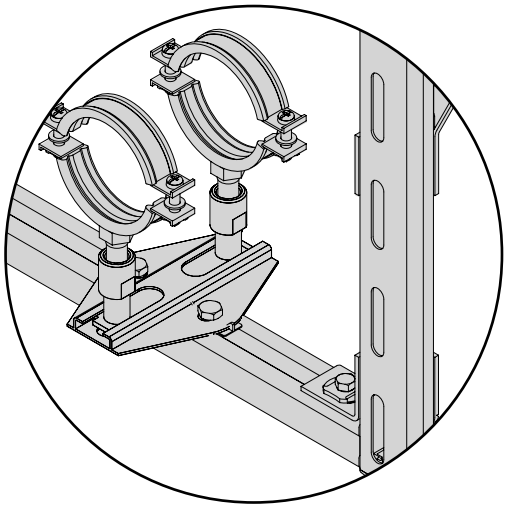
In the expansion zone it is necessary to make use of expansion elements that properly distribute expansion forces to the supporting structure.
The pipe support must be designed acording the loading scheme:

Loading scheme

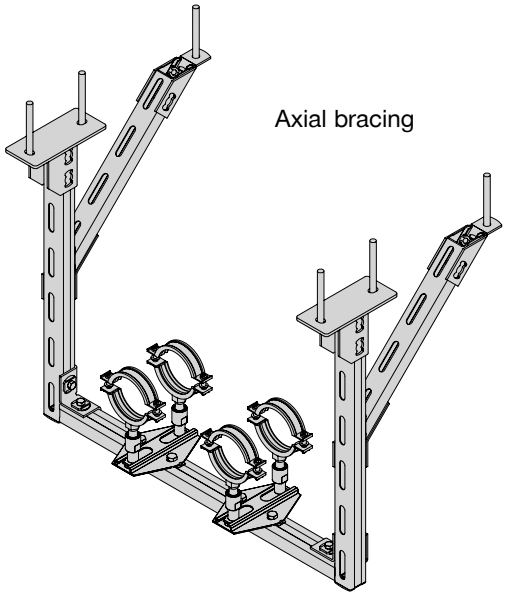


This leads to use of special solutions:

Sliding/rolling elements



Axial bracing

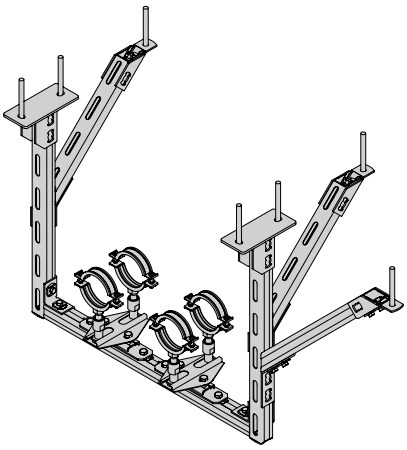


Compensation zone

In this zone, the expansion impact meets natural compensation achieved by the spring effect (resistance) of the system. Compensation tends to comprise movement in several directions during the heating-up or cooling-down phases. The pipe supports must therefore allow all of these movements and be able to transfer the loads properly to the supporting building structure.

Pipes on standing supports

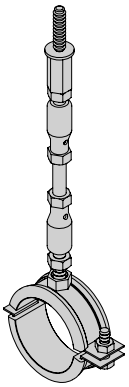
∫ > 4°



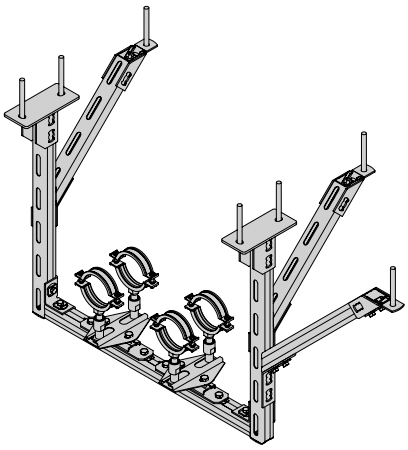
Suspended pipes

Y > 7°

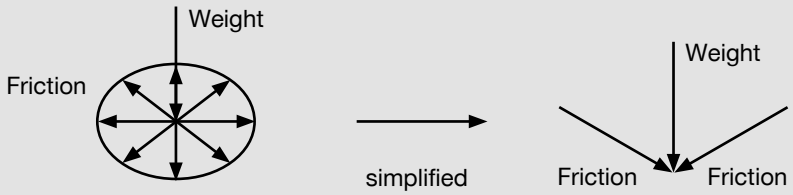
Y < 15°



Y > 15°

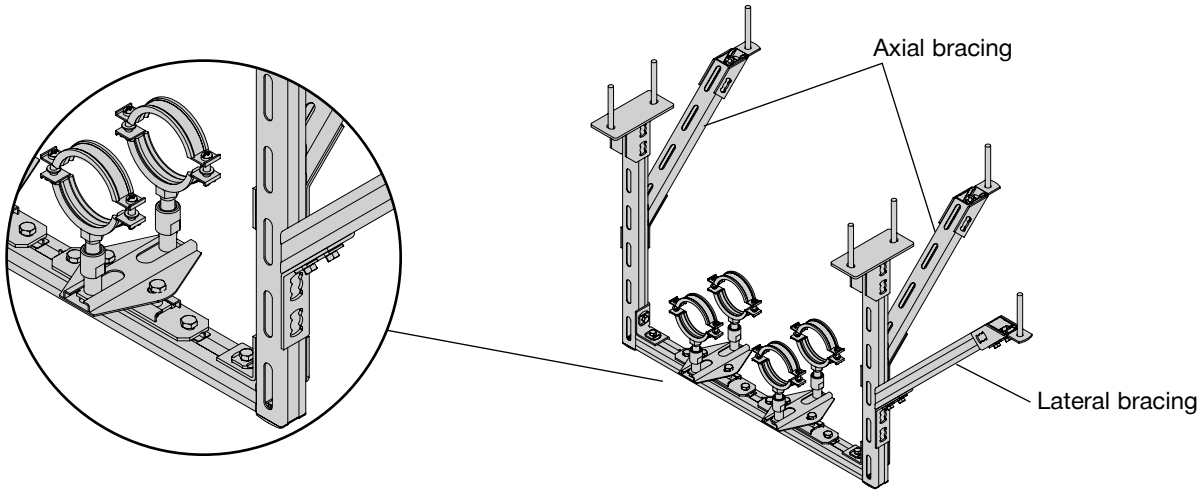


Loading scheme

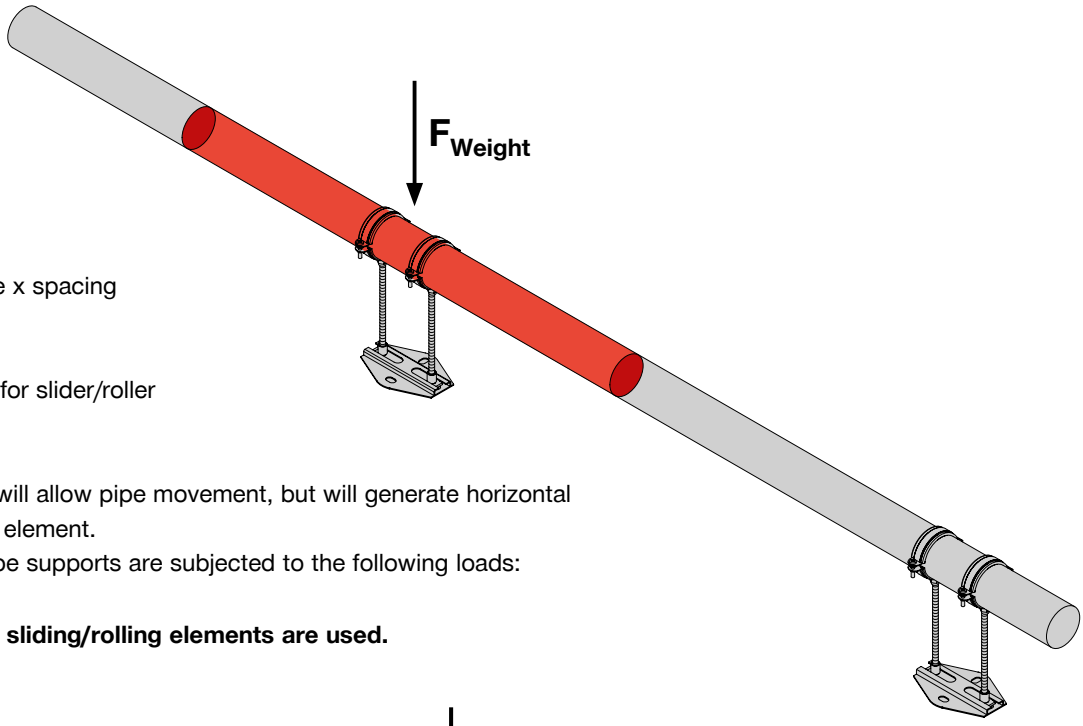


This leads to use of special solutions:

Cross sliding/rolling elements



Friction

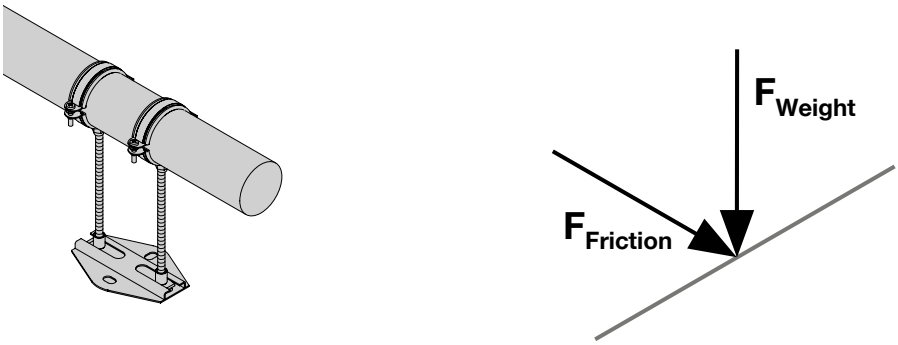


F_{Weight} = weight of 1m pipe x spacing
$F_{Friction}$ = F_{Weight} x μ

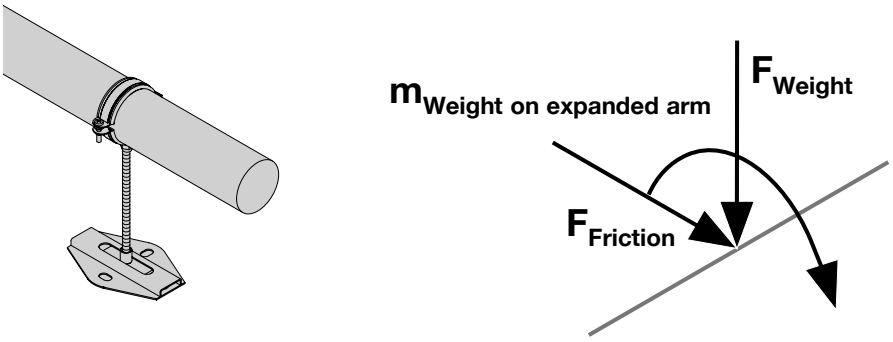
μ = specific friction factor for slider/roller

Every expansion element will allow pipe movement, but will generate horizontal force due to friction in the element.
As a consequence, the pipe supports are subjected to the following loads:

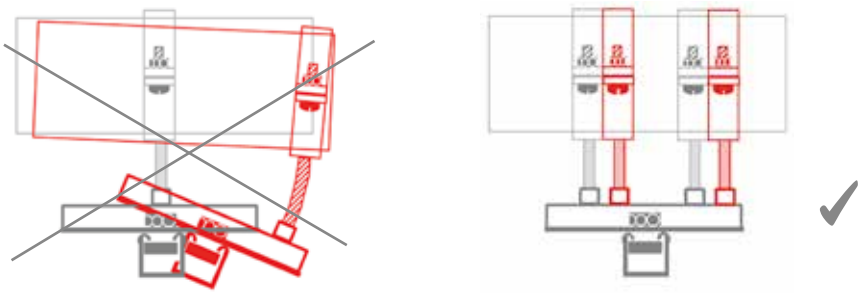
Two loads where double sliding/rolling elements are used.



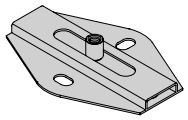
Two loads and one moment (torsional) where single sliding/rolling elements are used.

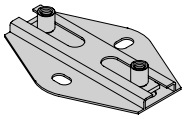


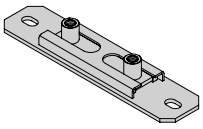
Recommendation: Always use double sliders/rollers on open-section profiles (MQ system)

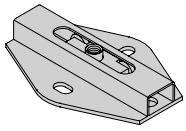


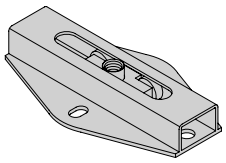
Friction – galvanized elements

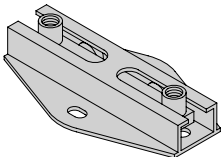


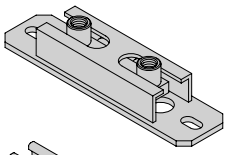


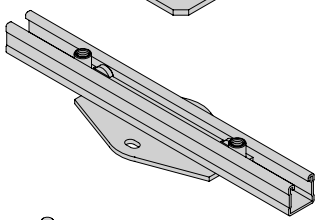


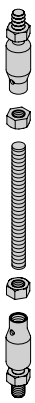










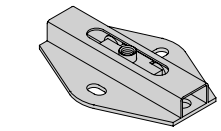


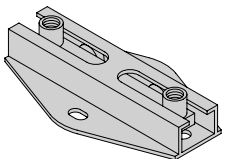
Type	Item number	Loading capacity (kN)	Friction μ (_)	Expansion capacity (mm) centric	Expansion capacity (mm) pre-set	Temperature resistance (°C)	
MSG 1.0 M8/10	**248205**	**1.0**	**0.18**	**40**	**80**	**-40**	**+130**
MSG 1.0 M12/16	**248206**	**1.0**	**0.18**	**40**	**80**	**-40**	**+130**
MSG 1.75 M8/M10D	**248209**	**1.75**	**0.18**	**47**	**94**	**-40**	**+130**
MSG 1.75 M12/M16D	**248210**	**1.75**	**0.18**	**47**	**94**	**-40**	**+130**
MSG-UK D1.75 M8/10	**337115**	**1.75**	**0.18**	**27**	**54**	**-40**	**+130**
MRG 2.0 M10/12	**243550**	**2.0**	**0.08**	**40**	**80**	**-40**	**+300***
MRG 4.0 M12/16	**243551**	**4.0**	**0.08**	**60**	**120**	**-40**	**+300***
MRG-D6 M12/16	**334131**	**8.0**	**0.08**	**58**	**116**	**-40**	**+300***
MRG-UK D6 M12/16	**336755**	**6.0**	**0.08**	**23**	**46**	**-40**	**+300***
MRG-D225 M12/16	**237394**	**2.5**	**0.1**	**112.5**	**225**	**-40**	**+300***
Swiveling elements							
MPH M8	**418035**	**2.5**	**negligible**	**max. 15°**		**max. 100°**	
MPH-I M8	**418037**	**2.5**	**negligible**	**max. 15°**		**max. 100°**	
MPH M10	**418036**	**2.5**	**negligible**	**max. 15°**		**max. 100°**	
MPH M12	**418038**	**5.0**	**negligible**	**max. 15°**		**max. 100°**	
MPSG-M8	**338994**	**0.8**	**negligible**	**max. 15°**		**max. 100°**	
MPSG-M10	**338995**	**1.5**	**negligible**	**max. 15°**		**max. 100°**	

***For higher temperatures above 100°C use reduction factors $k_{p,\theta}$ as per DIN EN 1993-1-2:2005 + AC 2005 (D)**

Friction – hot-dip galvanized elements

Type	Item number	Loading capacity (kN)	Friction μ (_)	Expansion capacity (mm) centric	Expansion capacity (mm) pre-set	Temperature resistance (°C)	
MSG 2.0 M10/12-F	**304213**	**1.5**	**0.15**	**40**	**80**	**-40**	**+300**
MRG-D6 M12/16-F	**302214**	**6.0**	**0.15**	**58**	**116**	**-40**	**+300**

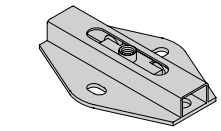


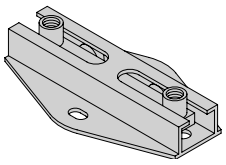


Friction – stainless steel elements

Type	Item number	Loading capacity (kN)	Friction μ (_)	Expansion capacity (mm) centric	Expansion capacity (mm) pre-set	Temperature resistance (°C)	
MRG 2.0 M10/12-R	**304086**	**1.5**	**0.15**	**40**	**80**	**-40**	**+300**
MRG-D6 M12/16-R	**304087***	**6.0**	**0.15**	**58**	**116**	**-40**	**+300**

* Manufactured only on request





Elbow resistance

$$S_{min} = \sqrt{\frac{3E}{2\sigma_{zul}}} * \sqrt{\Delta L * AD}$$

E = Modulus of elasticity of pipe material (temperature dependent)

σ_{zul} = Allowable stress on pipe material (temperature dependent and load factor included – yield stress / safety factor)

ΔL = $L * \Delta T * \alpha$

ΔT = $T_{max.} - T_{inst}$

α = Coefficient of pipe material expansion

L = Length between fixed point and bending arm

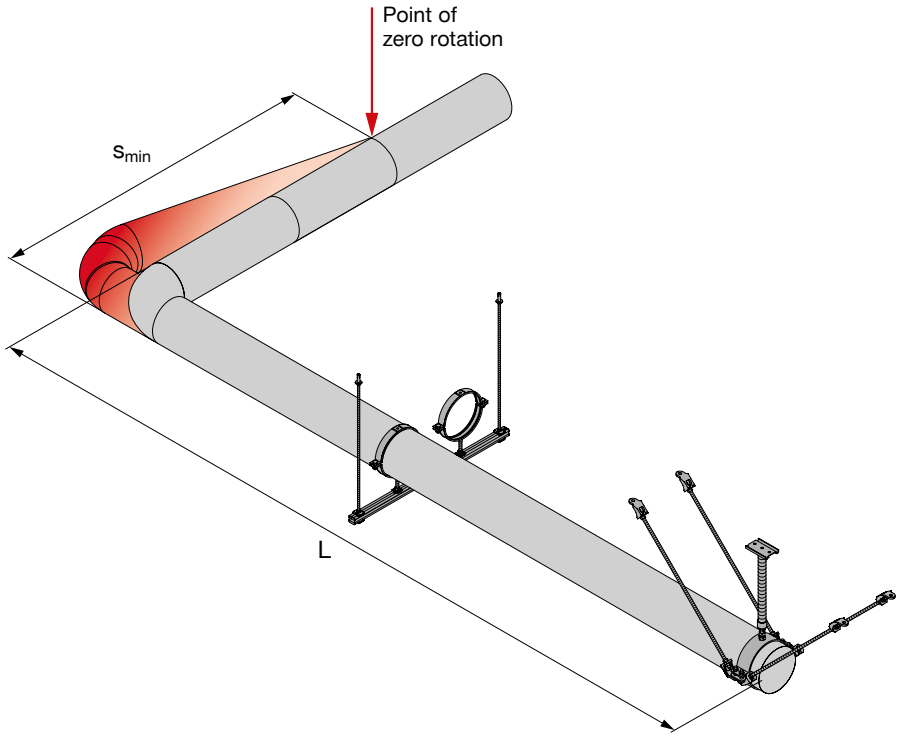
$T_{max.}$ = Max. operational temperature e.g. heating media temperature 70°C

T_{inst} = Installation temperature (temperature at which the fixed points were tightened) e.g. 20°C

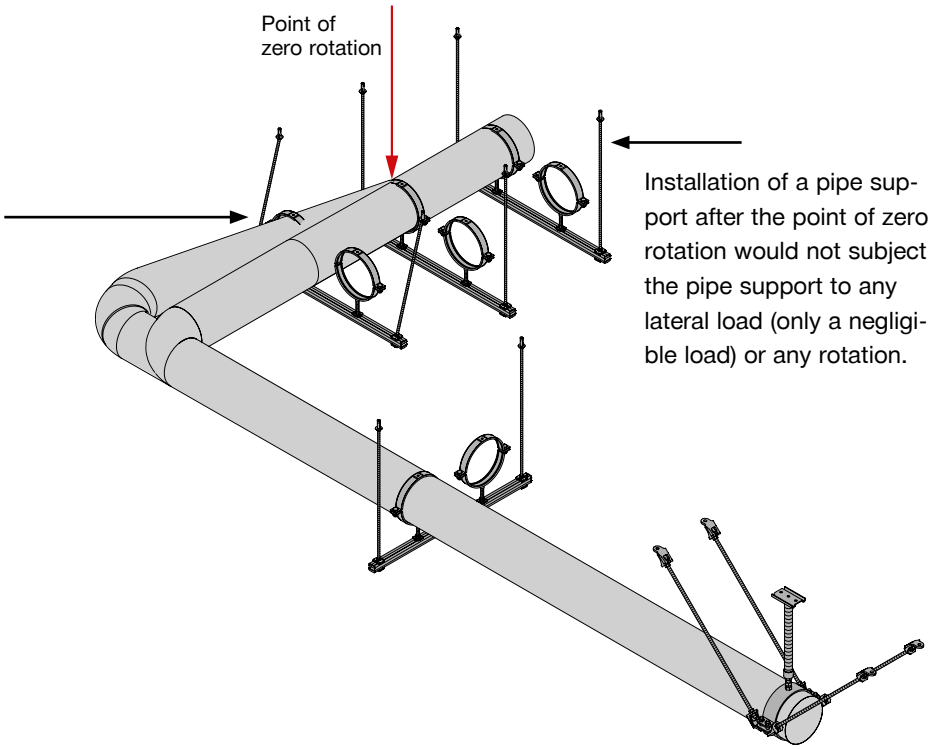
AD = Outside diameter of pipe material

Point of zero rotation

The important point is the so-called point of zero rotation. It is the point where expansion has no further (negligible) influence after natural compensation.



Installation of a pipe support before the point of zero rotation would subject the pipe support to lateral loads and, at the same time, it would increase the load at the fixed point (the value depends on lateral resistance of the pipe support).



Installation of a pipe support after the point of zero rotation would not subject the pipe support to any lateral load (only a negligible load) or any rotation.

Fixed point loads

$$F_{FP} = F_{CR} + F_{FR}$$

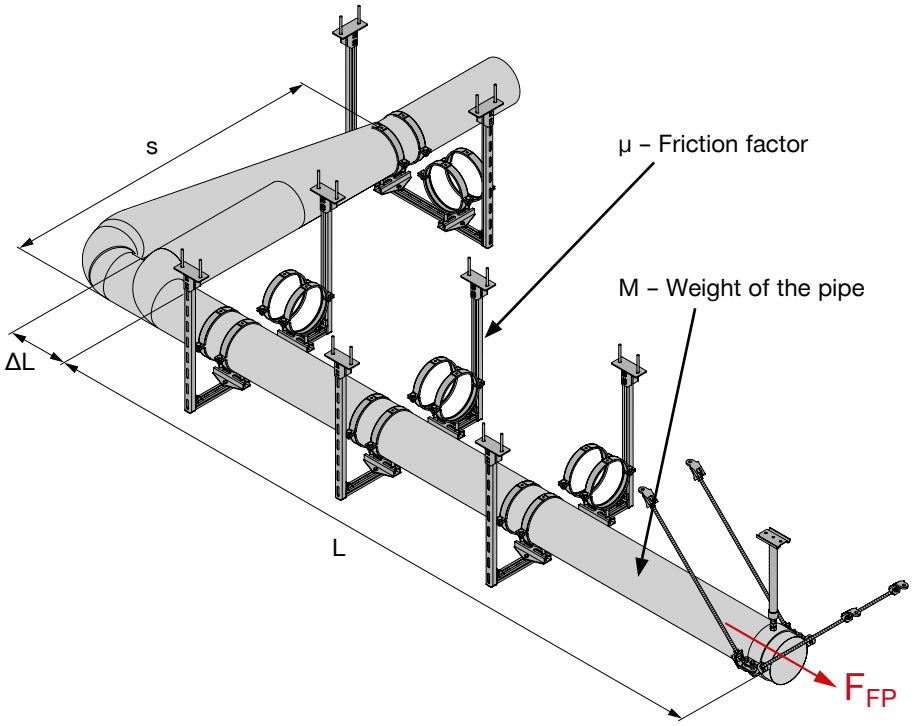
F_{CR} - Resistance of compensation (elbow, U-bend, etc.)
ΣF_{FR} - Friction load in all pipe supports

$$F_{CR} = E \times I \times (\Delta L \times 3/s^3)$$

E - Modulus of elasticity
I - Moment of inertia of the pipe
ΔL - Expansion of the pipe
S - Bending arm

$$F_{FR} = \mu \times M \times L$$

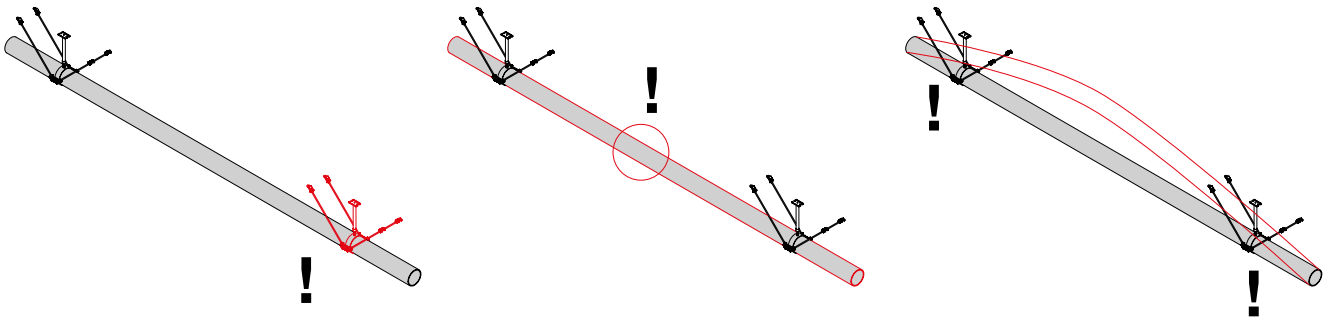
μ - Friction factor
M - Weight of the pipe: 1m, water-filled, incl. insulation
L - Length of the pipe section from fixed point to bending arm



Natural compensation – rules to follow for safe design / control of expansion

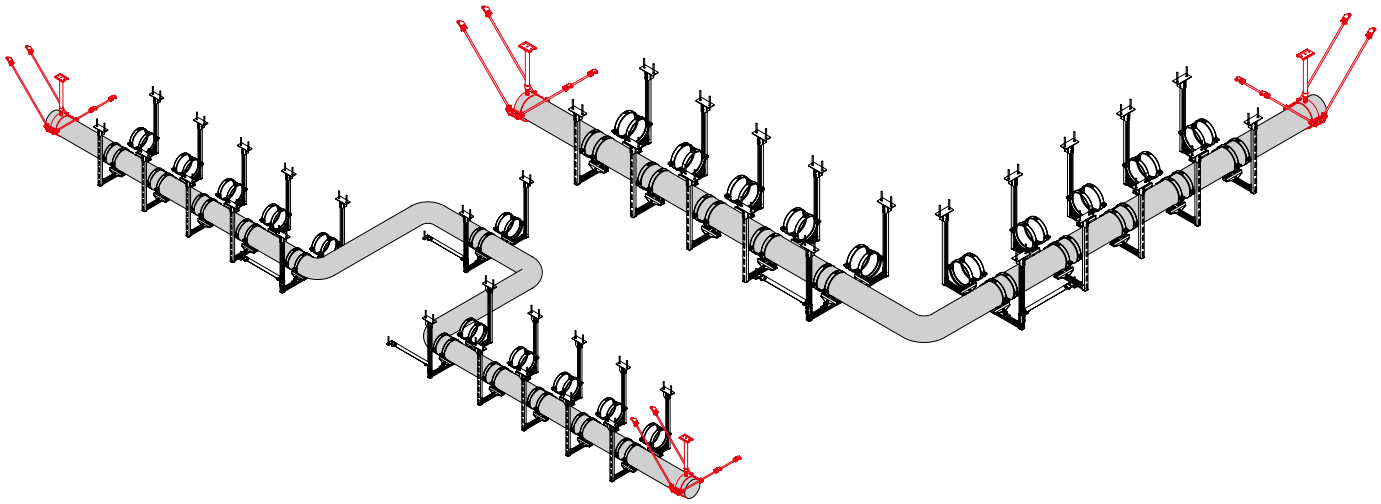
Rule no. 1

Never two fixed points on the same pipe without compensation between.



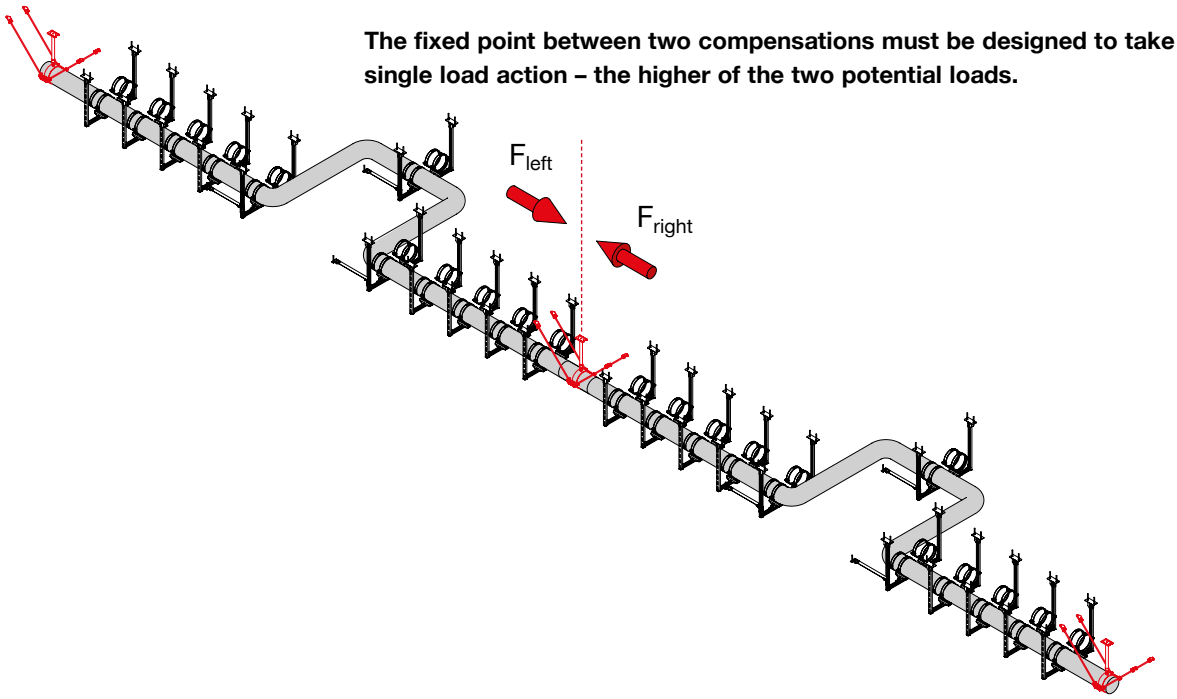
Rule no. 2

Every compensation must be accompanied by one fixed point on each side.



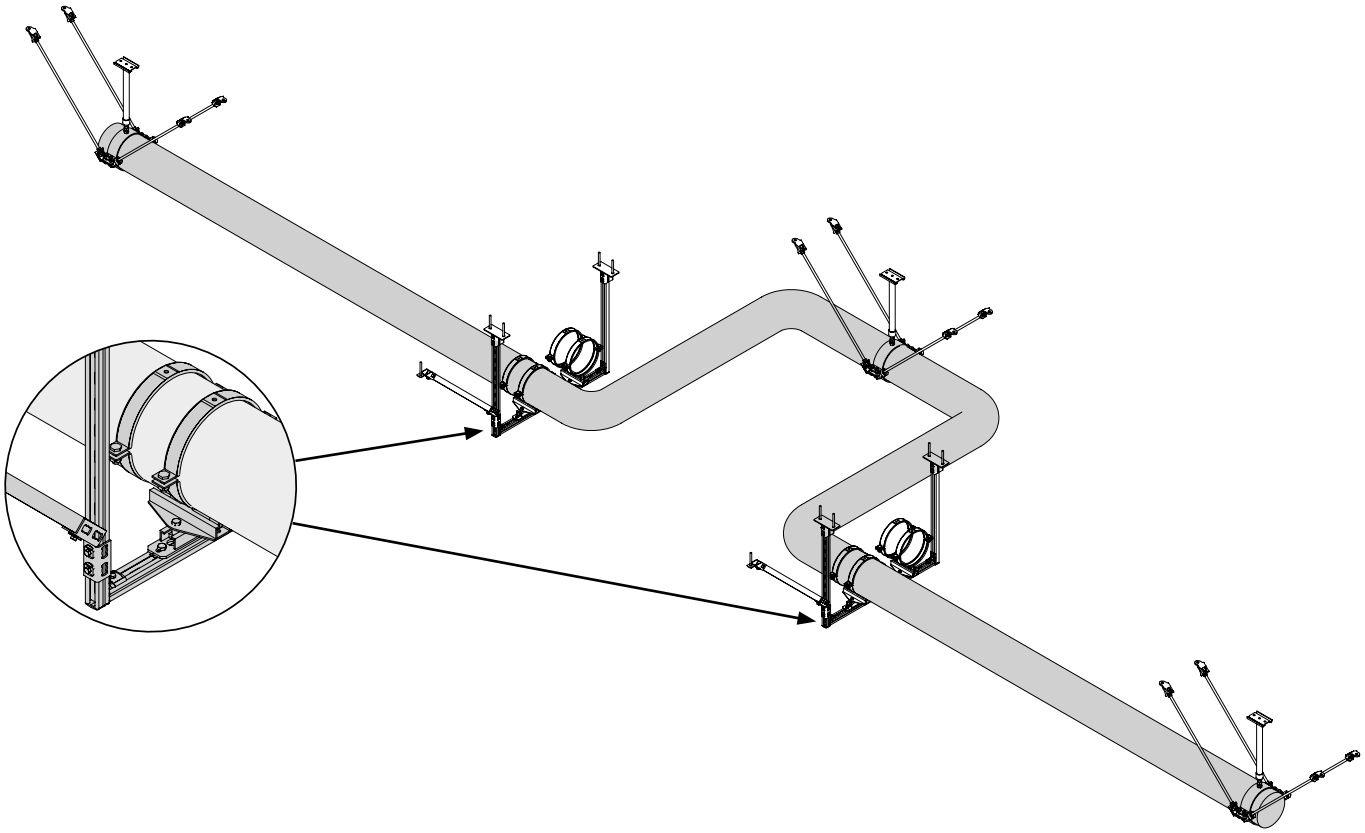
Rule no. 3

The fixed point between two compensations must be designed to take up a single load action – the higher of the two potential loads.

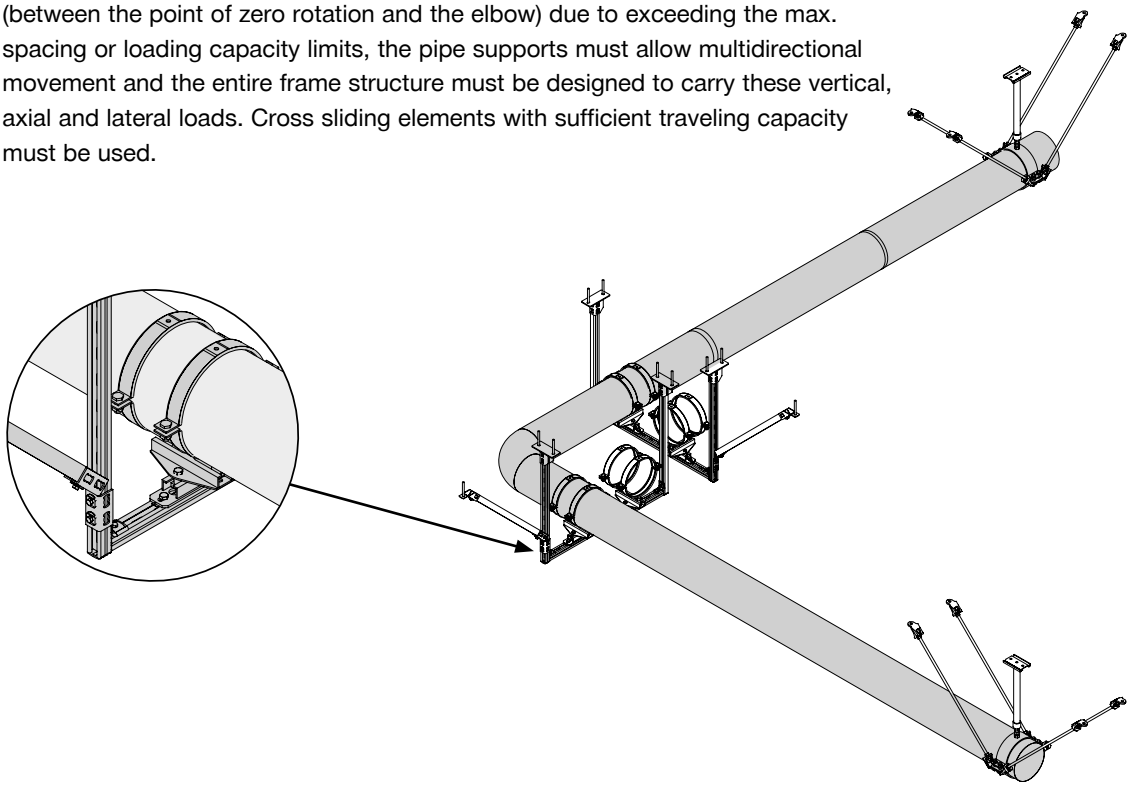


Natural compensation – special cases

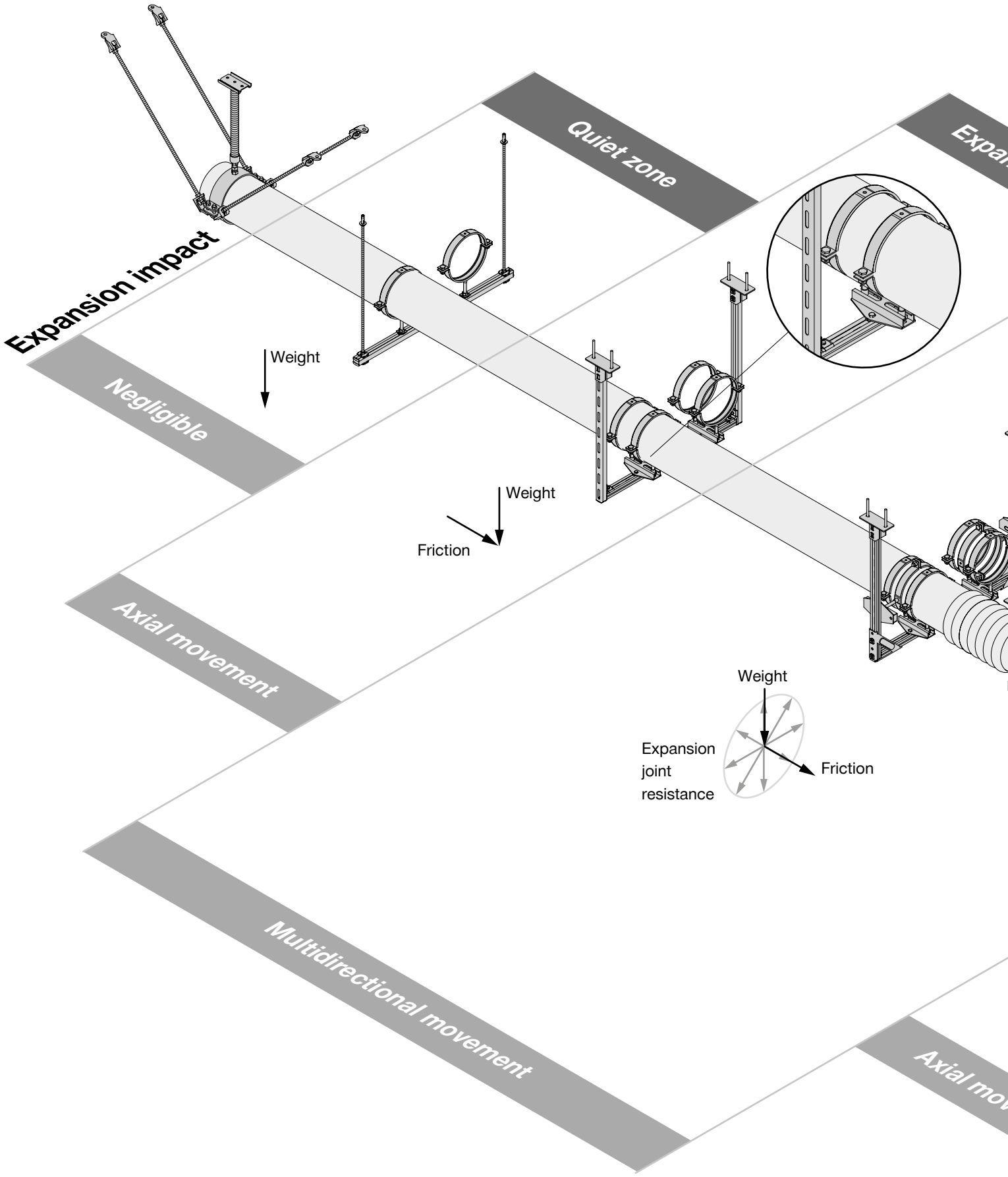
Mainly in the industrial segment, the preferred method of achieving even more control of expansion involves placement of a **fixed point at the U-bend arm**. The only difference here is that the last support and all supports up to the point of zero rotation must have cross sliding/rolling elements to allow lateral compensation.

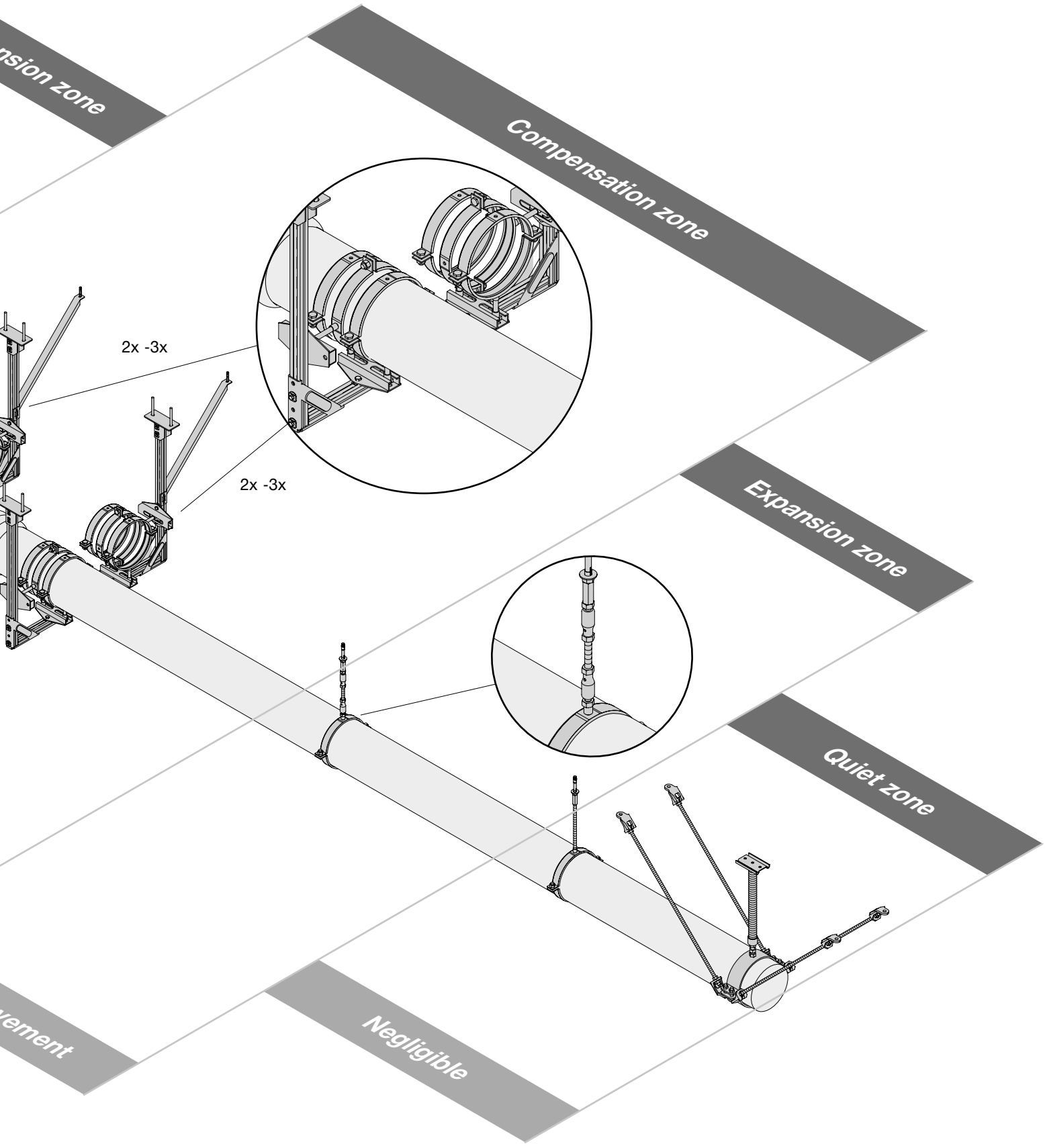


In situations where the pipe support has to be placed very close to the elbow (between the point of zero rotation and the elbow) due to exceeding the max. spacing or loading capacity limits, the pipe supports must allow multidirectional movement and the entire frame structure must be designed to carry these vertical, axial and lateral loads. Cross sliding elements with sufficient traveling capacity must be used.



Technical compensation – zones and typical solutions



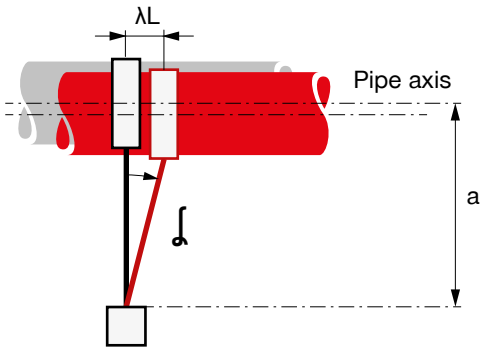


Technical compensation – zones

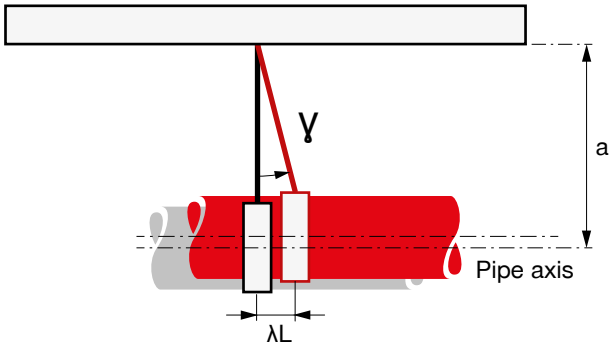
Expansion impact zones

Pipe runs can be divided into zones according to the impact of expansion on the pipe supports. The zones are defined differently for pipes on standing supports and for suspended pipes.
The main factors are expansion along the pipe axis and distance from the upper surface of the channel (in the case of pipes on standing supports) and expansion along the pipe axis and distance from the underside of the supporting structure (in the case of suspended pipes).

Upper surface of channel



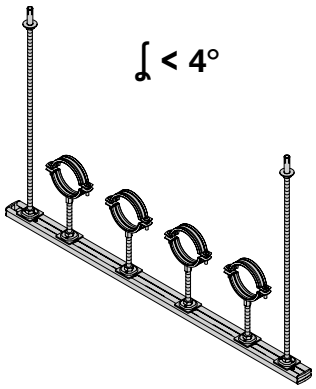
Underside of the supporting structure



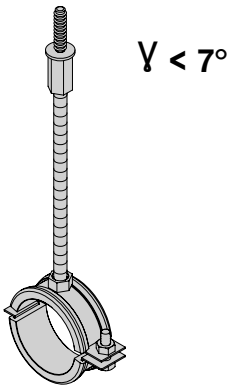
Quiet zone

At this pipe zone the impact of expansion is negligible – no special measures are required.

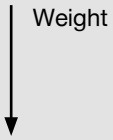
Pipes on standing supports



Suspended pipes



Loading scheme



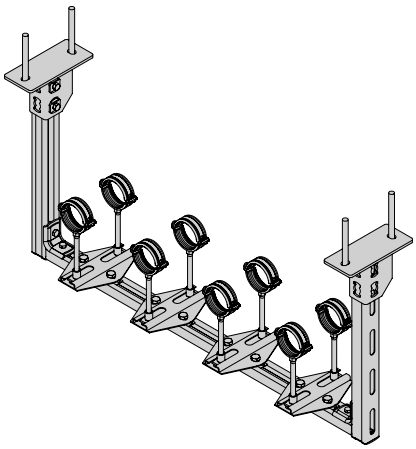
The pipe supports must be designed to take up the vertical load resulting from the weight of the pipe section (only for relevant applications). See section “Typical plumbing applications”.

Expansion zone

This is the zone in which expansion begins to have an impact in axial direction. Traditional methods of pipe installation begin to run out of options and use of special expansion elements becomes necessary.
Ignoring expansion would result in torque moment in channels, significant displacement of threaded rods and irreversible deformation of several parts. All of these impacts could lead to a chain reaction and, in extreme cases, to collapse of the pipe support system.

Pipes on standing supports

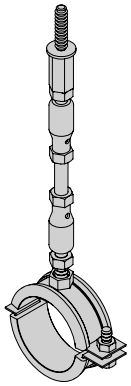
> 4°



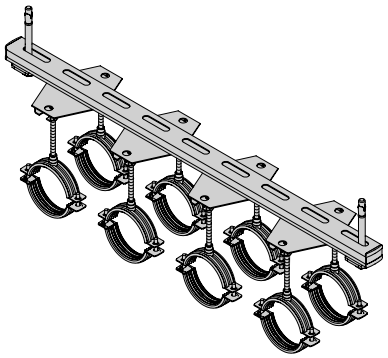
Suspended pipes

> 7°

< 15°

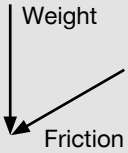


> 15°



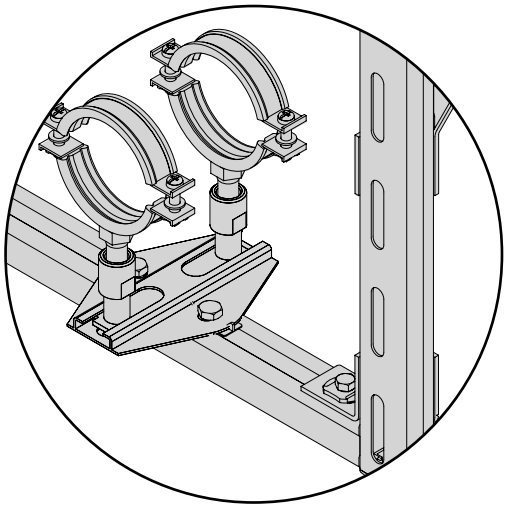
In the expansion zone it is necessary to make use of expansion elements that properly distribute expansion forces to the supporting structure.
The pipe support must be designed acording the loading scheme:

Loading scheme

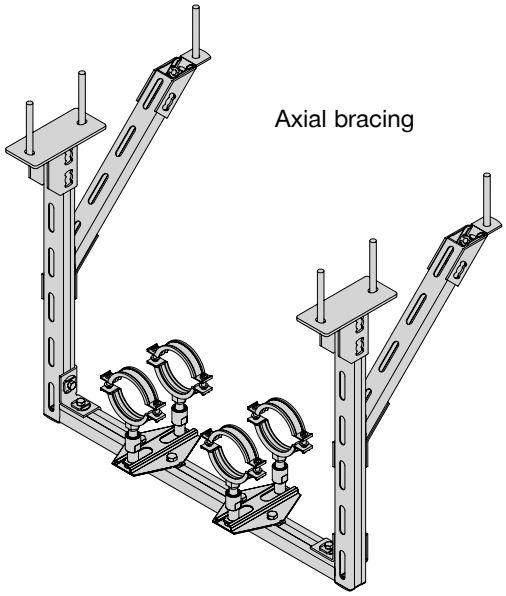


This leads to use of special solutions:

Sliding/rolling elements



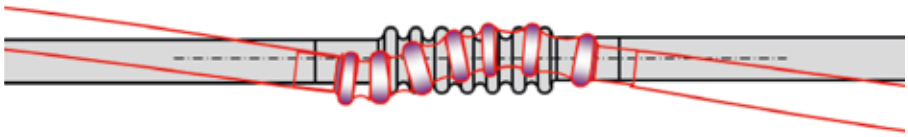
Axial bracing

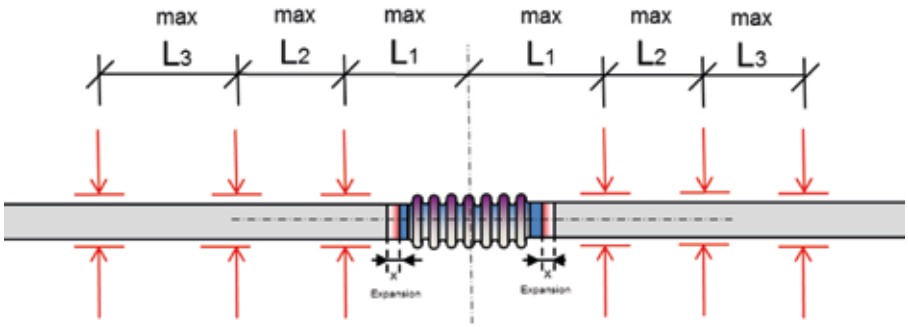


Compensation zone

In this zone, the expansion impact meets technical compensation and its resistance. Technical compensation (axial) behaves like a spring under pressure. This leads to unpredictability regarding the direction of the spring-back effect. An uncontrolled spring-back effect would lead to irreversible deformation of the expansion joint and would subject the pipe supports to unpredictable loads in unpredictable directions. The expansion joint must therefore be controlled by fitting suitably engineered axial guides at exactly the required distance from the expansion joint and at both sides of the joint.

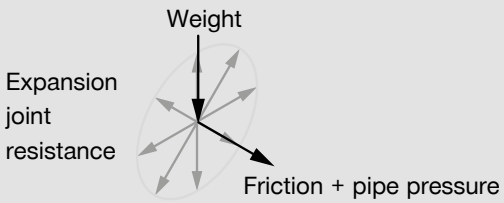
Uncontrolled expansion leads to irreversible deformation and in many cases to collapse of the pipe system.



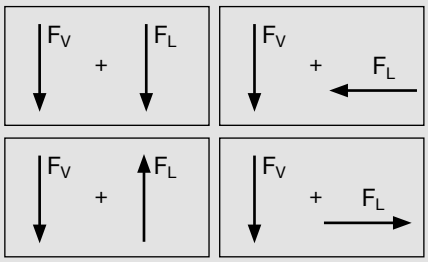


Number (2-3) of correctly designed axial guides placed at the required distances for safe control of the expansion joint.

Loading scheme

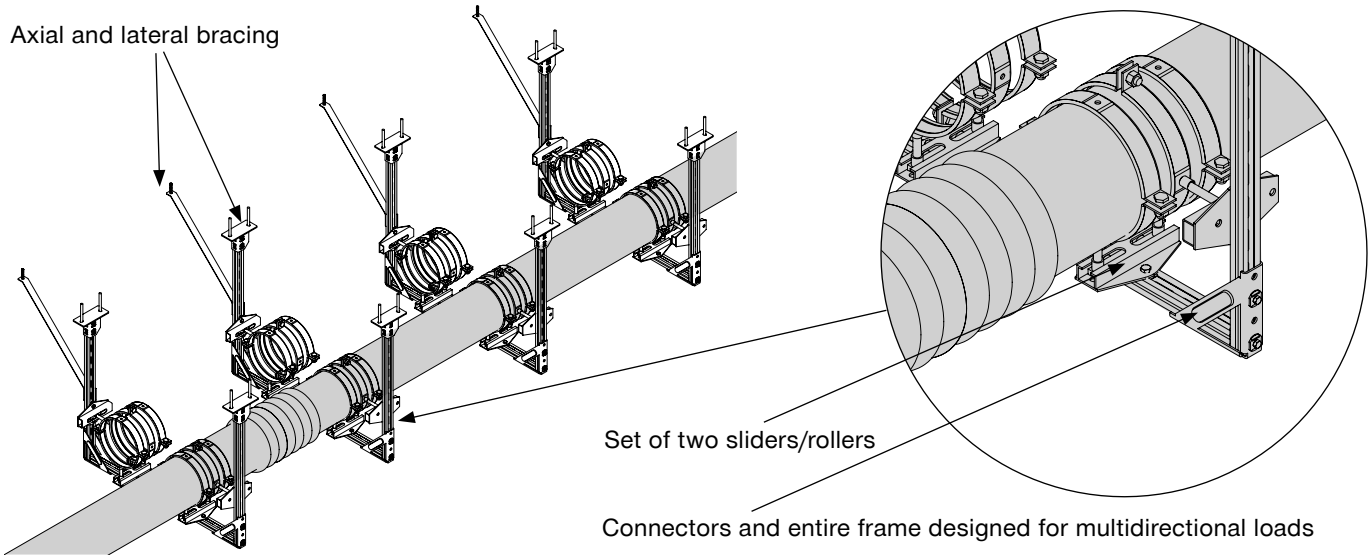


Finding worst case combination and loading case impact on axial guidance



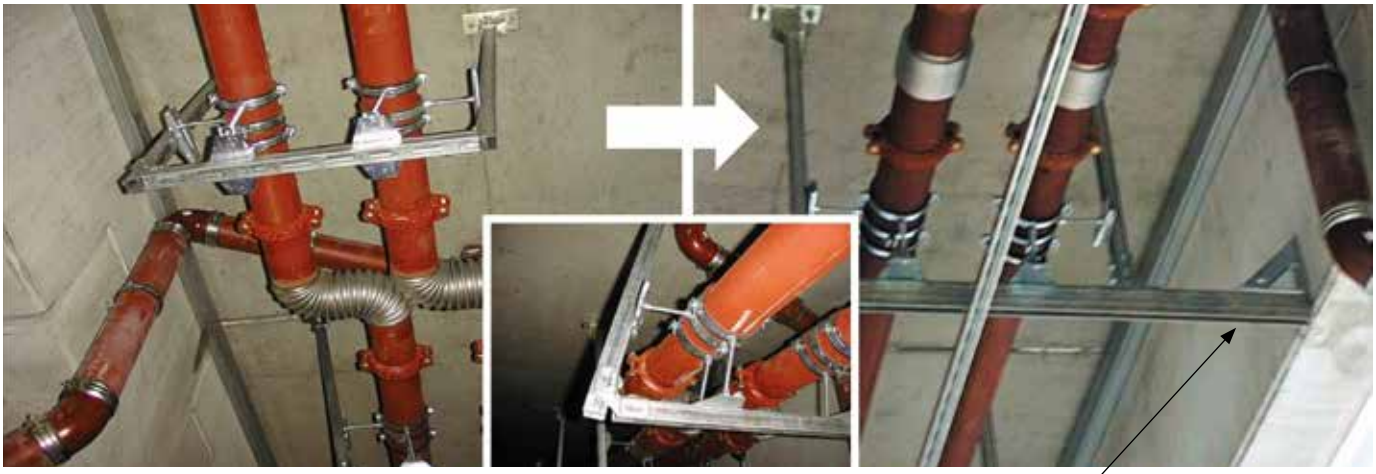
This leads to use of special solutions:

2x - 3x correctly designed axial guides placed at the required distance on both sides of the expansion joint.



Axial guidance

Underestimation of the need for axial guidance may lead to significant problems, irreversible deformation or even collapse.

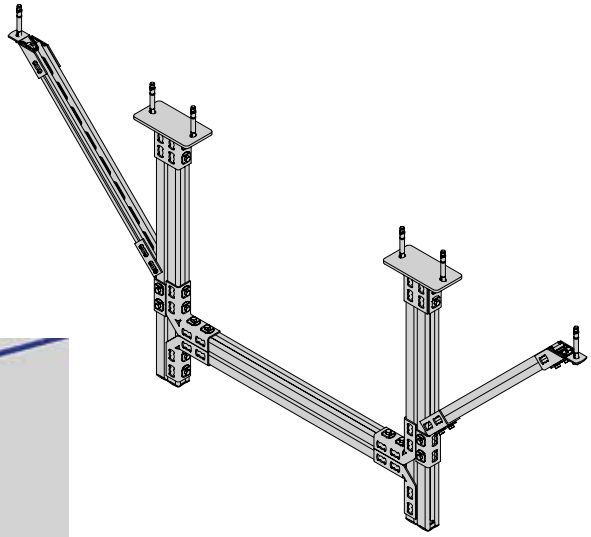


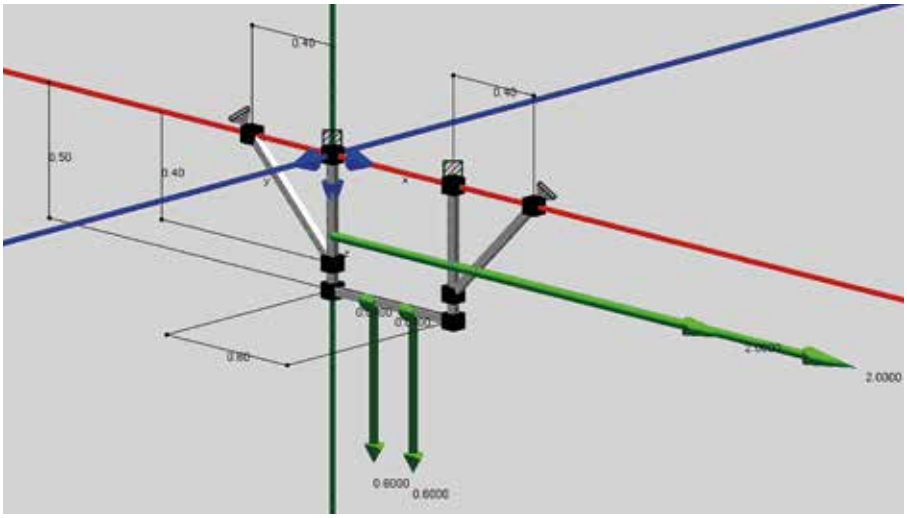
Example of underestimated support structure (weak connectors) carrying proper axial guidance elements.

Hilti Engineering Services will help you to calculate and design the right solutions. PC software that allows you to manage the whole design of systems subjected to multidirectional loads is also available from Hilti (Hilti PROFIS Installation).

After finding the worst-case combination of loads, the loads can be entered in the 3D module of Hilti PROFIS Installation:

1. Beam model of the application
2. Set the load combination
3. 3D verification of all beams and connectors
4. Calculation report
5. ACAD/BIM export
6. Shop drawings
7. Bill of materials for the project





Fixed point loads

$$F_{FP} = F_{TP} + F_{SR} + F_{FR}$$

F_{TP} - Pipe pressure load
F_{SR} - Spring rate load
F_{FR} - Friction load in all pipe supports

$$F_{TP} = 10 \times P \times A$$

P - Design value for pressure
A - Effective area of compensator (see manufacturer's data)

$$F_{SR} = \Delta L \times C$$

ΔL - Expansion of the pipe
C - Spring rate of the expansion joint (see manufacturer's data)
Note: In case of pre-tightened expansion joints $F_{SR} = 2 \times \Delta L \times C$

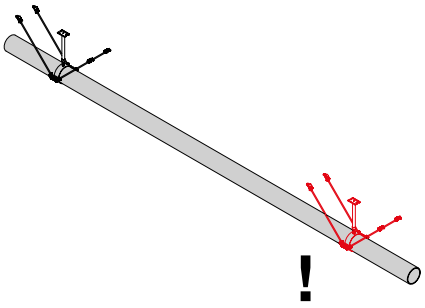
$$F_{FR} = \mu \times M \times L$$

μ - Friction factor
M - Weight of the pipe: 1m, water-filled, incl. insulation
L - Length of the pipe esction from fixed point to bending arm

Technical compensation – rules to follow for safe design / control of expansion

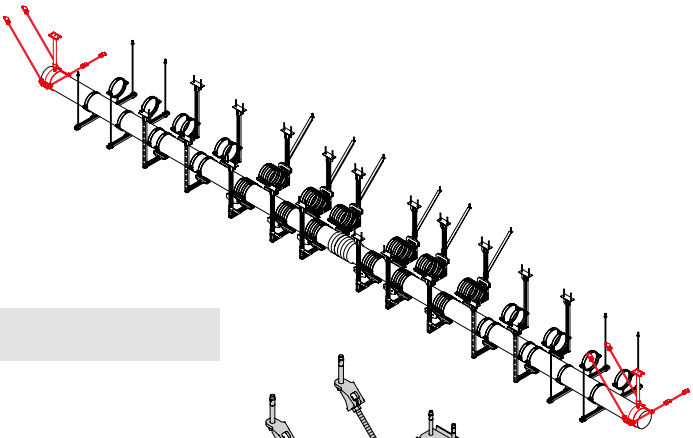
Rule no. 1

Never two fixed points on the same pipe without compensation between.



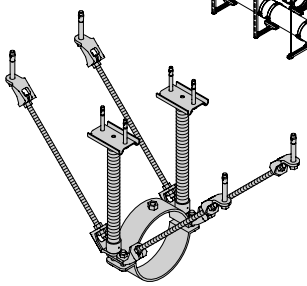
Rule no. 2

Every compensation must be accompanied by two fixed points – one on each side.



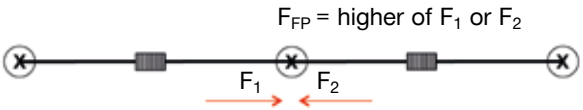
Rule no. 3

Every fixed point must be braced on both sides.



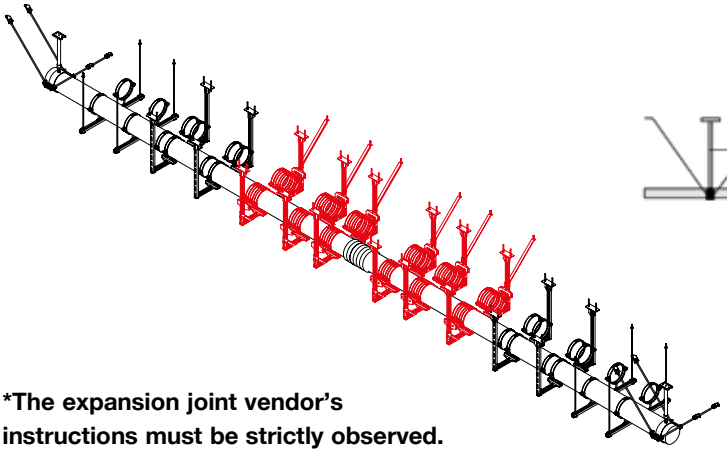
Rule no. 4

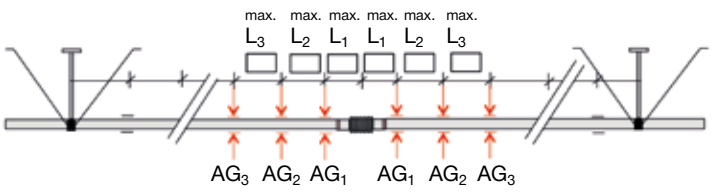
The fixed point between two compensations must be designed to take up a single load action – the higher of the two potential loads.



Rule no. 5

Axial expansion must be accommodated by *two or three correctly engineered axial guides on both sides at the proper distance.





***The expansion joint vendor's instructions must be strictly observed.**

Single Fastening On Concrete - M8 Options

M8 stud anchor		
1x	**HST3 M8x75 -/10**	**2105888**
	HST2 M8x75/10	**2108161**
1x	**M8x25 coupler**	**216703**

M8 drop in anchor		
1x	**HKD M8x30 anchor**	**376959**

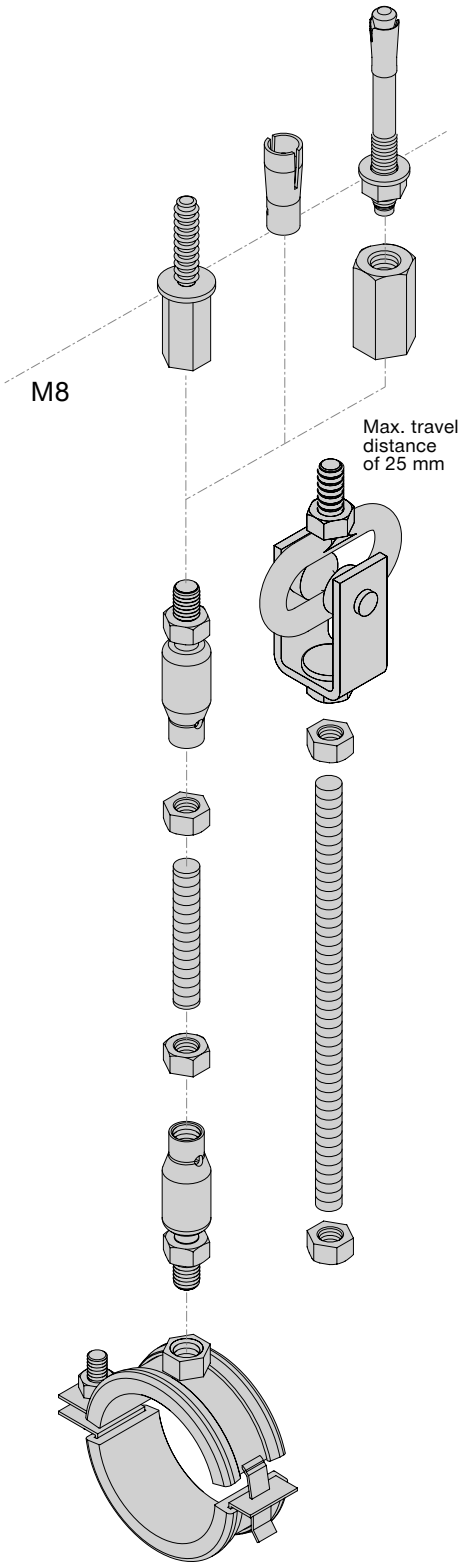
M8 screw anchor		
1x	**HUS-I 6x55 M8/M10**	**423180**

M8 swivel hanger		
1x	**MPH M8 swivel hanger**	**418035**
1x	**M8 nut**	**216465**

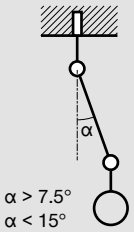
M8 threaded rods		
1x	**AM8x1000 threaded rod**	**339793**
1x	**AM8x2000 threaded rod**	**339794**
1x	**AM8x3000 threaded rod**	**216415**

M8 swivel hanger		
1x	**MPH M8 swivel hanger**	**418035**
1x	**M8 nut**	**216465**

M8 pipe rings	
MP-LHI	**Sizes 8mm- 2"**
MP-HI	**Sizes 8mm- 6"**
MPN-LI	**Sizes 8mm- 2"**
MPN-RC	**Sizes 8mm- 6"**

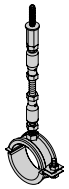


Limitation



M8 swivel hanger		
1x	**MPSG M8 swivel hanger**	**338994**
1x	**M8 nut**	**216465**

M8 nut		
1x	**M8 nut**	**216465**

Application description	Application	Product lines	Base material
Heating - single fastening M8	1 	Anchors	Concrete
		Swiveling elements	
		Pipe rings	

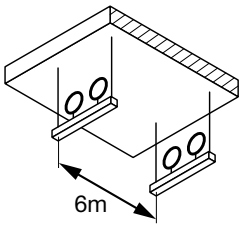
General comments

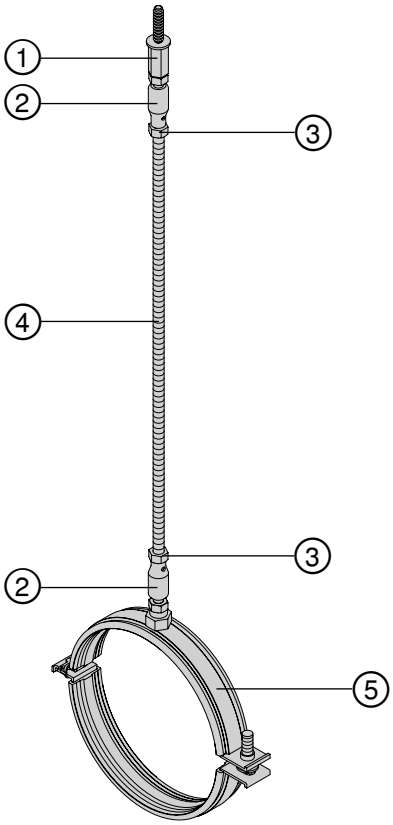
- Application subject to thermal expansion impact, no seismic, no fatigue impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF1

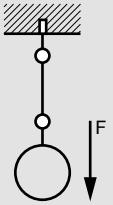
- Limited to 1x DN 125 (O.D. 139.7 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



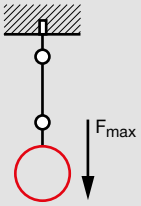


Additional loading capacity limits

This particular case
F = 1.66 kN recommended load



$F_{max.}$= 1.66 kN recommended load



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**423180**	**HUS-I 6x55 M8/M10 screw anchor**	1	-
②	**418035**	**MPH M8 swivel hanger**	2	-
③	**216465**	**M8 nut**	2	-
④	**339793**	**AM8x1000 threaded rod**	1	Depends on distance
⑤	**335704**	**MPN-RC 5" B pipe ring**	1	-

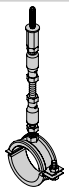
Application description

Heating - single fastening M8

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



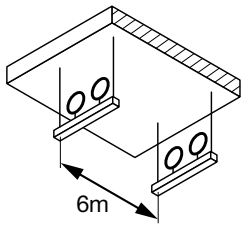
1

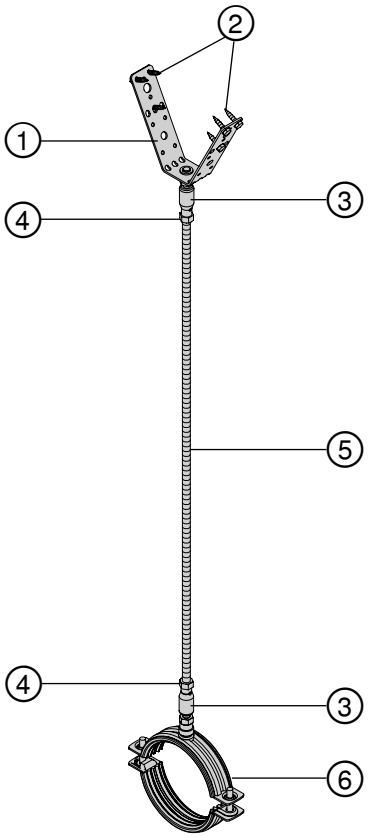
Base material	Concrete
Product line	Swivel hangers
Capacity limit	1x DN125 steel

Heating Applications - Single Fastening

Type H-SF40

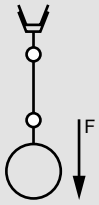
- Limited to 1x DN 80 (O.D. 88.9 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



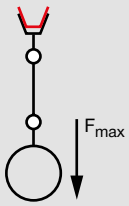


Additional loading capacity limits

This particular case
F = 0.76 kN recommended load



$F_{max.}$= approx. 0.6 - 0.8 kN
rec. loads - spot loading capacity of the PMS



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**386558**	**MVA-MS M8 V-hanger**	1	-
②	**406471**	**S-MS01Z 4.0x13 S screw**	6	-
③	**418035**	**MPH M8 swivel hanger**	2	-
④	**216465**	**M8 nut**	2	-
⑤	**339793**	**AM8x1000 threaded rod**	1	Depends on distance
⑥	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	1	-

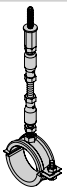
Application description

Heating - single fastening M8

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



1

Base material	PMS
Product line	V-hangers
Capacity limit	1x DN80 steel

Single Fastening On Concrete - M10 Options

M10 stud anchor		
1x	**HST3 M10x100 40/20**	**2105713**
	HST2 M10x100/20	**2107846**
1x	**M10x30 coupler**	**216704**

M10 drop in anchor		
1x	**HKD M10x40 anchor**	**376967**

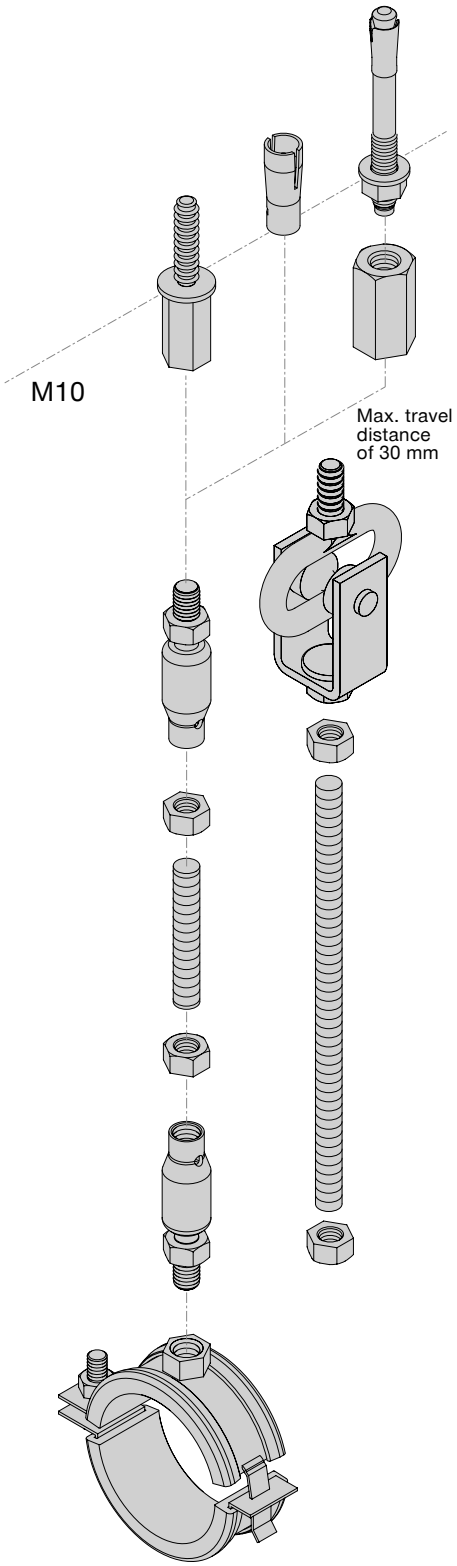
M10 screw anchor		
1x	**HUS-I 6x55 M8/M10**	**423180**

M10 swivel hanger		
1x	**MPH M10 swivel hanger**	**418036**
1x	**M10 nut**	**216466**

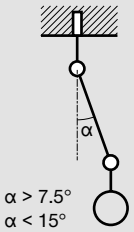
M10 threaded rods		
1x	**AM10x1000 threaded rod**	**339795**
1x	**AM10x2000 threaded rod**	**339796**
1x	**AM10x3000 threaded rod**	**216418**

M10 swivel hanger		
1x	**MPH M10 swivel hanger**	**418036**
1x	**M10 nut**	**216466**

M10 pipe rings	
MP-LHI	**Sizes 8mm- 2"**
MP-HI	**Sizes 8mm- 6"**
MPN-LI	**Sizes 8mm- 2"**
MPN-RC	**Sizes 8mm- 6"**

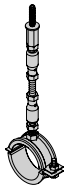


Limitation



M10 swivel hanger		
1x	**MPSG M10 swivel hanger**	**338995**
1x	**M10 nut**	**216466**

M10 nut		
1x	**M10 nut**	**216466**

Application description	Application	Product lines	Base material
Heating - single fastening M10	1 	Anchors	Concrete
		Swiveling elements	
		Pipe rings	

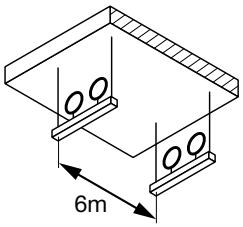
General comments

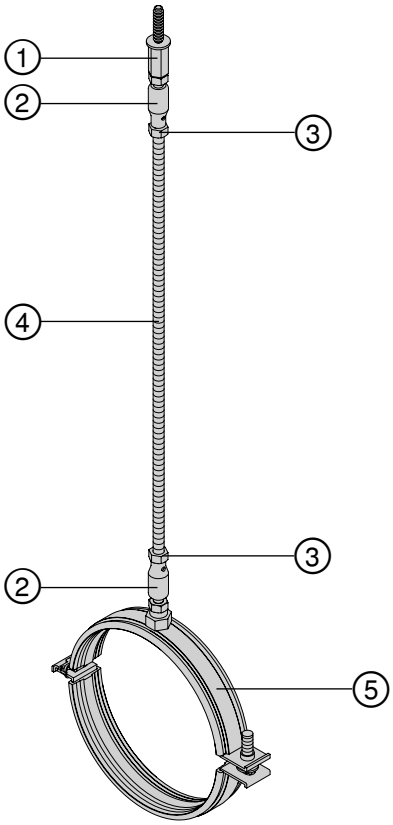
- Application subject to thermal expansion impact, no seismic, no fatigue impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF2

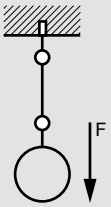
- Limited to 1x DN 125 (O.D. 139.7 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



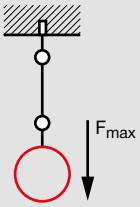


Additional loading capacity limits

This particular case
F = 1.66 kN recommended load



$F_{max.}$= 1.8 kN recommended load



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**423180**	**HUS-I 6x55 M8/M10 screw anchor**	1	-
②	**418036**	**MPH M10 swivel hanger**	2	-
③	**216466**	**M10 nut**	3	-
④	**339795**	**AM10x1000 threaded rod**	1	Depends on distance
⑤	**335704**	**MPN-RC 5" B pipe ring**	1	-

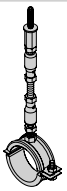
Application description

Heating - single fastening M10

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



1

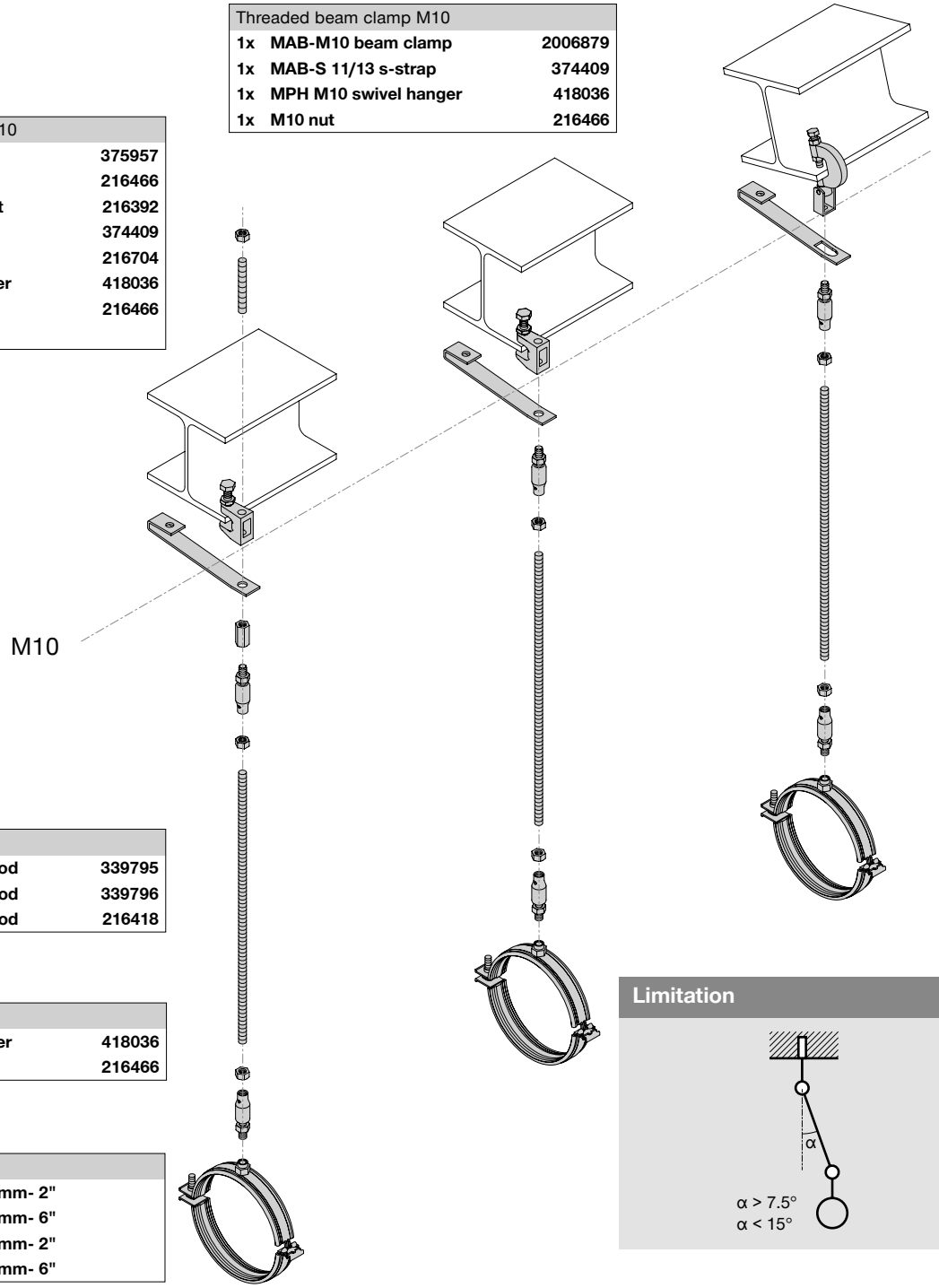
Base material	Concrete
Product line	Swivel hangers
Capacity limit	1x DN125 steel

Single Fastening On Steel - M10 Options

Swivel beam clamp M10		
1x	MQT-G M10 beam clamp	284239
1x	MQT-S s-strap	284863
1x	MPH M10 swivel hanger	418036
1x	M10 nut	216466

Threaded beam clamp M10		
1x	MAB-M10 beam clamp	2006879
1x	MAB-S 11/13 s-strap	374409
1x	MPH M10 swivel hanger	418036
1x	M10 nut	216466

Unthreaded beam clamp M10		
1x	MAB 11 beam clamp	375957
1x	M10 nut	216466
1x	AM10x80 threaded bolt	216392
1x	MAB-S 11/13 s-strap	374409
1x	M10x30 coupler	216704
1x	MPH M10 swivel hanger	418036
1x	M10 nut	216466



M10 threaded rods		
1x	AM10x1000 threaded rod	339795
1x	AM10x2000 threaded rod	339796
1x	AM10x3000 threaded rod	216418

M10 swivel hanger		
1x	MPH M10 swivel hanger	418036
1x	M10 nut	216466

M10 pipe rings	
MP-LHI	Sizes 8mm- 2"
MP-HI	Sizes 8mm- 6"
MPN-LI	Sizes 8mm- 2"
MPN-RC	Sizes 8mm- 6"

Limitation

Application description	Application	Product lines	Base material
Heating - single fastening M10	1	Beam clamps	Steel
		Swiveling elements	
		Pipe rings	

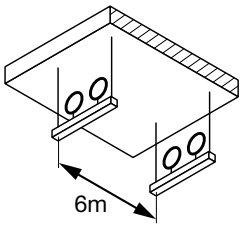
General comments

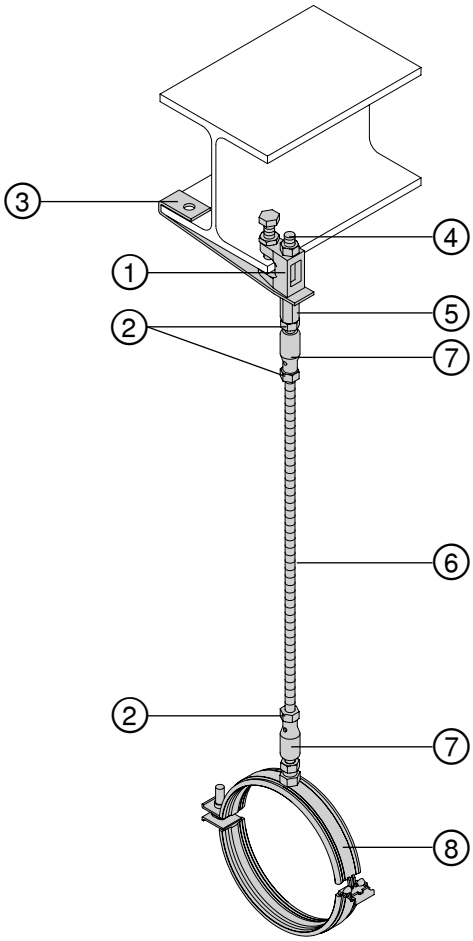
- Application subject to thermal expansion impact, no seismic, no fatigue impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF21

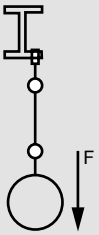
- Limited to 1x DN 125 (O.D. 139.7 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



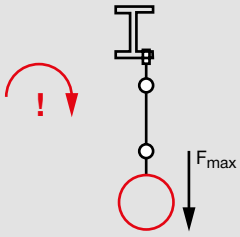


Additional loading capacity limits

This particular case
F = 1.66 kN recommended loads



$F_{max.}$= 1.8 kN recommended loads
I-beam is subject to eccentricity



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**375957**	**MAB-11 beam clamp**	1	-
②	**216466**	**M10 nut**	3	-
③	**374409**	**MAB-S 11/13 securing strap**	1	-
④	**216392**	**AM10x80 threaded bolt**	1	-
⑤	**216704**	**M10x30 coupler**	1	-
⑥	**339795**	**AM10x1000 threaded rod**	1	Depends on distance
⑦	**418036**	**MPH-M10 swivel hanger**	2	-
⑧	**335704**	**MPN-RC 5" B**	1	-

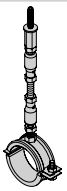
Application description

Heating - single fastening M10

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



1

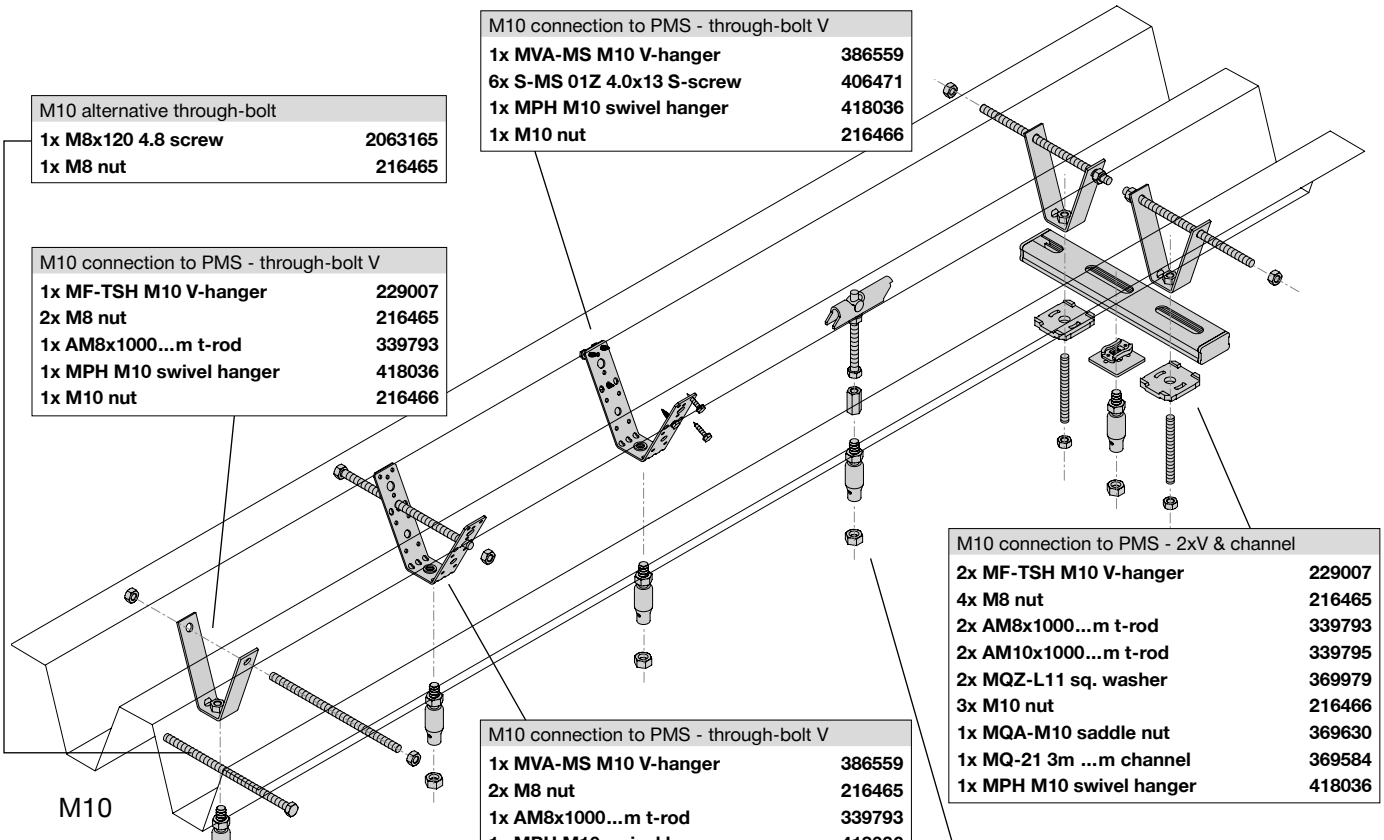
Base material	Steel
Product line	Beam clamps
Capacity limit	1x DN125 steel

Single Fastening On PMS - M10 Options

M10 alternative through-bolt	
1x M8x120 4.8 screw	**2063165**
1x M8 nut	**216465**

M10 connection to PMS - through-bolt V	
1x MF-TSH M10 V-hanger	**229007**
2x M8 nut	**216465**
1x AM8x1000...m t-rod	**339793**
1x MPH M10 swivel hanger	**418036**
1x M10 nut	**216466**

M10 connection to PMS - through-bolt V	
1x MVA-MS M10 V-hanger	**386559**
6x S-MS 01Z 4.0x13 S-screw	**406471**
1x MPH M10 swivel hanger	**418036**
1x M10 nut	**216466**



M10 connection to PMS - 2xV & channel	
2x MF-TSH M10 V-hanger	**229007**
4x M8 nut	**216465**
2x AM8x1000...m t-rod	**339793**
2x AM10x1000...m t-rod	**339795**
2x MQZ-L11 sq. washer	**369979**
3x M10 nut	**216466**
1x MQA-M10 saddle nut	**369630**
1x MQ-21 3m ...m channel	**369584**
1x MPH M10 swivel hanger	**418036**

M10 connection to PMS - through-bolt V	
1x MVA-MS M10 V-hanger	**386559**
2x M8 nut	**216465**
1x AM8x1000...m t-rod	**339793**
1x MPH M10 swivel hanger	**418036**
1x M10 nut	**216466**

PMS punch pliers	
TSH-Z punch pliers	**374004**
M-TSH-I spare spikes (pair)	**374005**

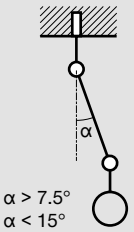
M10 connection to PMS - toggle anchor	
1x MF-SKD M10/100 toggle anchor	**230608**
2x M10 nut	**216466**
1x M10x30 hex. coupler	**216704**
1x MPH M10 swivel hanger	**418036**

M10 threaded rods	
1x AM10x1000 threaded rod	**339795**
1x AM10x2000 threaded rod	**339796**
1x AM10x3000 threaded rod	**216418**

M10 swivel hanger	
1x MPH M10 swivel hanger	**418036**
1x M10 nut	**216466**

M10 pipe rings	
MP-LHI	**Sizes 8 mm- 2"**
MP-HI	**Sizes 8 mm- 6"**
MPN-LI	**Sizes 8 mm- 2"**
MPN-RC	**Sizes 8 mm- 6"**

Limitation



Application description	Application	Product lines	Base material
Heating - single fastening M10	1	Anchors	PMS
		Swiveling elements	
		Pipe rings	

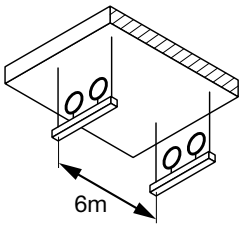
General comments

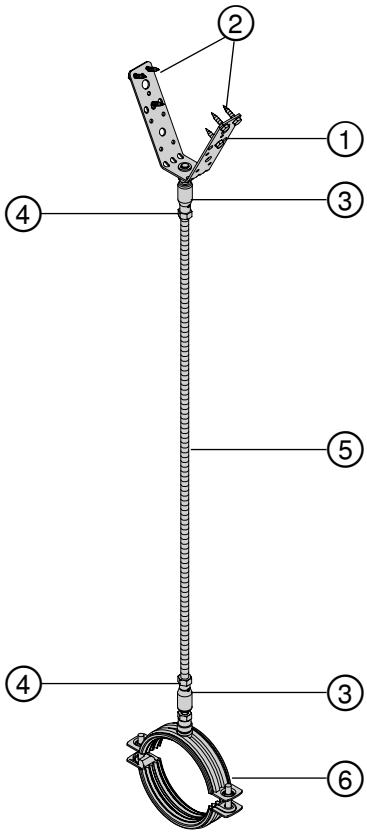
- Application subject to thermal expansion impact, no seismic, no fatigue no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF 41

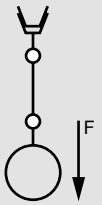
- Limited to 1x DN 80 (O.D. 88.9 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



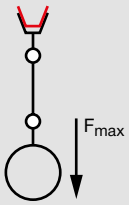


Additional loading capacity limits

This particular case
F = 0.76 kN recommended load



$F_{max.}$= approx. 0.6 - 0.8 kN
rec. loads - spot loading capacity of the PMS



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**386559**	**MVA-MS M10 V-hanger**	1	-
②	**406471**	**S-MS 01Z 4.0x13 S screw**	6	-
③	**418036**	**MPH-M10 swivel hanger**	2	-
④	**216466**	**M10 nut**	2	-
⑤	**339795**	**AM10x1000 threaded rod**	1	Depends on distance
⑥	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	1	-

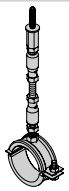
Application description

Heating - single fastening M10

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



1

Base material	PMS
Product line	V-hangers
Capacity limit	1x DN80 steel

Single Fastening On Concrete - M12 Options

M12 safety anchor	
1x HSC-I M12x60 anchor	**31146**

M12 stud anchor	
1x HST3 M12x115 40/20	**2105719**
1x HST2 M12x115/20	**2107849**
1x M12x40 coupler	**216705**

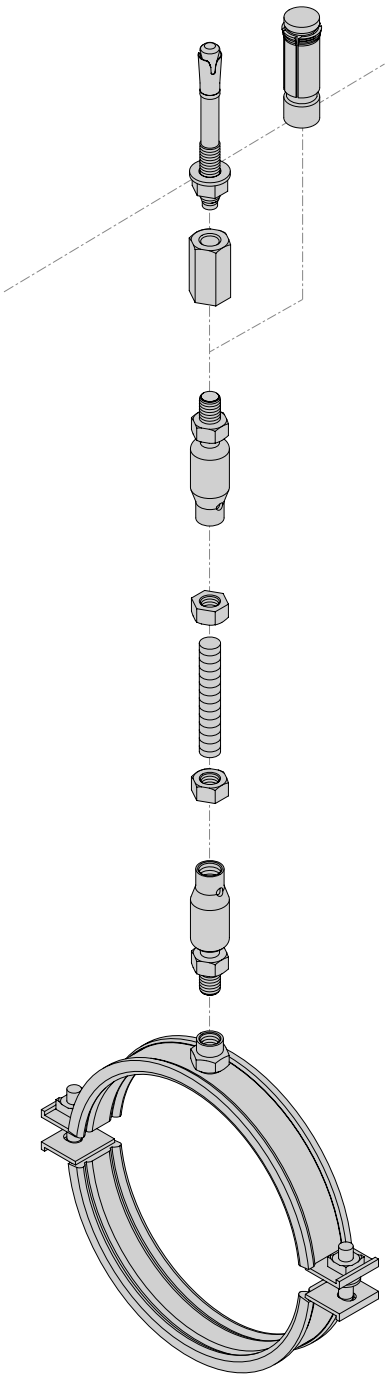
M12

M12 swivel hanger	
1x MPH M12 swivel hanger	**418038**
1x M12 nut	**216467**

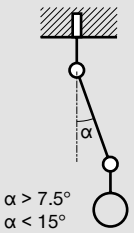
M12 threaded rods	
1x AM12x1000 threaded rod	**339797**
1x AM12x2000 threaded rod	**216420**
1x AM12x3000 threaded rod	**216421**

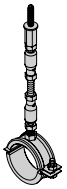
M12 swivel hanger	
1x MPH M12 swivel hanger	**418038**
1x M12 nut	**216467**

M12 pipe rings	
MP-MI..G	**Sizes 3/8" - 6"**
MP-MXI	**Sizes 2" - 3"**



Limitation



Application description	Application	Product lines	Base material
Heating - single fastening M12	1 	Anchors	Concrete
		Swiveling elements	
		Pipe rings	

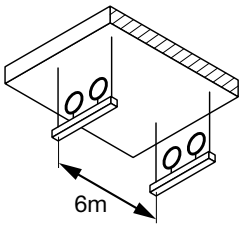
General comments

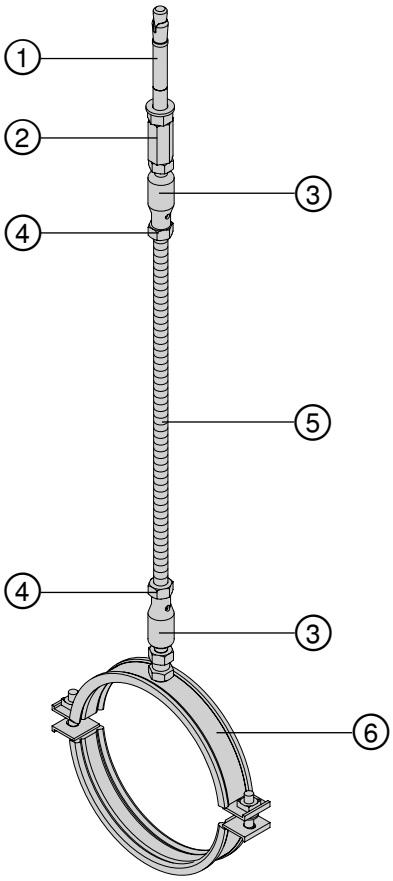
- Application subject to thermal expansion impact, no seismic, no fatigue no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF3

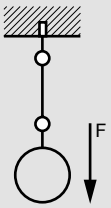
- Limited to 1x DN 150 (O.D. 168.3 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



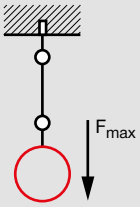


Additional loading capacity limits

This particular case
F = 2.32 recommended load



$F_{max.}$= 2.4 kN recommended load



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105719**	**HST3 M12x115 40/20 stud anchor**	1	-
②	**216705**	**M12x40 coupler**	1	-
③	**418038**	**MPH M12 swivel hanger**	2	-
④	**216467**	**M12 nut**	2	-
⑤	**339797**	**AM12x1000 threaded rod**	1	Depends on distance
⑥	**20887**	**MP-MI 6" G pipe ring**	1	-

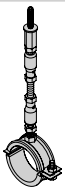
Application description

Heating - single fastening M12

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



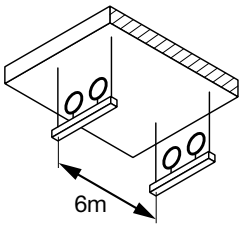
1

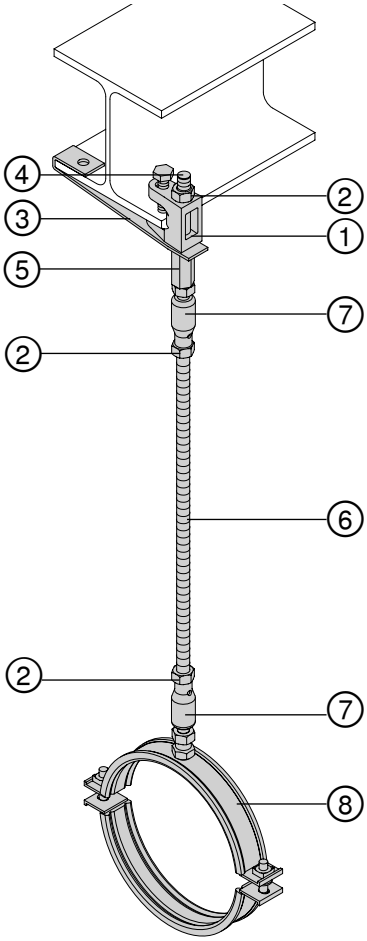
Base material	Concrete
Product line	Anchors
Capacity limit	1x DN150 steel

Heating Applications - Single Fastening

Type H-SF22

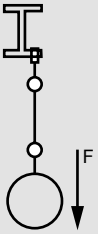
- Limited to 1x DN 150 (O.D. 168.3 mm) steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm rubber



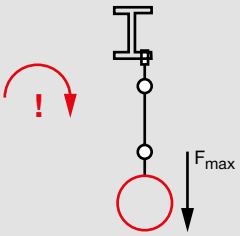


Additional loading capacity limits

This particular case
F = 2.32 kN recommended load



$F_{max.}$ = 2.4 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**375958**	**MAB-13 beam clamp**	1	-
②	**216467**	**M12 nut**	3	-
③	**374409**	**MAB-S 11/13 securing strap**	1	-
④	**216399**	**AM 12x100 threaded bolt**	1	-
⑤	**216705**	**M12x40 coupler**	1	-
⑥	**339797**	**AM12x1000 threaded rod**	1	Depends on distance
⑦	**418038**	**MPH M12 swivel hanger**	2	-
⑧	**20887**	**MP-MI 6" G pipe ring**	1	-

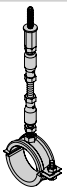
Application description

Heating - single fastening M12

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

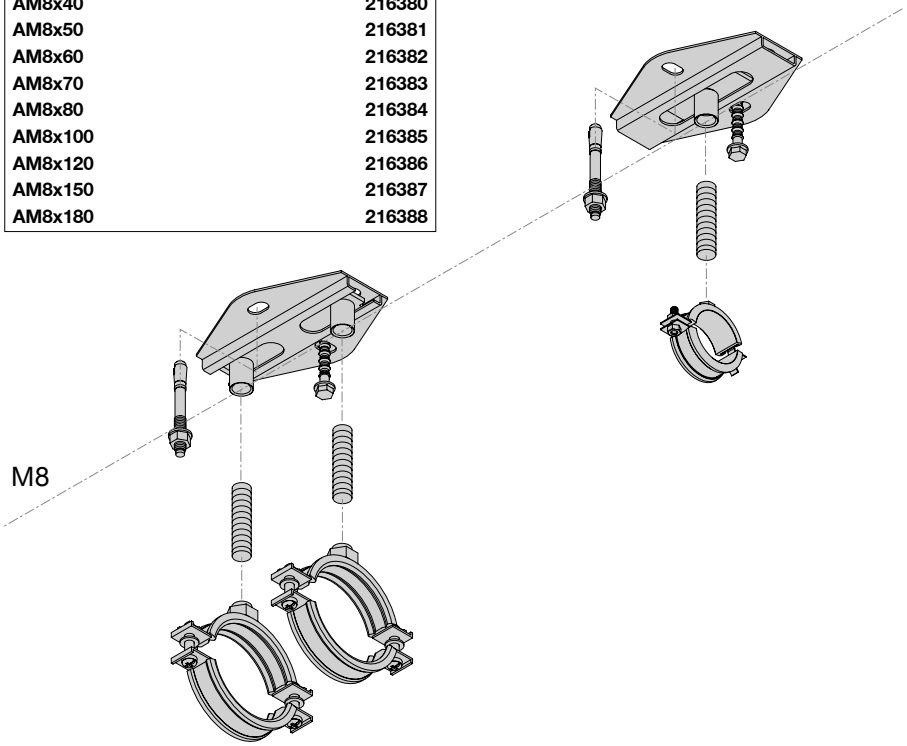


1

Base material	Steel
Product line	Beam clamps
Capacity limit	1x DN150 steel

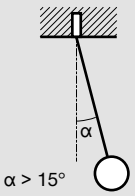
Single Fastening On Concrete – M8 Options

M8 sliding point	
Slider	
1x MSG 1.75 M8/M10D	**248209**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
2x M8 threaded bolt	
AM8x30	**216379**
AM8x40	**216380**
AM8x50	**216381**
AM8x60	**216382**
AM8x70	**216383**
AM8x80	**216384**
AM8x100	**216385**
AM8x120	**216386**
AM8x150	**216387**
AM8x180	**216388**

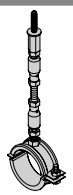


M8 pipe rings	
MP-LHI	**Sizes 8mm- 2"**
MP-HI	**Sizes 8mm- 6"**
MPN-LI	**Sizes 8mm- 2"**
MPN-RC	**Sizes 8mm- 6"**

Limitation



M8 sliding point	
Slider	
1x MSG 1.0 M8/M10	**248205**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
2x HST2 M10x90/10 stud anchor	**2107847**
1x M8 threaded bolt	
AM8x30	**216379**
AM8x40	**216380**
AM8x50	**216381**
AM8x60	**216382**
AM8x70	**216383**
AM8x80	**216384**
AM8x100	**216385**
AM8x120	**216386**
AM8x150	**216387**
AM8x180	**216388**

Application description	Application	Product lines	Base material
Heating - single fastening M8	1 	Anchors	Concrete
		Sliders / rollers	
		Pipe rings	

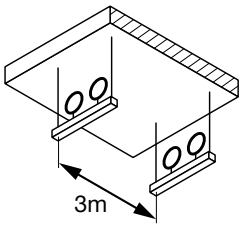
General comments

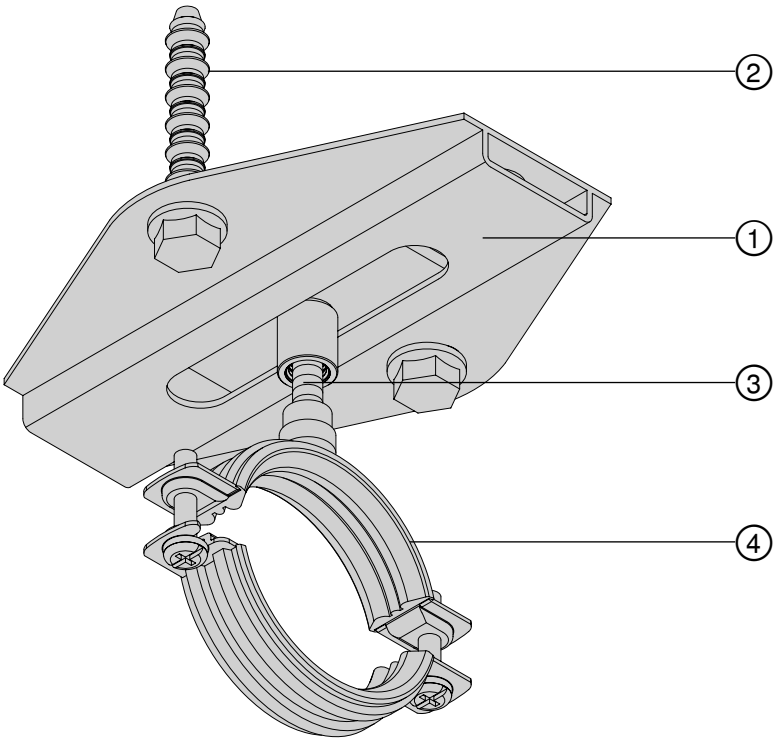
- Application subject to thermal expansion impact, no seismic, no fatigue no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF5

- Limited to 1x DN 50 (O.D. 60.3 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



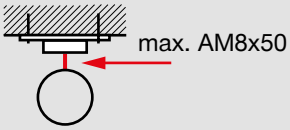


Additional loading capacity limits

This particular case

F_w = 0.25 kN recommended load

$F_{max.}$= 0.265 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**248205**	**MSG 1.0 M8/M10 slider**	1	-
②	**2079794**	**HUS3-H 8x55/-/- screw anchor**	2	-
③	**216381**	**AM8x50 threaded bolt**	1	-
④	**386411**	**MP-HI 59-66 M8/M10**	1	-

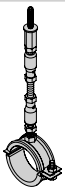
Application description

Heating - single fastening M8

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



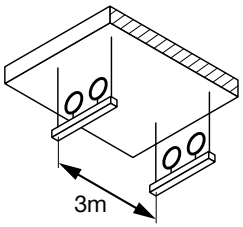
1

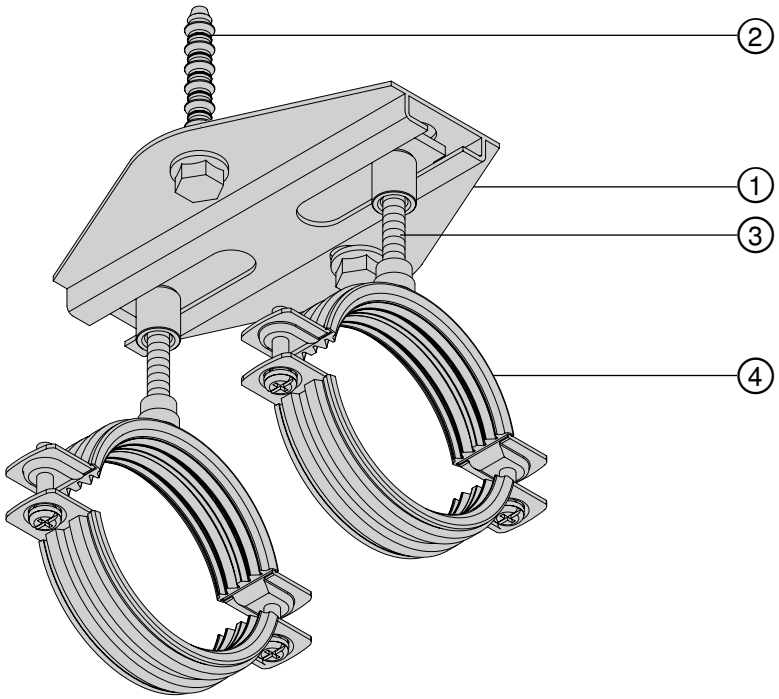
Base material	Concrete
Product line	Sliders, anchors
Capacity limit	1x DN50 steel

Heating Applications - Single Fastening

Type H-SF6

- Limited to 1x DN 80 (O.D. 88.9 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



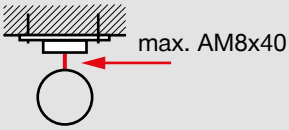


Additional loading capacity limits

This particular case

F_w = 0.51 kN recommended loads

$F_{max.}$ = 0.51 kN recommended loads



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**248209**	**MSG 1.75 M8/M10 slider**	1	-
②	**2079794**	**HUS3-H 8x55/-/- screw anchor**	2	-
③	**216380**	**AM8x40 threaded bolt**	2	-
④	**386414**	**MP-HI 84-93 M8/M10**	2	-

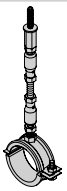
Application description

Heating - single fastening M8

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

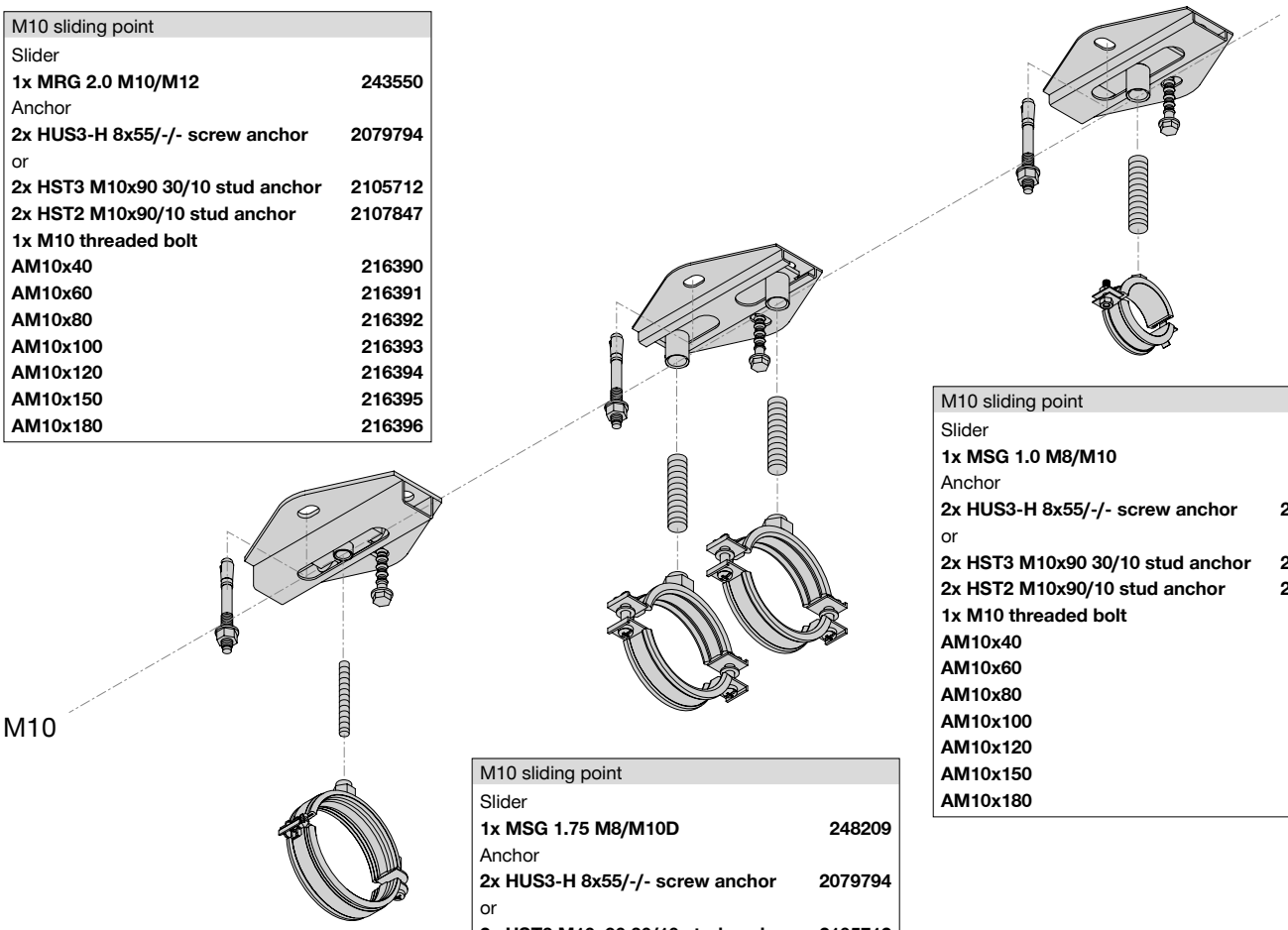


1

Base material	Concrete
Product line	Sliders, anchors
Capacity limit	1x DN80 steel

Single Fastening On Concrete – M10 Options

M10 sliding point	
Slider	
1x MRG 2.0 M10/M12	**243550**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
2x HST2 M10x90/10 stud anchor	**2107847**
1x M10 threaded bolt	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

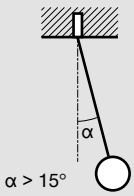


M10 sliding point	
Slider	
1x MSG 1.0 M8/M10	**248205**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
2x HST2 M10x90/10 stud anchor	**2107847**
1x M10 threaded bolt	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

M10 sliding point	
Slider	
1x MSG 1.75 M8/M10D	**248209**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
2x HST2 M10x90/10 stud anchor	**2107847**
2x M10 threaded bolt	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

M10 pipe rings	
MP-LHI	**Sizes 8 mm- 2"**
MP-HI	**Sizes 8 mm- 6"**
MPN-LI	**Sizes 8 mm- 2"**
MPN-RC	**Sizes 8 mm- 6"**

Limitation



Application description	Application	Product lines	Base material
Heating - single fastening M10	1	Anchors	Concrete
		Sliders / rollers	
		Pipe rings	

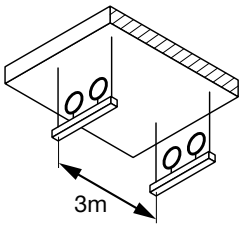
General comments

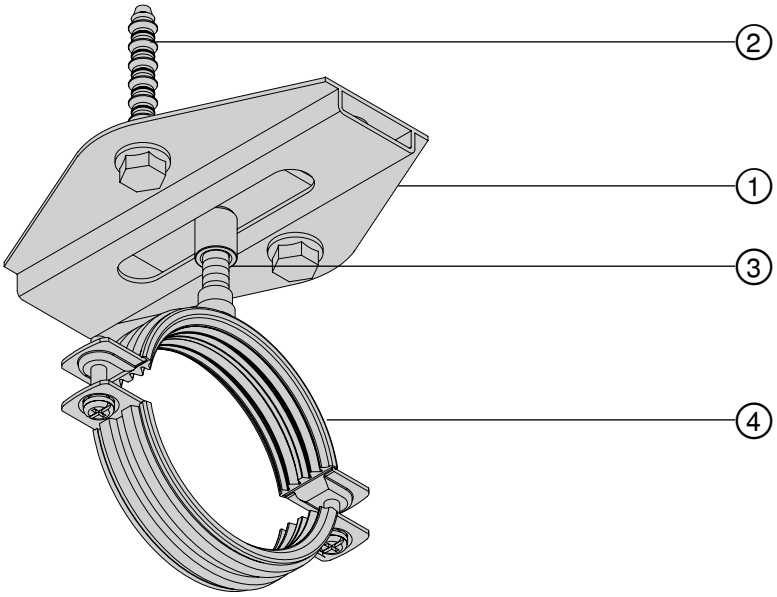
- Application subject to thermal expansion impact, no seismic, no fatigue no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF7

- Limited to 1x DN 80 (O.D. 88.9 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber

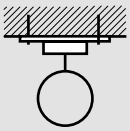




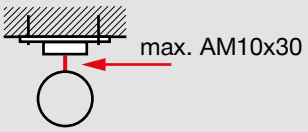
Additional loading capacity limits

This particular case

F_w = 0.51 kN recommended load



$F_{max.}$= 0.55 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**248205**	**MSG 1.0 M8/M10 slider**	1	-
②	**2079794**	**HUS3-H 8x55/-/- screw anchor**	2	-
③	**216389**	**AM10x30 threaded bolt**	1	-
④	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	1	-

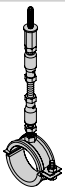
Application description

Heating - single fastening M10

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



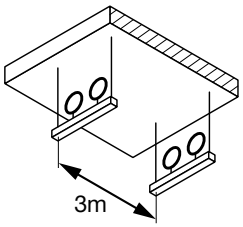
1

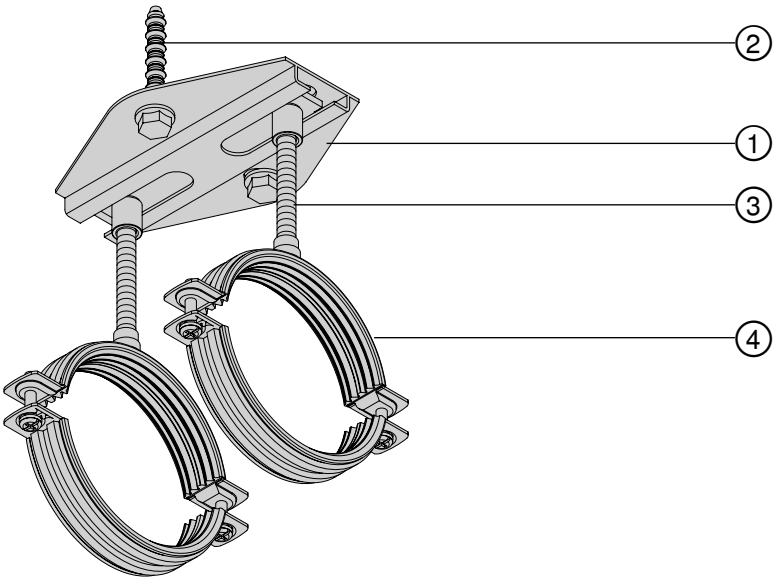
Base material	Concrete
Product line	Sliders, anchors
Capacity limit	1x DN80 steel

Heating Applications - Single Fastening

Type H-SF8

- Limited to 1x DN 100 (O.D. 108 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



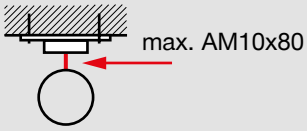


Additional loading capacity limits

This particular case

F_w = 0.68 kN recommended loads

$F_{max.}$= 0.68 kN recommended loads



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**248209**	**MSG 1.75 M8/M10 slider**	1	-
②	**2079794**	**HUS3-H 8x55/-/- screw anchor**	2	-
③	**216392**	**AM10x80 threaded bolt**	2	-
④	**386416**	**MP-HI 101 - 110 M8/M10**	2	-

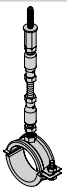
Application description

Heating - single fastening M10

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



1

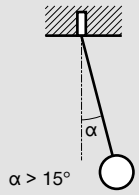
Base material	Concrete
Product line	Sliders, anchors
Capacity limit	1x DN100 steel

Single Fastening On Concrete – M12 Options

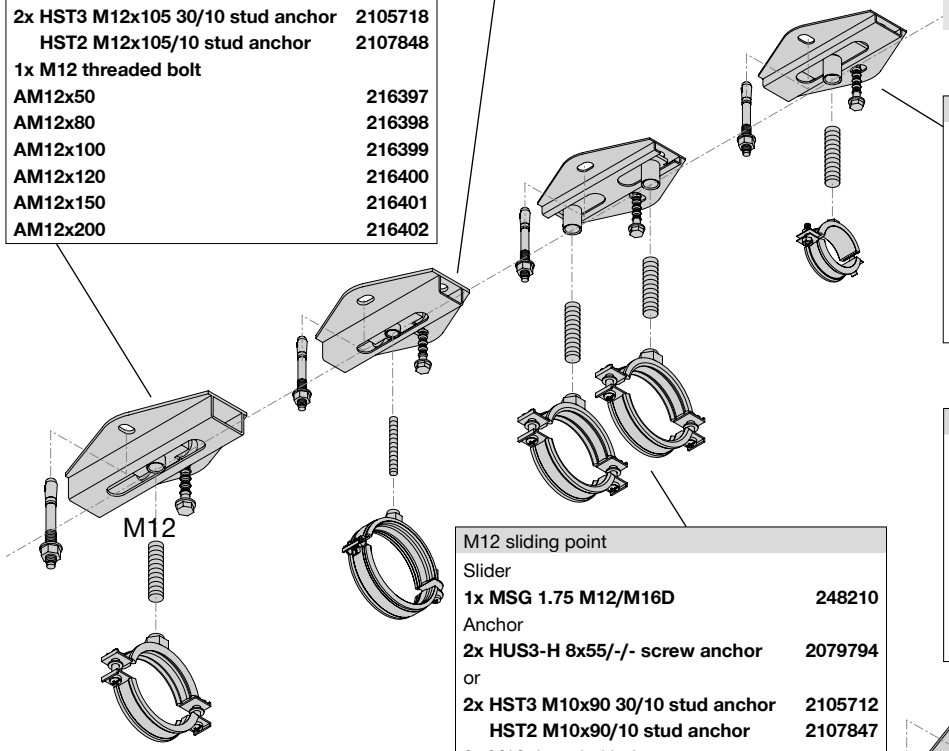
M12 sliding point	
Roller	
1x MRG 4.0 M12/M16	**243551**
Anchor	
2x HUS3-H 10x60 5/-/- screw anchor	**2079911**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
1x M12 threaded bolt	
AM12x50	**216397**
AM12x80	**216398**
AM12x100	**216399**
AM12x120	**216400**
AM12x150	**216401**
AM12x200	**216402**

M12 sliding point	
Roller	
1x MRG 2.0 M10/M12	**243550**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
1x M12 threaded bolt	

Limitation



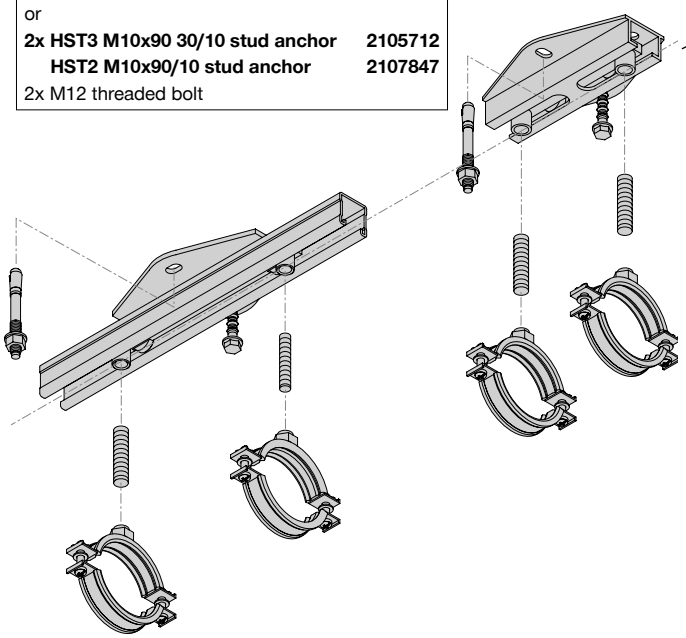
M12 sliding point	
Slider	
1x MSG 1.0 M12/M16	**248206**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
1x M12 threaded bolt	



M12 sliding point	
Slider	
1x MSG 1.75 M12/M16D	**248210**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
2x M12 threaded bolt	

M12 sliding point	
Roller	
1x MRG-D6 roller	**334131**
Anchor	
2x HUS3-H 10x60 5/-/- screw anchor	**2079911**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
2x M12 threaded bolt	

M12 pipe rings	
MP-PI..M12	**Sizes 219mm-326mm**
MP-MI..G	**Sizes 3/8" - 6"**
MP-MXI	**Sizes 2" - 3"**



M12 sliding point	
Roller	
1x MRG-D 225 M12/M16	**237394**
Anchor	
2x HUS3-H 10x60 5/-/- screw anchor	**2079911**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
2x M12 threaded bolt	

Application description	Application	Product lines	Base material
Heating - single fastening M12	1	Anchors	Concrete
		Sliders / rollers	
		Pipe rings	

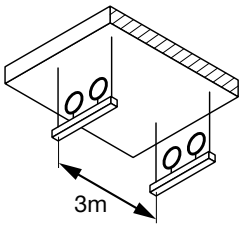
General comments

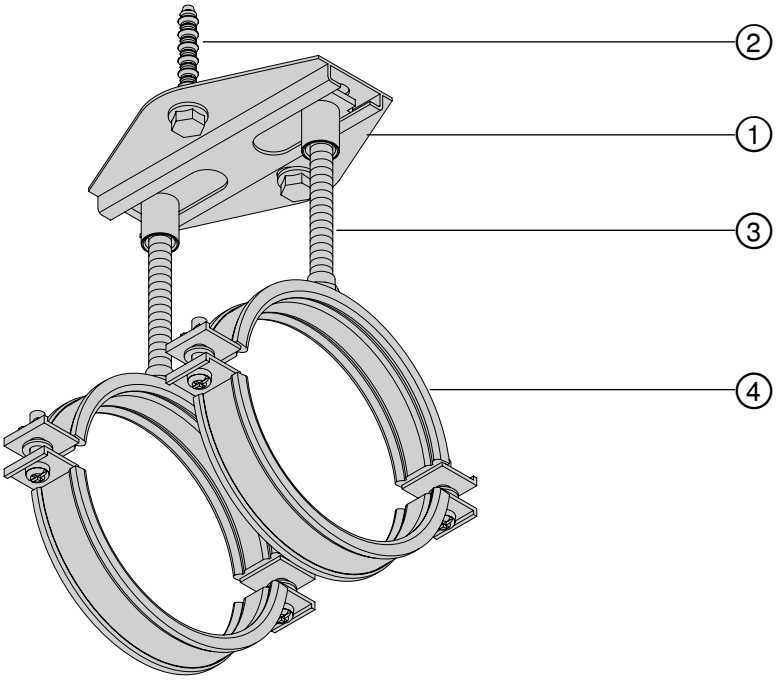
- Application subject to thermal expansion impact, no seismic, no fatigue no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF9

- Limited to 1x DN 125 (O.D. 133.0 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



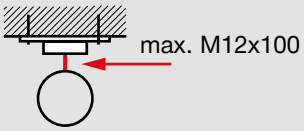


Additional loading capacity limits

This particular case

F_w = 0.93 kN recommended load

$F_{max.}$= 0.98 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**248210**	**MSG 1.75 M12/M16 slider**	1	-
②	**2079794**	**HUS3-H 8x55/-/- screw anchor**	2	-
③	**216401**	**AM12x100 threaded bolt**	2	-
④	**20879**	**MP-MI 133 G pipe ring**	2	-

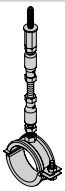
Application description

Heating - single fastening M12

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



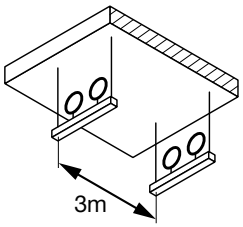
1

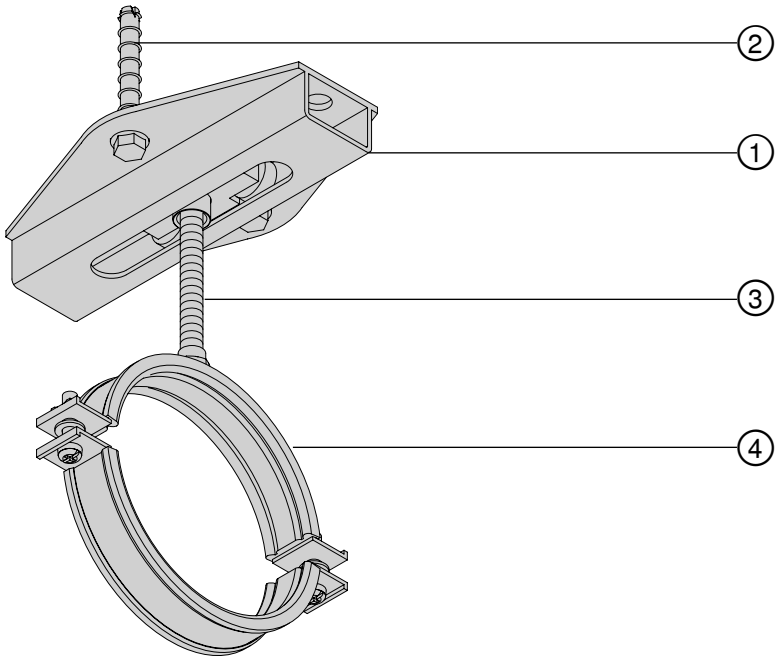
Base material	Concrete
Product line	Sliders, anchors
Capacity limit	1x DN125 concrete

Heating Applications - Single Fastening

Type H-SF10

- Limited to 1x DN 125 (O.D. 133.0 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



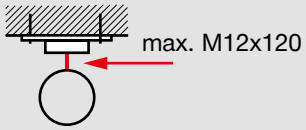


Additional loading capacity limits

This particular case

F = 0.93 kN recommended load

$F_{max.}$ = 0.96 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**243550**	**MRG 2.0 M10/M12 roller**	1	-
②	**2079911**	**HUS3-H 10x60 5/-/- screw anchor**	2	-
③	**216400**	**AM12x120 threaded bolt**	1	-
④	**20879**	**MP-MI 133 G pipe ring**	1	-

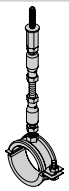
Application description

Heating - single fastening M12

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



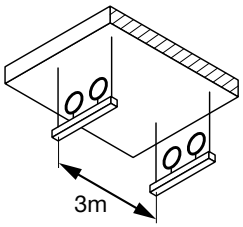
1

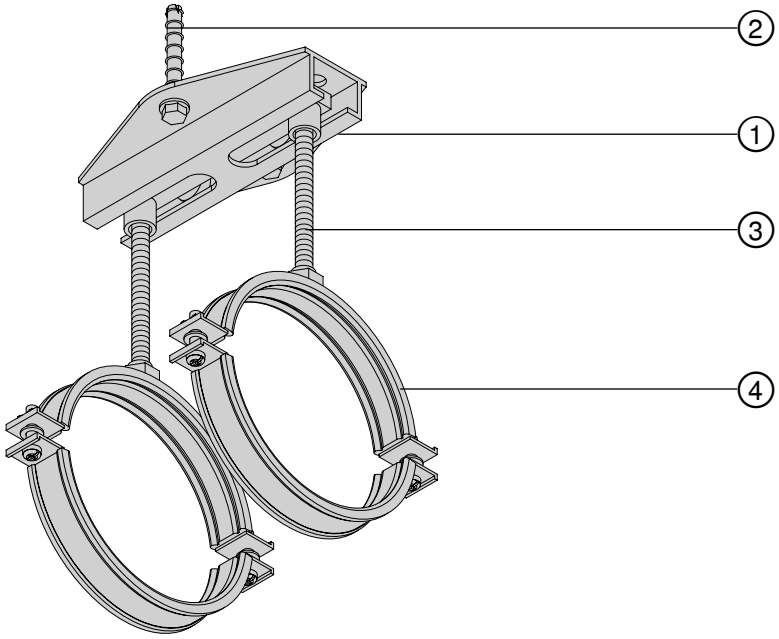
Base material	Concrete
Product line	Rollers, anchors
Capacity limit	1x DN125 concrete

Heating Applications - Single Fastening

Type H-SF11

- Limited to 1x DN 150 (O.D. 168.3 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



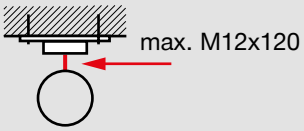


Additional loading capacity limits

This particular case

F = 1.35 kN recommended load

$F_{max.}$= 1.44 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**334131**	**MRG-D6**	1	-
②	**2079911**	**HUS3-H 10x60 5/-/- screw anchor**	2	-
③	**339797**	**AM12x1000 threaded rod**	2	0.18
④	**20887**	**MP-MI 6" G pipe ring**	2	-

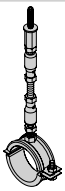
Application description

Heating - single fastening M12

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



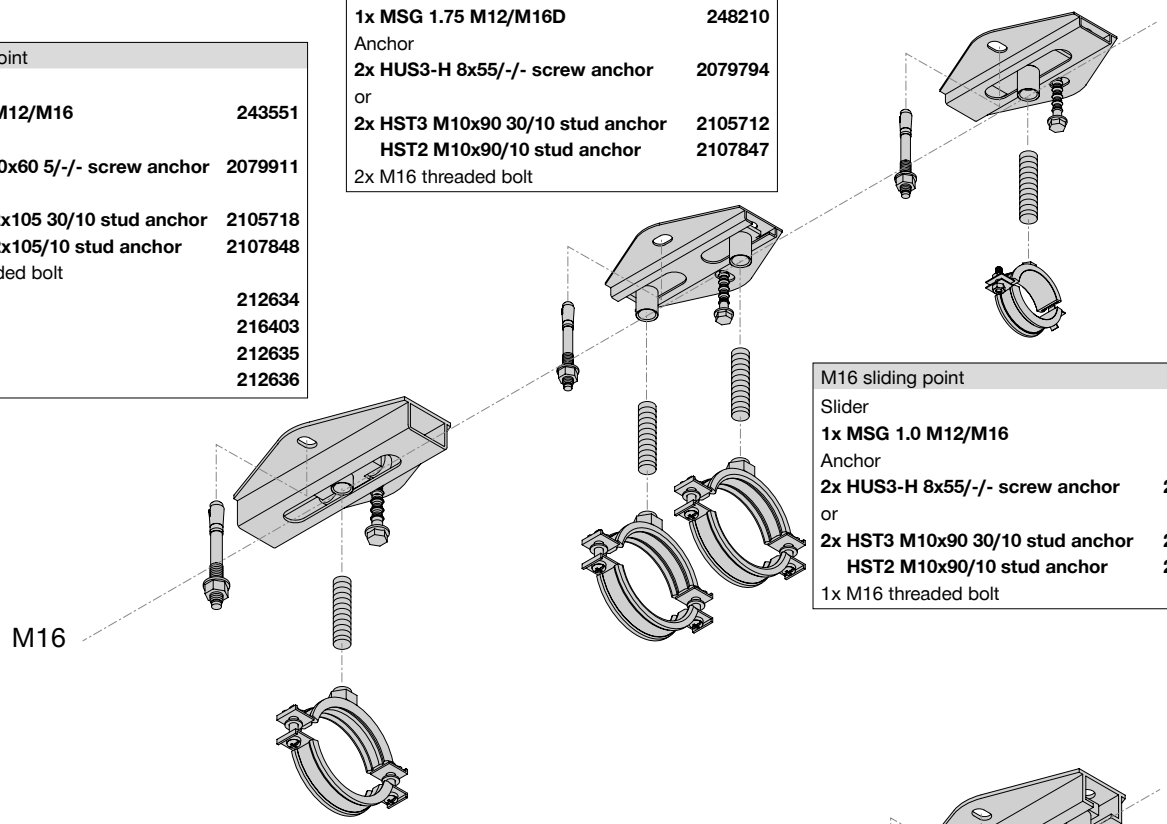
1

Base material	Concrete
Product line	Rollers, anchors
Capacity limit	1x DN150 concrete

Single Fastening On Concrete – M16 Options

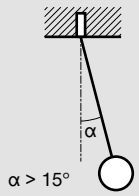
M16 sliding point	
Roller	
1x MRG 4.0 M12/M16	**243551**
Anchor	
2x HUS3-H 10x60 5/-/- screw anchor	**2079911**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
1x M16 threaded bolt	
AM16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

M16 sliding point	
Slider	
1x MSG 1.75 M12/M16D	**248210**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
2x M16 threaded bolt	

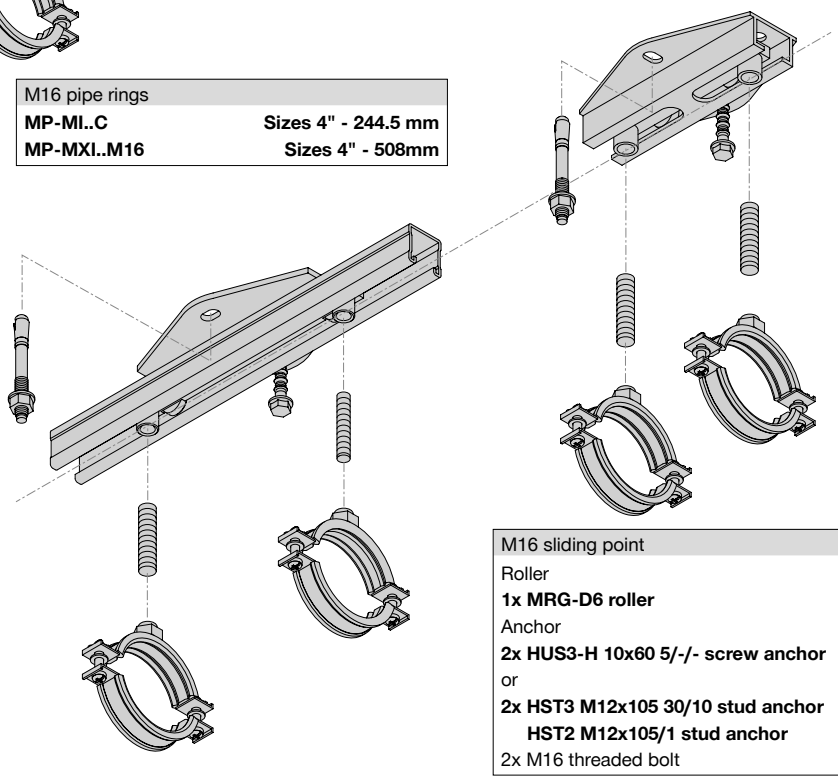


M16 sliding point	
Slider	
1x MSG 1.0 M12/M16	**248206**
Anchor	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
1x M16 threaded bolt	

Limitation

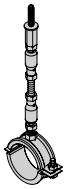


M16 pipe rings	
MP-MI..C	**Sizes 4" - 244.5 mm**
MP-MXI..M16	**Sizes 4" - 508mm**



M16 sliding point	
Roller	
1x MRG-D 225 M12/M16	**237394**
Anchor	
2x HUS3-H 10x60 5/-/- screw anchor	**2079911**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
2x M16 threaded bolt	

M16 sliding point	
Roller	
1x MRG-D6 roller	**334131**
Anchor	
2x HUS3-H 10x60 5/-/- screw anchor	**2079911**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/1 stud anchor	**2107848**
2x M16 threaded bolt	

Application description	Application	Product lines	Base material
Heating - single fastening M16	1 	Anchors	Concrete
		Sliders / rollers	
		Pipe rings	

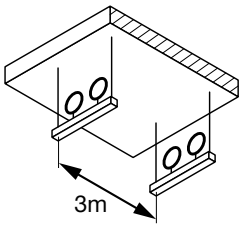
General comments

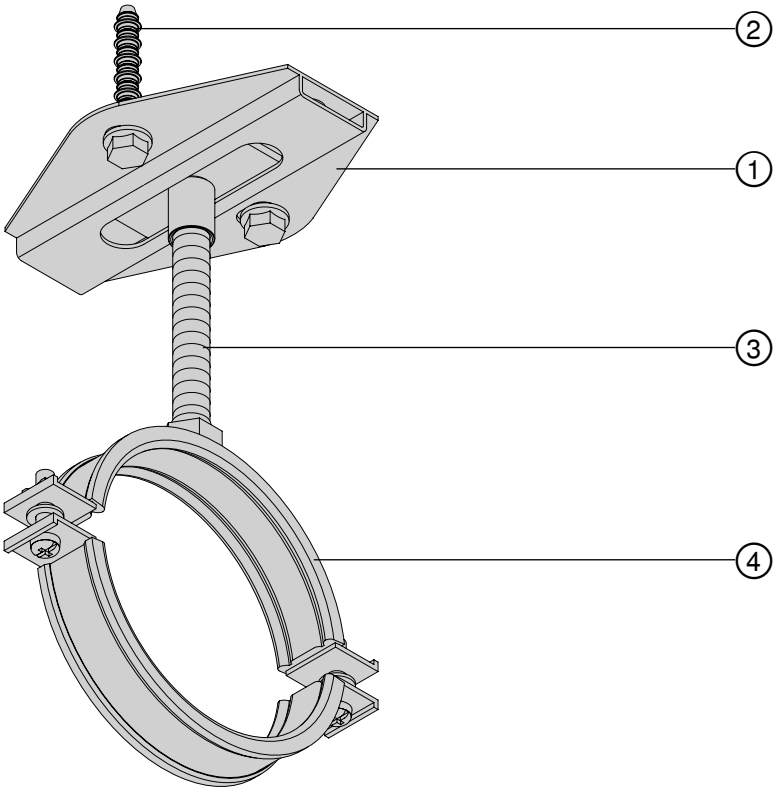
- Application subject to thermal expansion impact, no seismic, no fatigue no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Single Fastening

Type H-SF12

- Limited to 1x DN 125 (O.D. 133.0 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



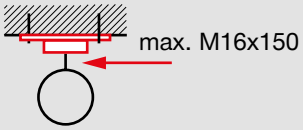


Additional loading capacity limits

This particular case

F = 0.93 kN recommended load

$F_{max.}$= 1.0 kN recommended load



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**248206**	**MSG 1.0 M12/M16 slider**	1	-
②	**2079794**	**HUS3-H 8x55/-/- screw anchor**	2	-
③	**212635**	**AM16x150 threaded bolt**	1	-
④	**20880**	**MP-MI 133 C pipe ring**	1	-

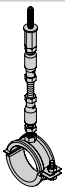
Application description

Heating - single fastening M16

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



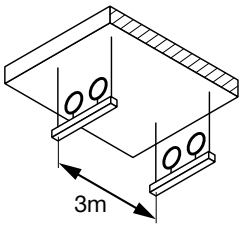
1

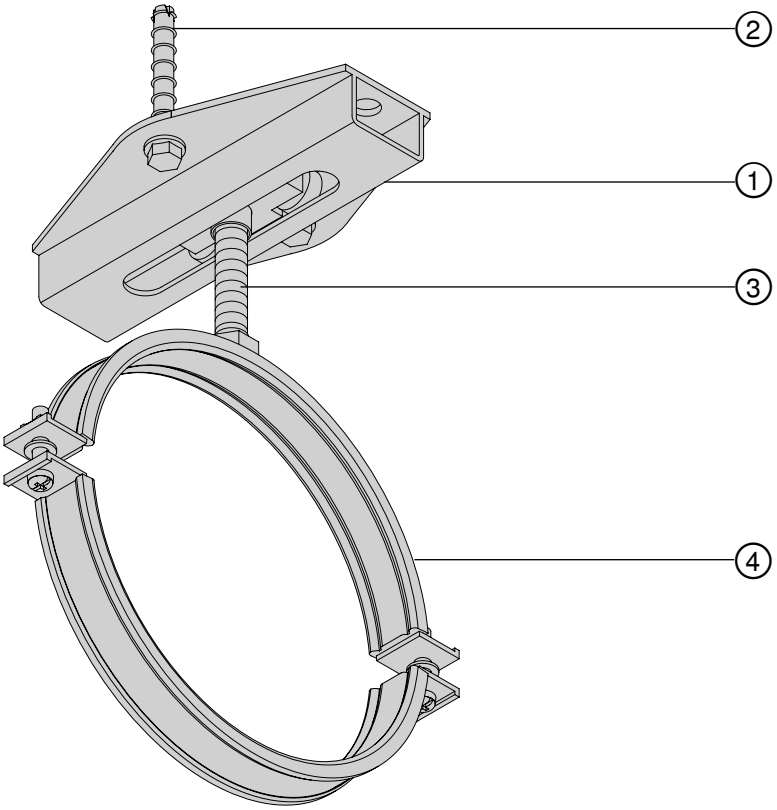
Base material	Concrete
Product line	Rollers, anchors
Capacity limit	1x DN125 concrete

Heating Applications - Single Fastening

Type H-SF13

- Limited to 1x DN 200 (O.D. 219.1 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber

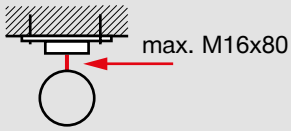




Additional loading capacity limits

This particular case
F = 2.24 kN recommended loads

$F_{max.}$ = 2.3 kN recommended loads



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**243551**	**MRG 4.0 M12/M16**	1	-
②	**2079911**	**HUS3-H 10x60 5/-/- screw anchor**	2	-
③	**216403**	**AM16x80 threaded bolt**	1	-
④	**20896**	**MP-MI 219.1 C pipe ring**	1	-

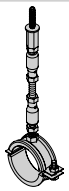
Application description

Heating - single fastening M16

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



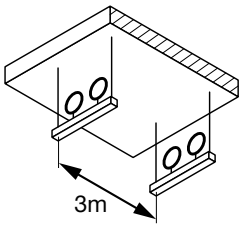
1

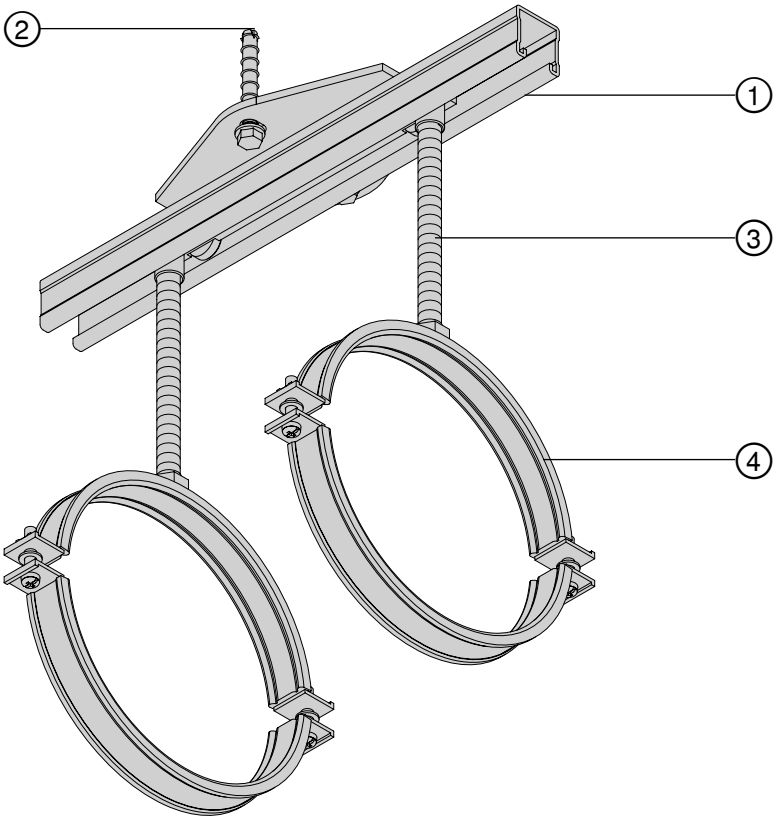
Base material	Concrete
Product line	Rollers, anchors
Capacity limit	1x DN200 concrete

Heating Applications - Single Fastening

Type H-SF14

- Limited to 1x DN 200 (O.D. 219.1 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber





Additional loading capacity limits

This particular case
F = 2.24 kN recommended loads

$F_{max.}$= 2.5 kN recommended loads

Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**237394**	**MRG-D225 M12/M16 roller**	1	-
②	**2079911**	**HUS3-H 10x60 5/-/- screw anchor**	2	-
③	**216422**	**AM16x1000 threaded rod**	2	0.18
④	**20896**	**MP-MI 219.1 C pipe ring**	1	-

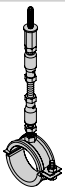
Application description

Heating - single fastening M16

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



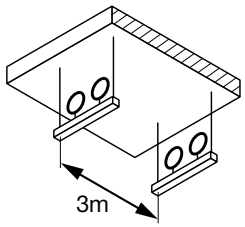
1

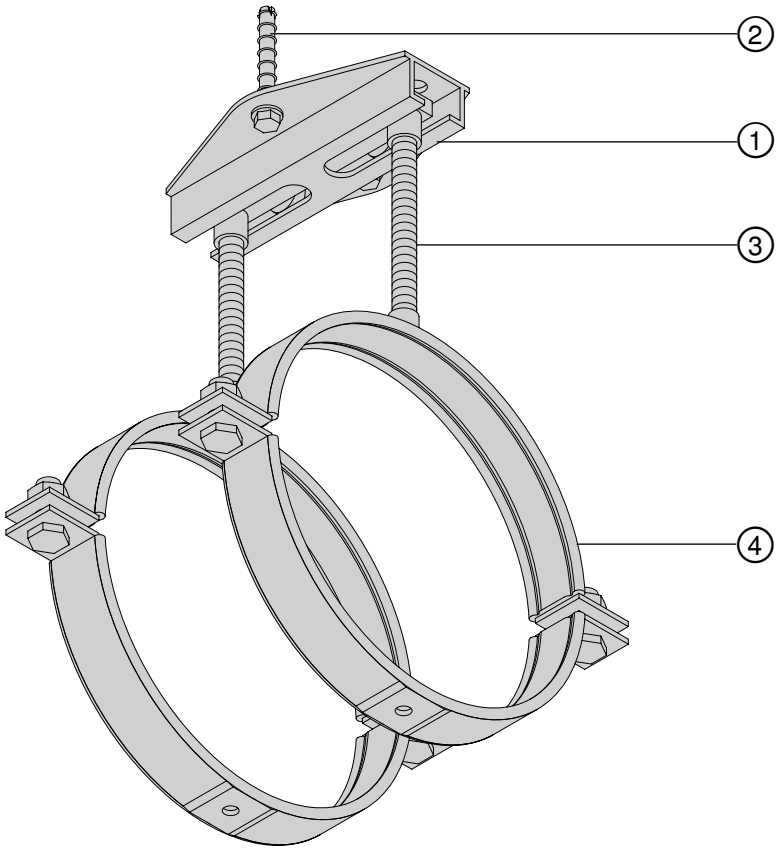
Base material	Concrete
Product line	Rollers, anchors
Capacity limit	1x DN200 concrete

Heating Applications - Single Fastening

Type H-SF15

- Limited to 1x DN 250 (O.D. 273.0 mm) steel pipe
- Spacing - support distance 3 m
- Insulation 40 mm rubber



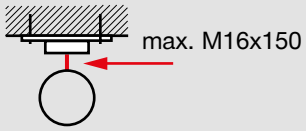


Additional loading capacity limits

This particular case

F = 3.12 kN recommended loads

$F_{max.}$ = 3.29 kN recommended loads



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**334131**	**MRG-D6 M12/M16 roller**	1	-
②	**2079911**	**HUS3-H 10x60 5/-/- screw anchor**	2	-
③	**212636**	**AM16x150 threaded bolt**	2	-
④	**372240**	**MP-MXI 267/274 M16 pipe ring**	2	-

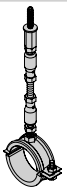
Application description

Heating - single fastening M16

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



1

Base material	Concrete
Product line	Rollers, anchors
Capacity limit	1x DN250 concrete

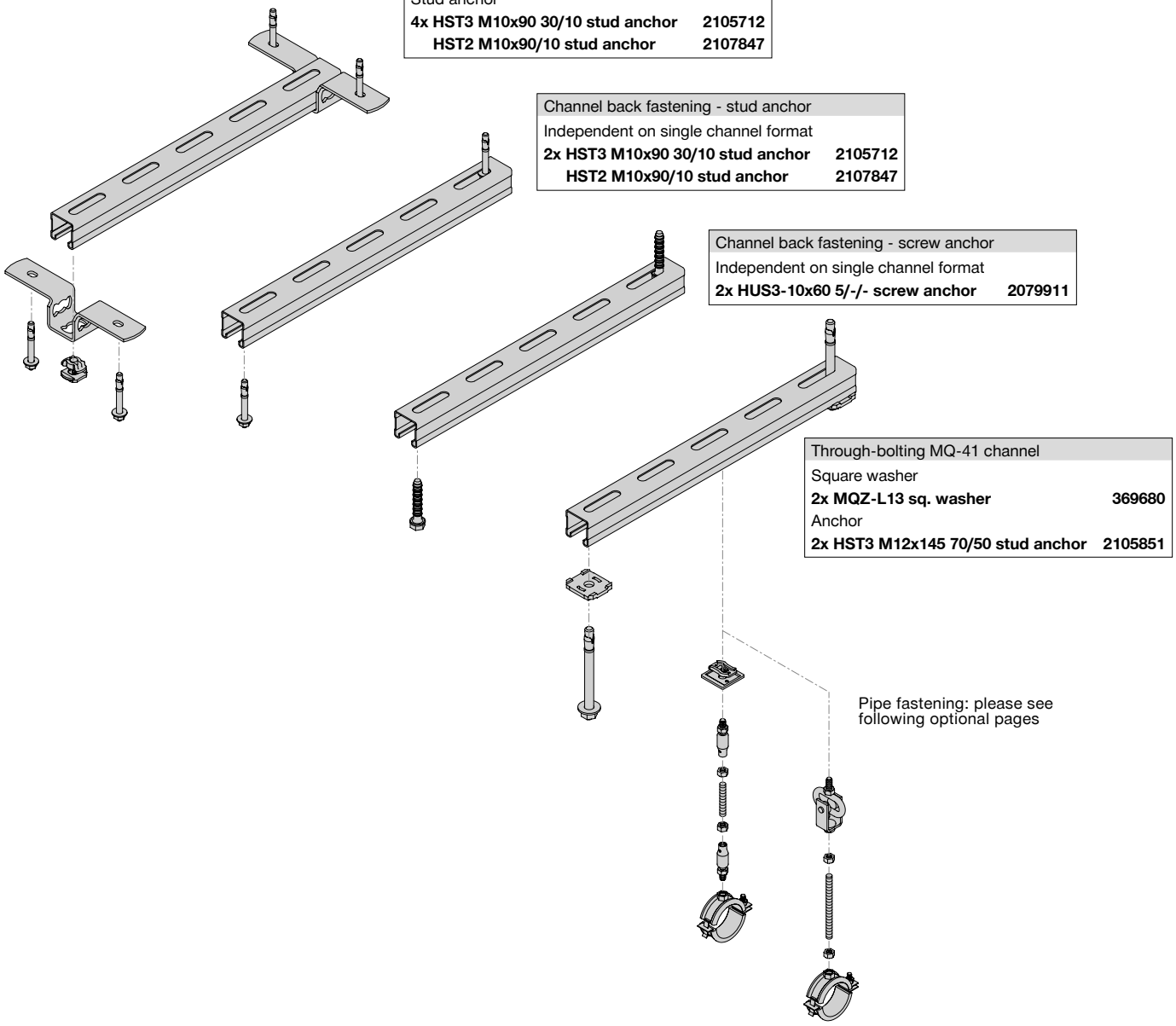
Head Rail On Concrete - Options For Connection To Concrete

Wall clamp	
For 41 mm channel format only	
2x MQB-G41 clamp	**369674**
2x MQN pushbutton	**369623**
Screw anchor	
4x HUS3-H 8x55/-/- screw anchor	**2079794**
Stud anchor	
4x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**

Channel back fastening - stud anchor	
Independent on single channel format	
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**

Channel back fastening - screw anchor	
Independent on single channel format	
2x HUS3-10x60 5/-/- screw anchor	**2079911**

Through-bolting MQ-41 channel	
Square washer	
2x MQZ-L13 sq. washer	**369680**
Anchor	
2x HST3 M12x145 70/50 stud anchor	**2105851**



Pipe fastening: please see following optional pages

Application description	Application	Product lines	Base material
Heating - head rail	2	MQ System	Concrete
		Anchors	
		Expansion elements	

General comments

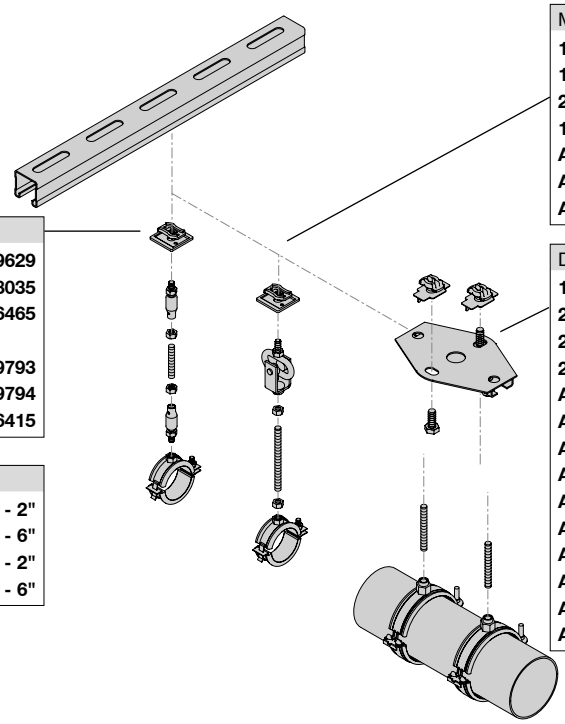
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Head Rail On Concrete - Options For M8, M10 Pipe Connections

M8 solutions

M8 swivel hanger in channel	
1x MQA-M8 saddle nut	**369629**
2x MPH-M8 swivel hanger	**418035**
2x M8 nut	**216465**
1x M8 threaded rod	
AM8x1000 t-rod	**339793**
AM8x2000 t-rod	**339794**
AM8x3000 t-rod	**216415**

M8 pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**



M8 swivel slide in channel	
1x MQA-M8 saddle nut	**369629**
1x MPSG-M8 swivel slide hanger	**338994**
2x M8 nut	**216465**
1x M8 threaded rod	
AM8x1000 t-rod	**339793**
AM8x2000 t-rod	**339794**
AM8x3000 t-rod	**216415**

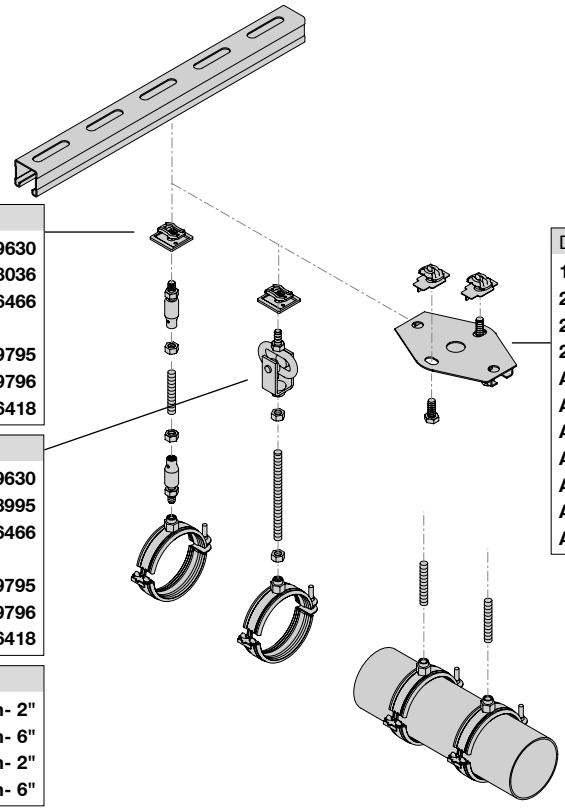
Double slider in channel	
1x MSG 1.75 M8/M10 slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M8 threaded bolts	
AM 8x 30	**216379**
AM 8x 40	**216380**
AM 8x 50	**216381**
AM 8x 60	**216382**
AM 8x 70	**216383**
AM 8x 80	**216384**
AM 8x100	**216385**
AM 8x120	**216386**
AM 8x150	**216387**
AM 8x180	**216388**

M10 solutions

M10 swivel hanger in channel	
1x MQA-M10 saddle nut	**369630**
2x MPH-M10 swivel hanger	**418036**
2x M10 nut	**216466**
1x M10 threaded rod	
AM10x1000 t-rod	**339795**
AM10x2000 t-rod	**339796**
AM10x3000 t-rod	**216418**

M10 swivel slide in channel	
1x MQA-M10 saddle nut	**369630**
1x MPSG-M10 swivel slide hanger	**338995**
2x M10 nut	**216466**
1x M10 threaded rod	
AM10x1000 t-rod	**339795**
AM10x2000 t-rod	**339796**
AM10x3000 t-rod	**216418**

M10 pipe rings	
MP-LHI Sizes	**8 mm- 2"**
MP-HI Sizes	**8 mm- 6"**
MPN-LI Sizes	**8 mm- 2"**
MPN-RC Sizes	**8 mm- 6"**



Double slider in channel	
1x MSG 1.75 M8/M10 slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

Application description	Application	Product lines	Base material
Heating - head rail	2	MQ System	Concrete
		Anchors	
		Expansion elements	

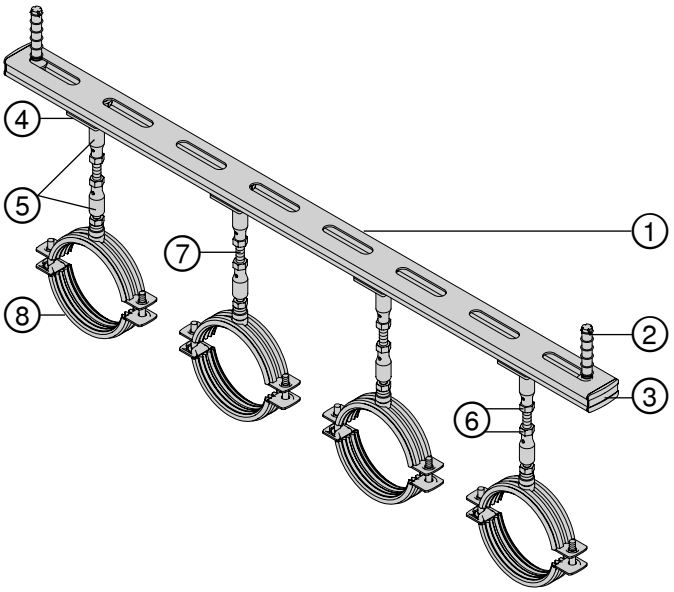
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Head Rail

Type H-HR1

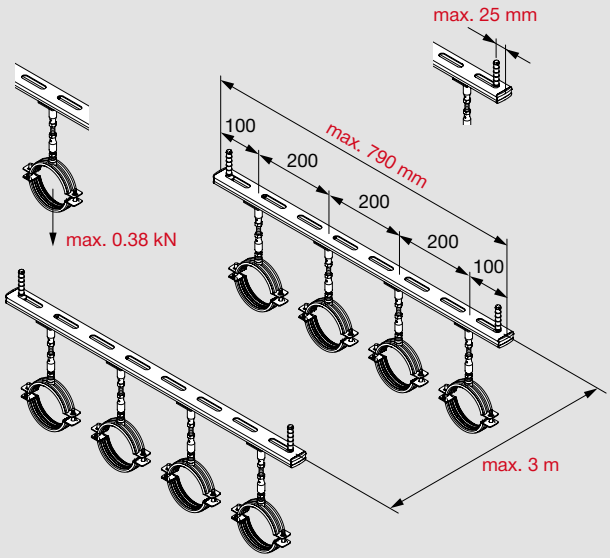
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item number	Description	Piece	Length (m)
①	**369584**	**MQ-21 3 m channel**	1	0.79
②	**2079911**	**HUS3-H 10x60 5/-/- screw anchor**	2	-
③	**370598**	**MQZ-E21 end cap**	2	-
④	**369629**	**MQA-M8 saddle nut**	4	-
⑤	**418035**	**MPH M8 swivel hanger**	8	-
⑥	**216465**	**M8 nut**	8	Depends on distance
⑦	**339793**	**AM8x1000 threaded rod**	4	-
⑧	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	4	-

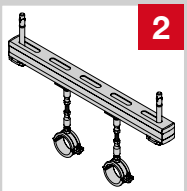
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

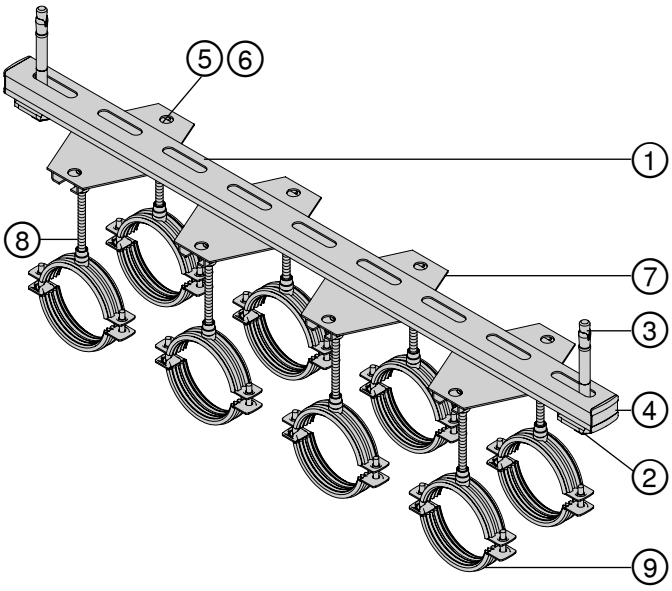


Base material	Concrete
Product line	MQ system, swivel
Capacity limit	4 x DN 80 concrete

Heating Applications - Head Rail

Type H-HR2

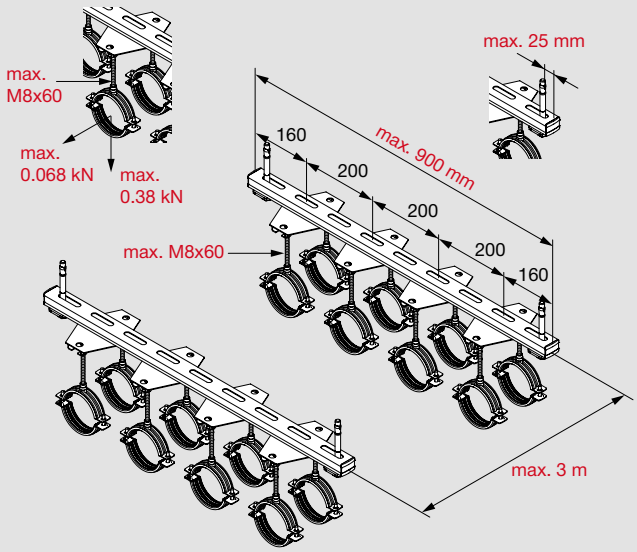
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369589**	**MQ-31 3 m channel**	1	0.9
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105851**	**HST3 M12x145 70/50 stud anchor**	2	-
④	**369686**	**MQZ-E31 end cap**	2	-
⑤	**369626**	**MQM-M10 wing nut**	8	-
⑥	**216454**	**M10x25 screw**	8	-
⑦	**248209**	**MSG 1.75 M8/10D slider**	4	-
⑧	**216382**	**AM 8x 60 threaded bolt**	8	-
⑨	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	8	-

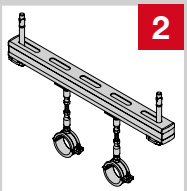
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

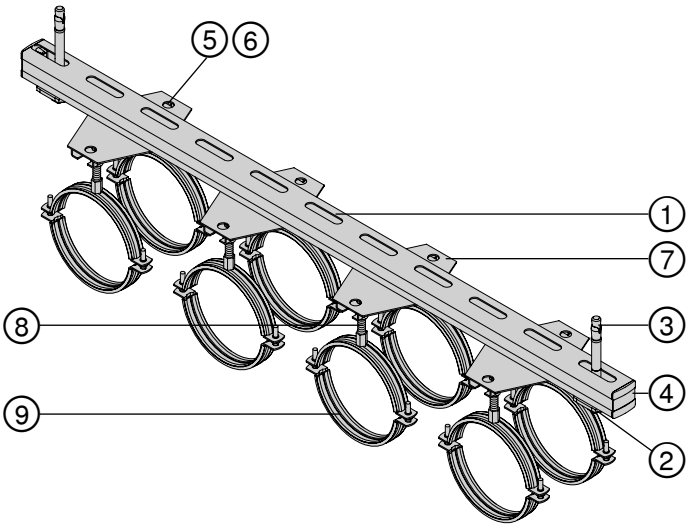


Base material	Concrete
Product line	MQ system, swivel
Capacity limit	4 x DN 80 concrete

Heating Applications - Head Rail

Type H-HR3

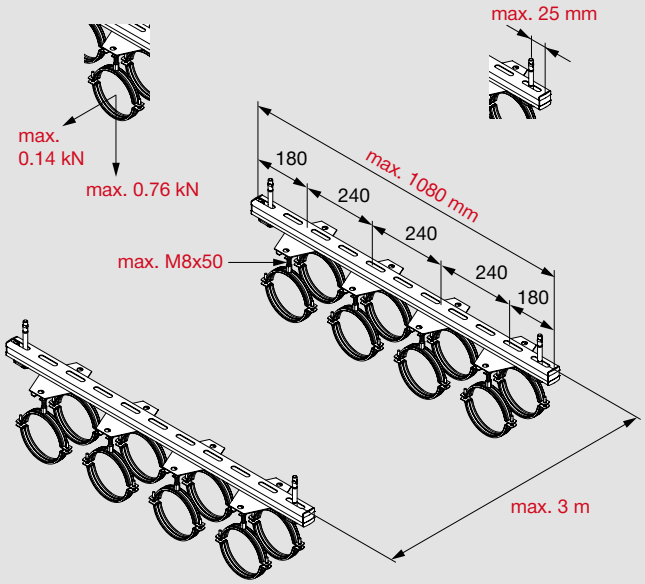
- Limited to max. 4 x DN 125 (O.D. 133.0 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4x DN 125 (O.D. 133.0 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3 m channel**	1	1.08
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105851**	**HST3 M12x145 70/50 stud anchor**	2	-
④	**369685**	**MQZ-E41 end cap**	2	-
⑤	**369626**	**MQM-M10 wing nut**	8	-
⑥	**216454**	**M10x25 screw**	8	-
⑦	**248209**	**MSG 1.75 M8/10D slider**	4	-
⑧	**216390**	**AM10x40 threaded bolt**	8	-
⑨	**386419**	**MP-HI 129 - 137 pipe ring**	8	-

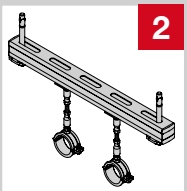
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



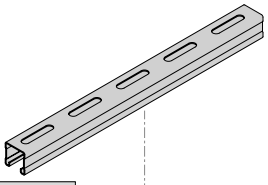
Base material	Concrete
Product line	MQ system, swivel
Capacity limit	4 x DN 125 concrete

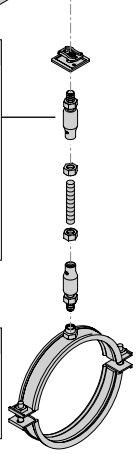
Head Rail On Concrete - Options For M12, M16 Pipe Connections

M12 solutions

M12 swivel hanger in channel	
1x MQA-M12 saddle nut	**369631**
2x MPH-M12 sw. hanger	**418038**
2x M12 nut	**216467**
1x M12 threaded rod	
AM12x1000 t-rod	**339797**
AM12x2000 t-rod	**216420**
AM12x3000 t-rod	**216421**

M12 pipe rings	
MP-PI..M12	**Sizes 219 mm - 326 mm**
MP-MI..G	**Sizes 3/8" - 6"**
MP-MXI	**Sizes 2" - 3"**



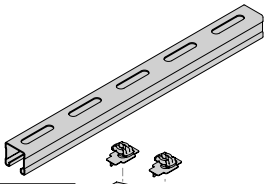


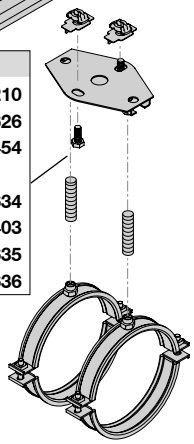
Double slider in channel	
1x MSG 1.75 M12/M16 slider	**248210**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M12 threaded bolts	
AM12x50	**216397**
AM12x80	**216398**
AM12x100	**216399**
AM12x120	**216400**
AM12x150	**216401**
AM12x200	**216402**

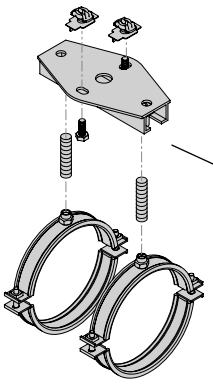
Double roller in channel	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M 12 threaded bolts	
AM12x50	**216397**
AM12x80	**216398**
AM12x100	**216399**
AM12x120	**216400**
AM12x150	**216401**
AM12x200	**216402**

M16 solutions

Double slider in channel	
1x MSG 1.75 M12/M16 slider	**248210**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M 16 threaded bolts	
AM 16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**



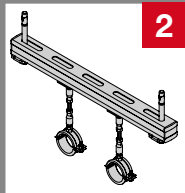




Double roller in channel	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M 16 threaded bolts	
AM 16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

M16 pipe rings	
MP-MI..C	**Sizes 4" - 244.5 mm**
MP-MXI..M16	**Sizes 4" - 508 mm**

M16 threaded rods	
216422	**AM16x1000**
216423	**AM16x2000**
216424	**AM16x3000**

Application description	Application	Product lines	Base material
Heating - head rail	2 	MQ System	Concrete
		Anchors	
		Expansion elements	

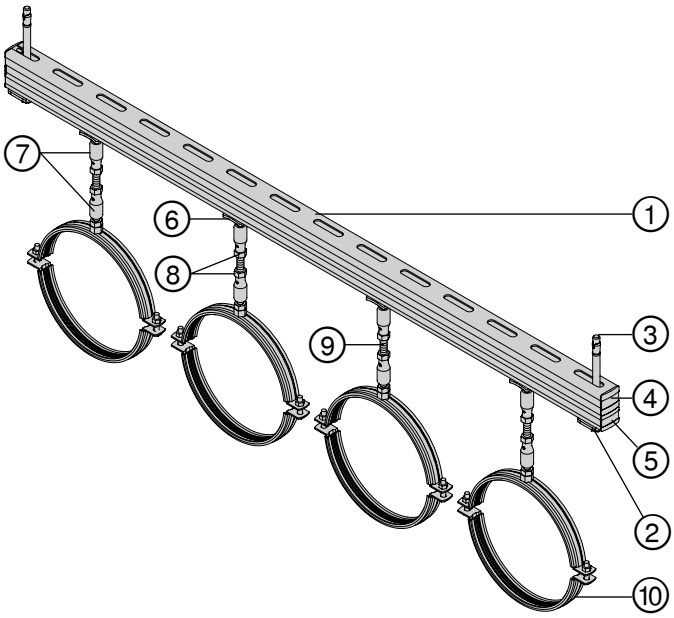
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Head Rail

Type H-HR4

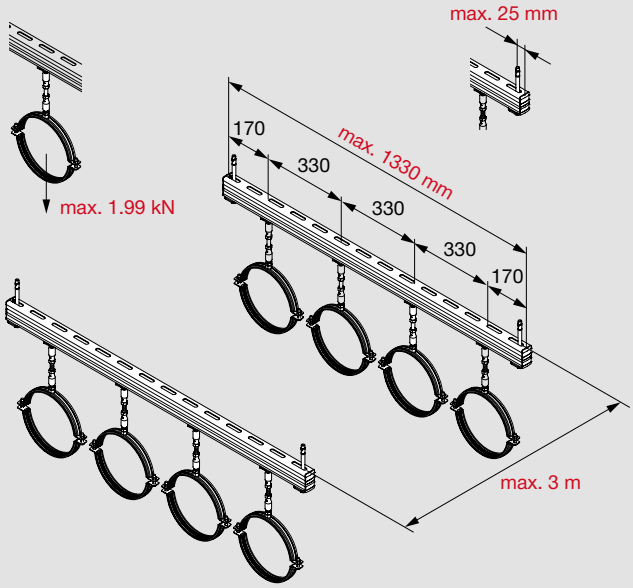
- Limited to max. 4 x DN 200 (O.D. 219.1 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4x DN 200 (O.D. 219.1 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369599**	**MQ-72 6 m channel**	1	1.33
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105853**	**HST3 M12x185 110/90 stud anchor**	2	-
④	**369685**	**MQZ-E41 end cap**	2	-
⑤	**369686**	**MQZ-E31 end cap**	2	-
⑥	**369631**	**MQA-M12-B saddle nut**	4	-
⑦	**418038**	**MPH-M12 swivel hanger**	8	-
⑧	**216467**	**M12 nut**	8	-
⑨	**339797**	**AM12x1000 threaded rod**	4	Depends on distance
⑩	**2073484**	**MP-PI 218-226 8" M12 pipe ring**	4	-

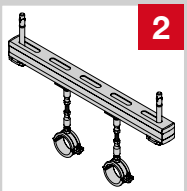
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

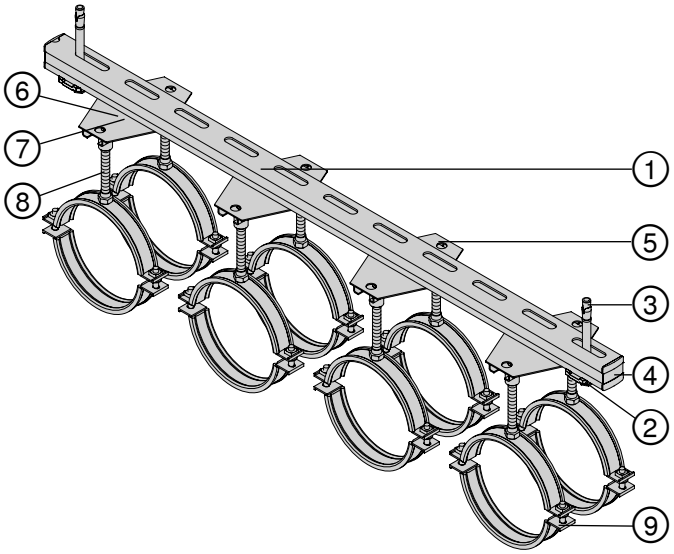


Base material	Concrete
Product line	MQ system, swivel
Capacity limit	4 x DN 200 concrete

Heating Applications - Head Rail

Type H-HR5

- Limited to max. 4 x DN 150 (O.D. 159.0 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

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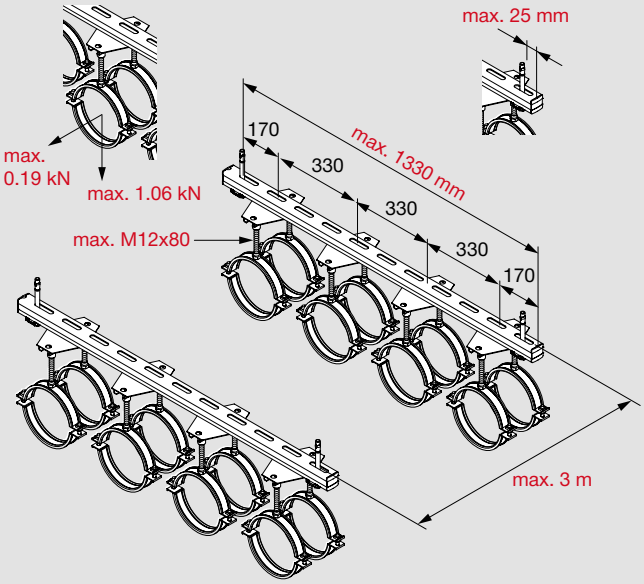
Limited to max. 4x DN 150 (O.D. 159.0 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369596**	**MQ-41/3 3 m channel**	1	1.12
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105851**	**HST3 M12x145 70/50 stud anchor**	2	-
④	**369685**	**MQZ-E41 end cap**	2	-
⑤	**248210**	**MSG 1.75 M12/16D slider**	4	-
⑥	**369626**	**MQM-M10 wing nut**	8	-
⑦	**216454**	**M10x25 screw**	8	-
⑧	**216398**	**AM12x80 threaded bolt**	8	-
⑨	**20885**	**MP-MI 159 G pipe ring**	4	-

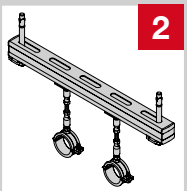
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

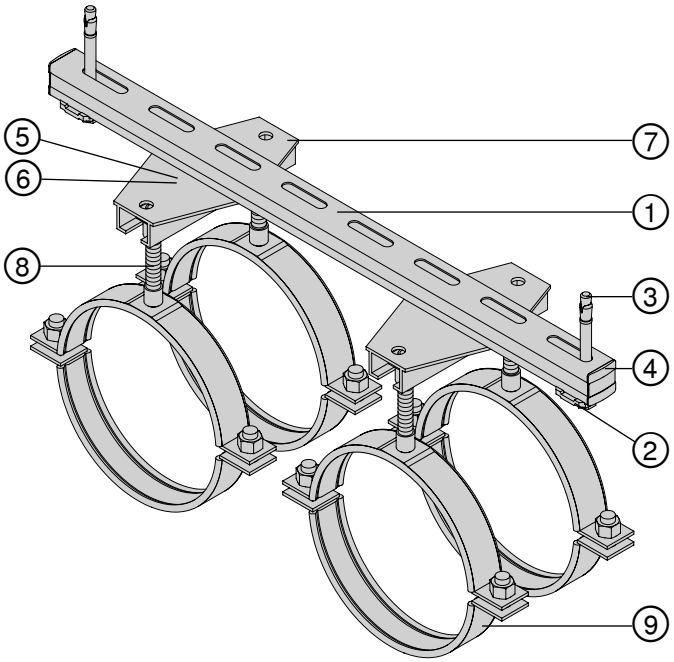


Base material	Concrete
Product line	MQ system, swivel
Capacity limit	4 x DN 150 concrete

Heating Applications - Head Rail

Type H-HR6

- Limited to max. 2 x DN 200 (O.D. 219.1 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

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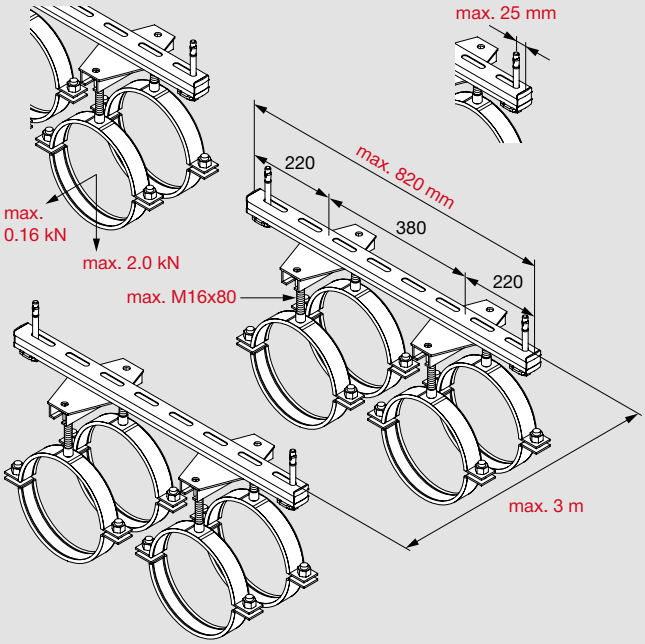
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 2x DN 200 (O.D. 219.1 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3 m channel**	-	0.81
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105851**	**HST3 M12x145 70/50 stud anchor**	2	-
④	**369685**	**MQZ-E41 end cap**	2	-
⑤	**369627**	**MQM-M12 wing nut**	4	-
⑥	**216458**	**M12x25 screw**	4	-
⑦	**334131**	**MRG-D6 M12/M16 roller**	2	-
⑧	**216422**	**AM16x1000 threaded rod**	4	0.08
⑨	**372238**	**MP-MXI 219 M16 pipe ring**	4	-

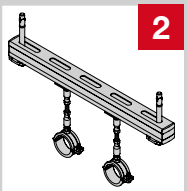
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

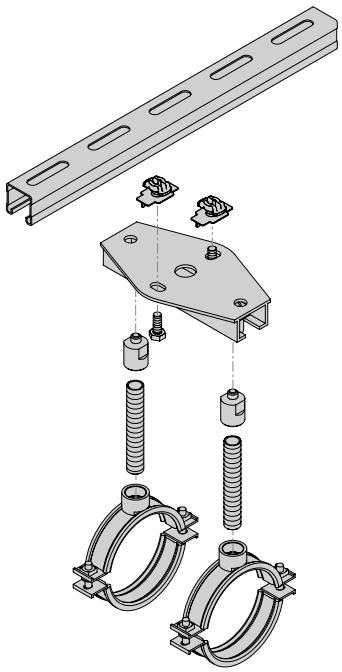
Application



Base material	Concrete
Product line	MQ system, rollers
Capacity limit	2 x DN 200 concrete

Head Rail On Concrete - Options For ½", 3/4" Pipe Connections

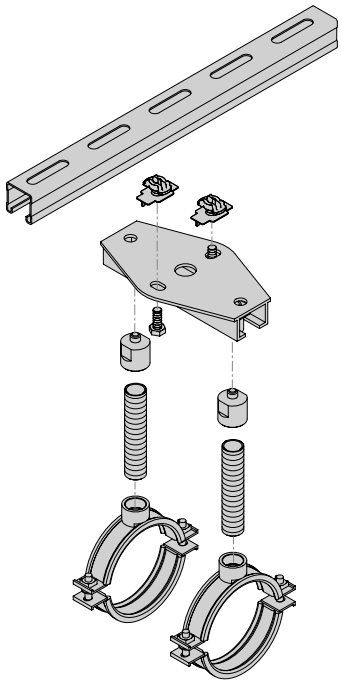
½" threaded pipe solutions



Double roller in channel	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x MRA 1⁄2" M16 adapter	**338992**
2x ½" threaded pipe GR-G 1/2"x2000	**56428**

½" connection boss pipe rings	
MP-MI..DL	**Sizes 3/4"- 2"**
MP-MXI..M16	**Sizes 4" - 508 mm**

¾" threaded pipe solutions



Double roller in channel	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x MRA 3/4" M16 adapter	**338993**
2x 3/4" threaded pipe GR-G 3/4"x2000	**56429**

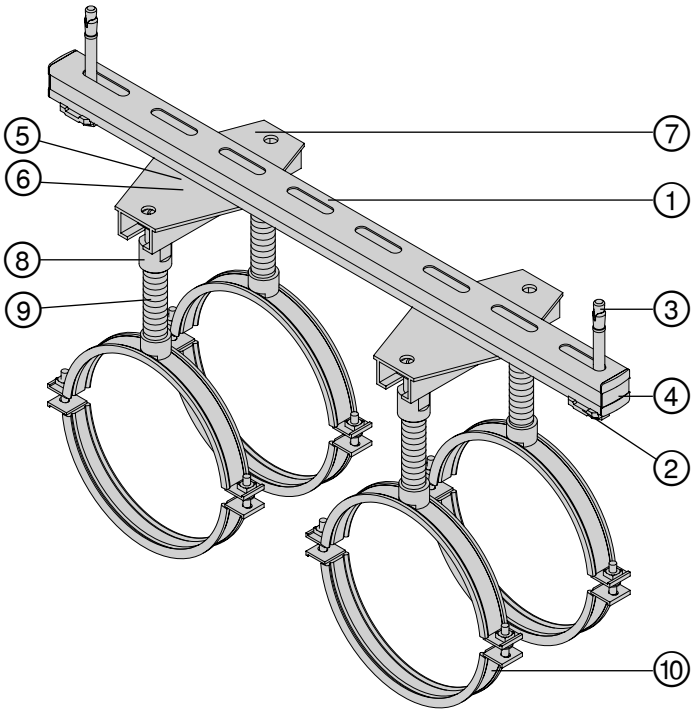
¾" connection boss pipe rings	
MP-MI..EL Sizes	**117mm - 267 mm**
MP-MXI..3/4"	**Sizes 2"- 133 mm**

Application description	Application	Product lines	Base material
Heating - head rail	2	MQ System	Concrete
General comments		Anchors	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Expansion elements	

Heating Applications - Head Rail

Type H-HR7

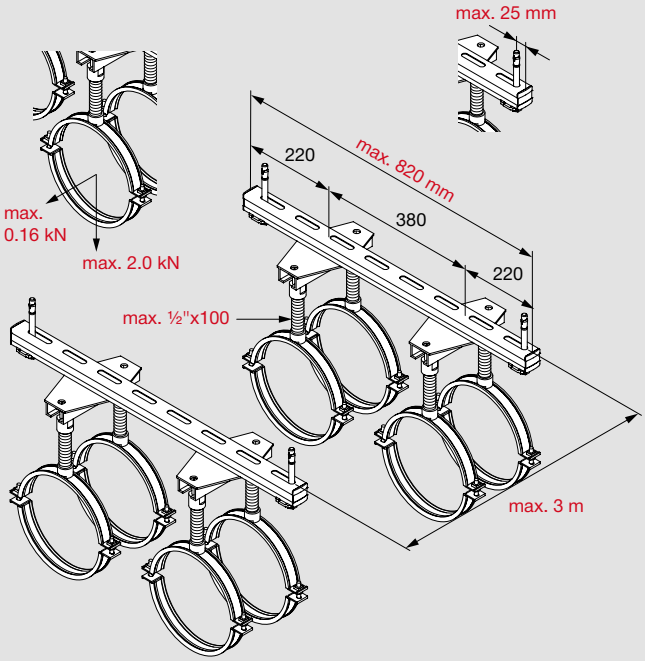
- Limited to max. 2 x DN 200 (O.D. 219.1 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 2 x DN 200 (O.D. 219.1 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3 m channel**	-	0.81
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105851**	**HST3 M12x145 70/50 stud anchor**	2	-
④	**369685**	**MQZ-E41 end cap**	2	-
⑤	**369627**	**MQM-M12 wing nut**	4	-
⑥	**216458**	**M12x25 screw**	4	-
⑦	**334131**	**MRG-D6 M12/M16 roller**	2	-
⑧	**338993**	**MRA 3/4" M16 adapter**	4	-
⑨	**56429**	**GR-G 3/4" x 2000 threaded pipe**	4	0.1
⑩	**20895**	**MP-MI 212 EL pipe ring**	4	-

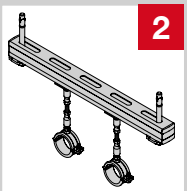
Application description

Heating - head rail

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

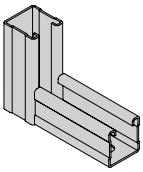
Application



Base material	Concrete
Product line	MQ system, rollers
Capacity limit	2 x DN 200 concrete

Trapeze On Concrete - Main Frame Options

Open section of vertical profiles facing the inside of the trapeze



41 format cantilever arms 4-hole base	
MQK-41/600/4	**369613**
MQK-41/1000/4	**369614**

41 format cantilever arms 2-hole base	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**

Connection to concrete – channel base	
1x MQP 1/3 channel base	**369647**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQV -2/2 D-14 channel base	**369639**
2x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 1/1 channel base	**369646**
1x MQN push button	**369623**

Relevant anchors for channel bases	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Connector	
1x MQW-Q2 connector	**369655**

Connector	
1x MQW-3 connector	**369656**
3x MQN push button	**369623**

Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

Pipe fastening:
please see following pages

41 format channels	
MQ-41 2m	**304559**
MQ-41 3m	**369591**
MQ-41 6m	**369592**
MQ-41 3m LL	**2048100**
MQ-41 6m LL	**2048101**
MQ-41/3 3m	**369596**
MQ-41/3 6m	**369597**
MQ-41 U 6m	**369595**
MQ-21D 3m	**369601**
MQ-21D 6m	**369602**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**

Connector	
1x MQW-S1 connector	**369664**
4x MQN push button	**369623**

Connector	
1x MQW-S2 connector	**369665**
4x MQN push button	**369623**

Plastic end caps	
1x MQZ-E41 for 41channel	**369685**
2x MQZ-E21 for 21D channel	**370598**

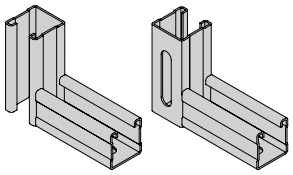
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Sliders / Rollers	
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

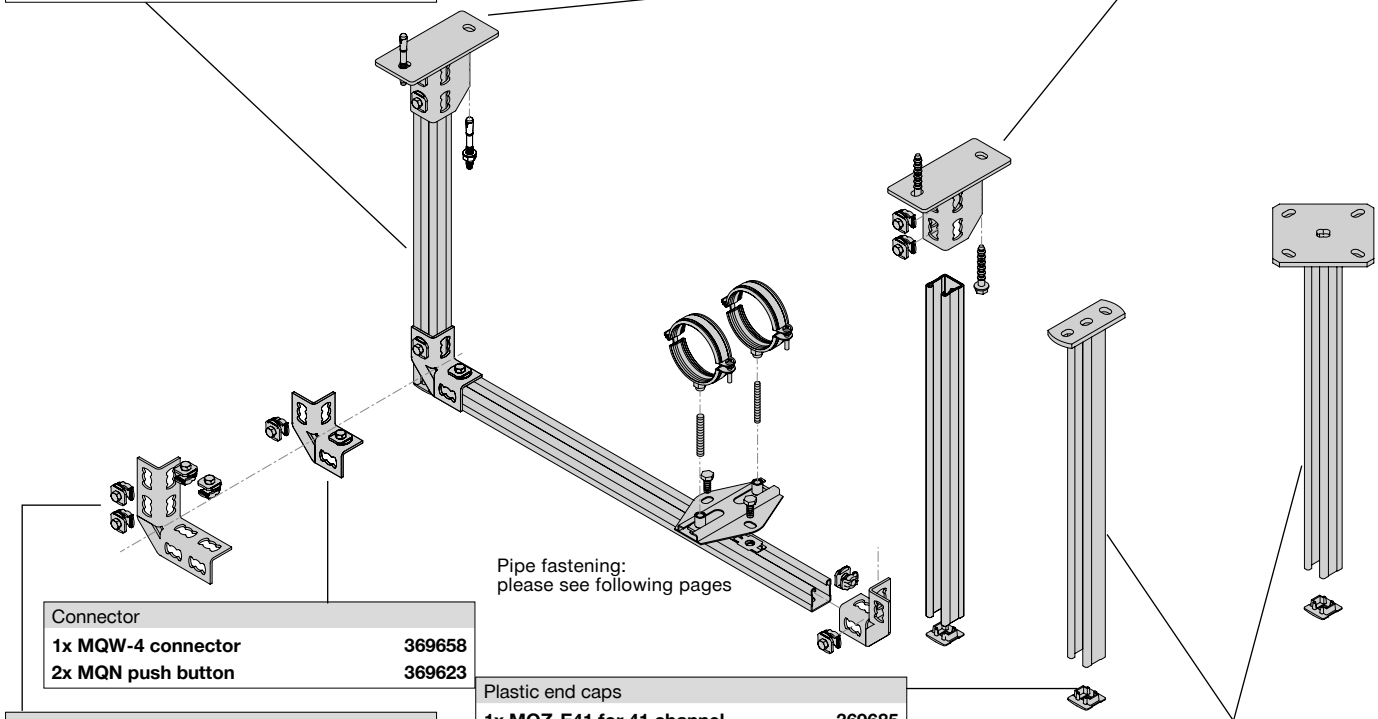
Trapeze On Concrete – Main Frame Options

Open section of vertical profiles facing pipe axis



41 mm format channels	
MQ-41 2m	**304559**
MQ-41 3m	**369591**
MQ-41 6m	**369592**
MQ-41 3m LL	**2048100**
MQ-41 6m LL	**2048101**
MQ-41/3 3m	**369596**
MQ-41/3 6m	**369597**
MQ-41 U 6m	**369595**
MQ-21D 3m	**369601**
MQ-21D 6m	**369602**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 Stud anchor	**2105718**
HST2 M12x105/10 Stud anchor	**2107848**



Pipe fastening:
please see following pages

Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**

Plastic end caps	
1x MQZ-E41 for 41 channel	**369685**
2x MQZ-E21 for 21D channel	**370598**

41 format cantilever arms	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-41/600/4	**369613**
MQK-41/1000/4	**369614**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**

Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Sliders / Rollers	
		Anchors	

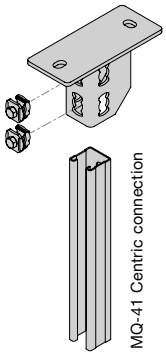
General comments

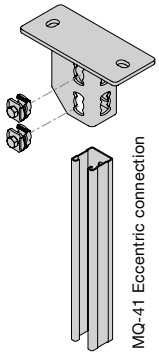
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

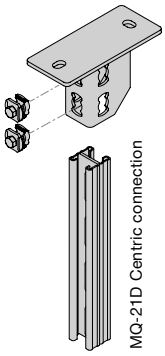
Trapeze On Concrete – Main Frame Options: Vertical Upright

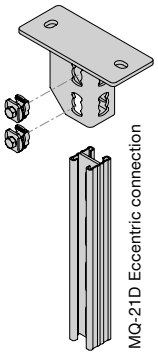
Assembly options

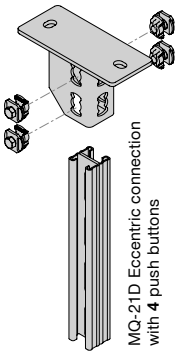
MQP 21-72 Channel base with multidirectional connection associated channels	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
41 mm format channels	
MQ-41 2m	**304559**
MQ-41 3m	**369591**
MQ-41 6m	**369592**
MQ-41 3m LL	**2048100**
MQ-41 6m LL	**2048101**
MQ-41/3 3m	**369596**
MQ-41/3 6m	**369597**
MQ-41 U 6m	**369595**
MQ-21D 3m	**369601**
MQ-21D 6m	**369602**



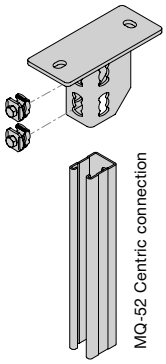


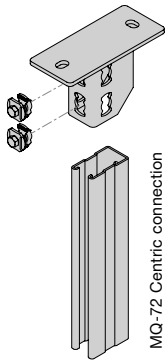




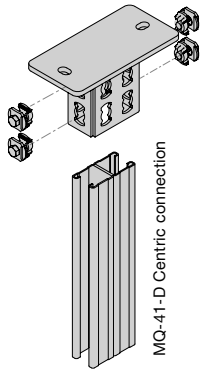


MQP 21-72 Channel base with one direction connection associated channels	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
52 and 72 mm format channels	
MQ-52 3m	**373795**
MQ-52 6m	**369598**
MQ-72 3m	**373797**
MQ-72 6m	**369599**
MQ-72 6m U	**370593**

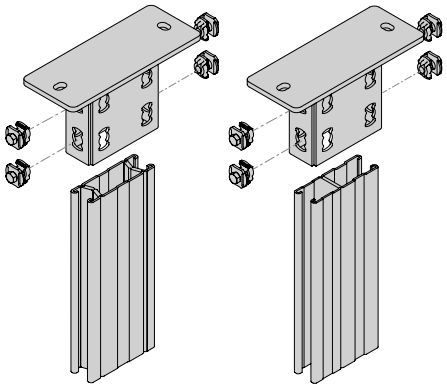




MQP 82 Channel base with associated channels	
1x MQP 82 channel base	**369652**
4x MQN push button	**369623**
41D mm format channels	
MQ-41D 3m	**369603**
MQ-41D 6m	**369604**



MQP 124 Channel base with associated channels	
1x MQP 124 channel base	**369653**
4x MQN push button	**369623**
41D mm format channels	
MQ-52-72 D 3m	**373799**
MQ-52-72 D 6m	**369605**
MQ-124X D 6m	**369606**



Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Trapeze On Concrete – Quiet Zone Pipe Fastening M8, M10

Quiet zone solutions M8

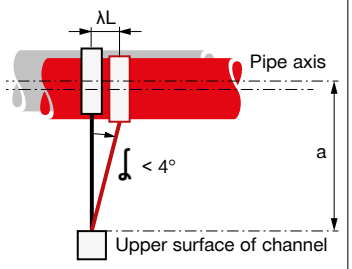
M8 channel nut and square washer	
1x AM8x.. threaded bolt	
1x M8 hex. nut	**216465**
1x MQZ-L9 square washer	**369678**
1x MQM-M8 wing nut	**369698**

M8 quick release saddle nut	
1x AM8x.. threaded bolt	
1x MQA-Q8 saddle nut	**369635**

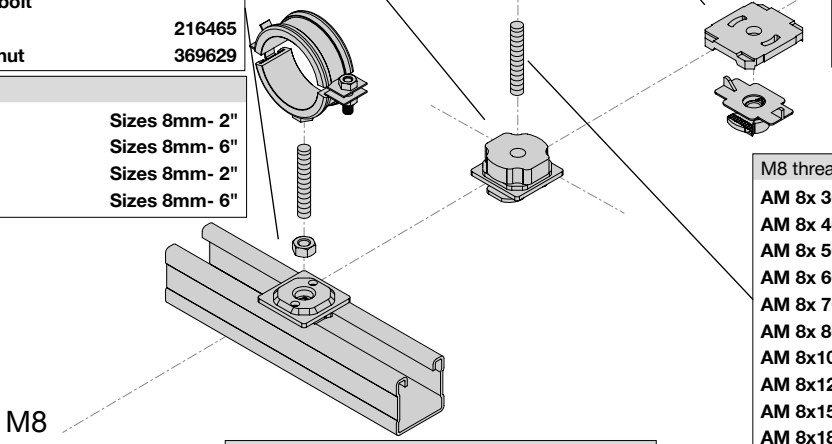
M8 saddle nut	
1x AM8x.. threaded bolt	
1x M8 hex. nut	**216465**
1x MQA-M8 saddle nut	**369629**

M8 pipe rings	
MP-LHI	**Sizes 8mm- 2"**
MP-HI	**Sizes 8mm- 6"**
MPN-LI	**Sizes 8mm- 2"**
MPN-RC	**Sizes 8mm- 6"**

For quiet zone solutions



M8 threaded bolts	
AM 8x 30	**216379**
AM 8x 40	**216380**
AM 8x 50	**216381**
AM 8x 60	**216382**
AM 8x 70	**216383**
AM 8x 80	**216384**
AM 8x100	**216385**
AM 8x120	**216386**
AM 8x150	**216387**
AM 8x180	**216388**



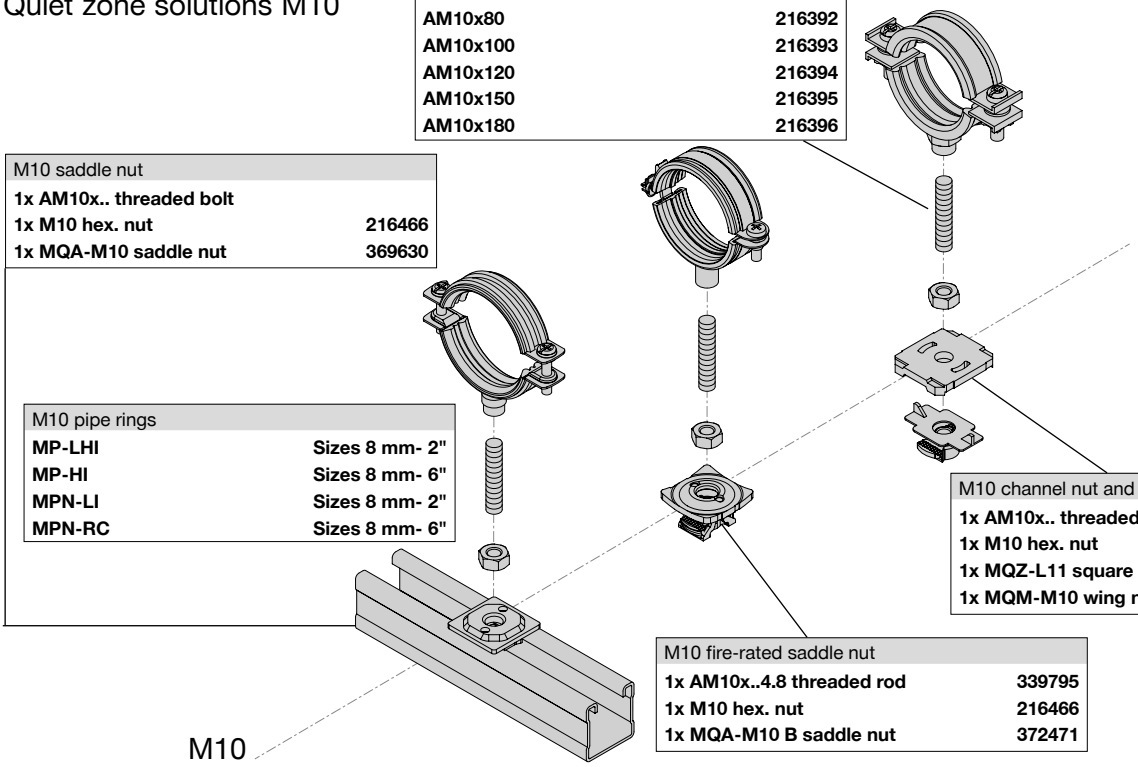
M8

Quiet zone solutions M10

M10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

M10 saddle nut	
1x AM10x.. threaded bolt	
1x M10 hex. nut	**216466**
1x MQA-M10 saddle nut	**369630**

M10 pipe rings	
MP-LHI	**Sizes 8 mm- 2"**
MP-HI	**Sizes 8 mm- 6"**
MPN-LI	**Sizes 8 mm- 2"**
MPN-RC	**Sizes 8 mm- 6"**



M10 channel nut and square washer	
1x AM10x.. threaded bolt	
1x M10 hex. nut	**216466**
1x MQZ-L11 square washer	**369679**
1x MQM-M10 wing nut	**369626**

M10 fire-rated saddle nut	
1x AM10x..4.8 threaded rod	**339795**
1x M10 hex. nut	**216466**
1x MQA-M10 B saddle nut	**372471**

M10

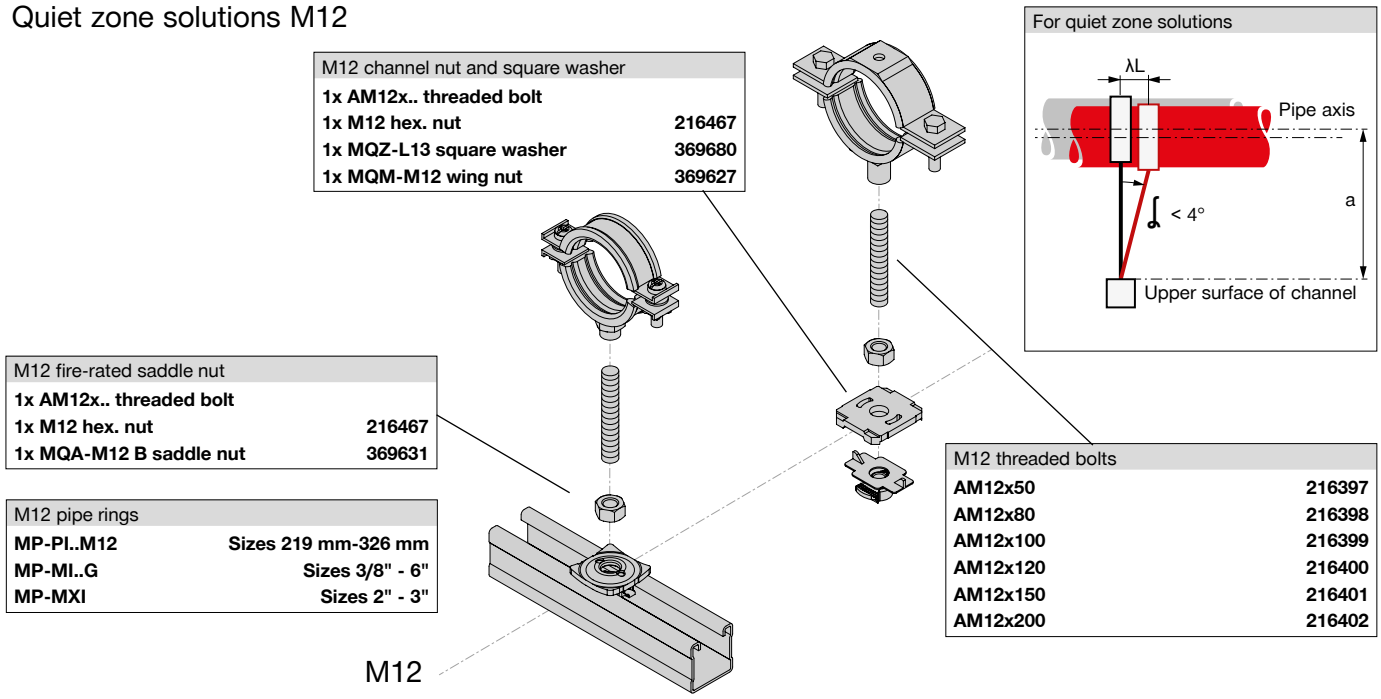
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Pipe rings	

General comments

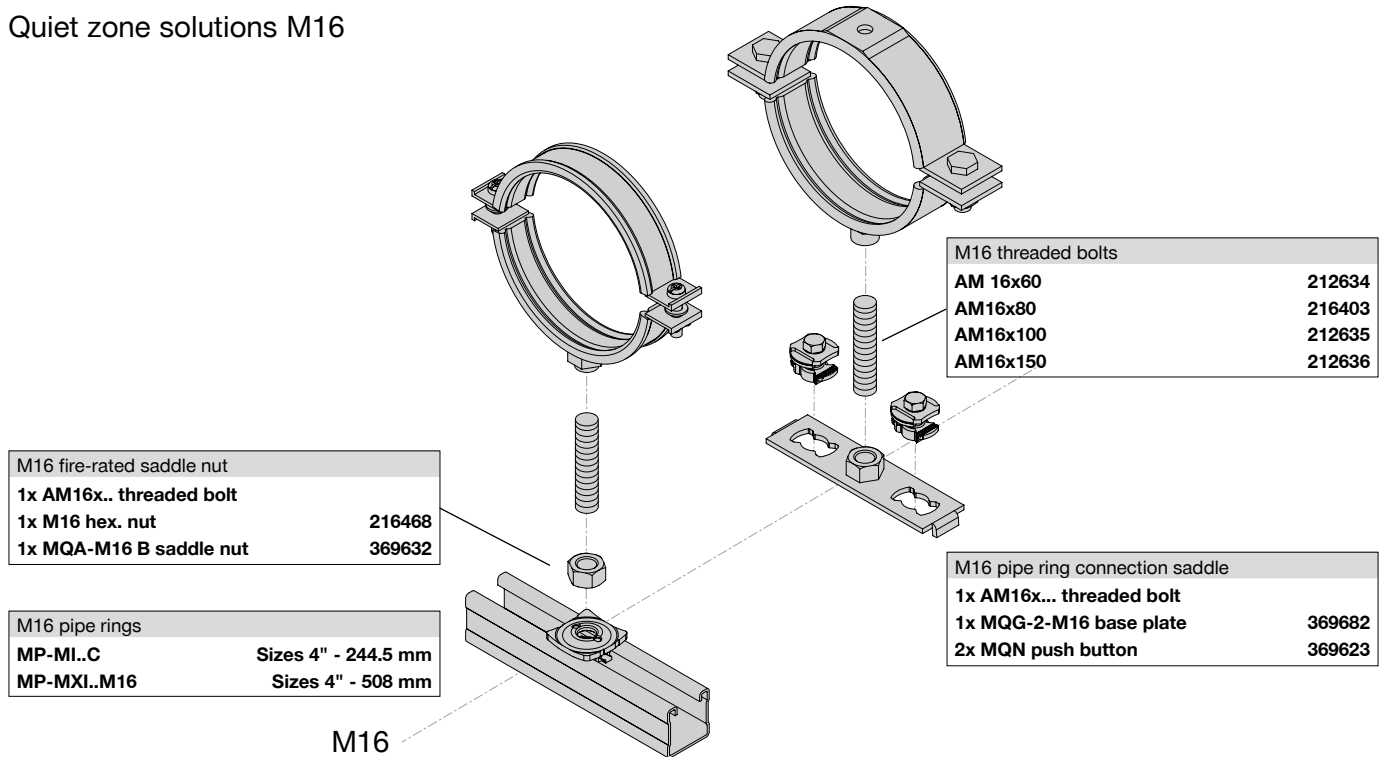
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Trapeze On Concrete – Quiet Zone Pipe Fastening M12, M16

Quiet zone solutions M12



Quiet zone solutions M16



Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Pipe rings	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

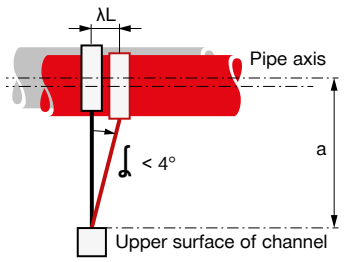
Trapeze On Concrete – Quiet Zone Pipe Fastening ½", ¾"

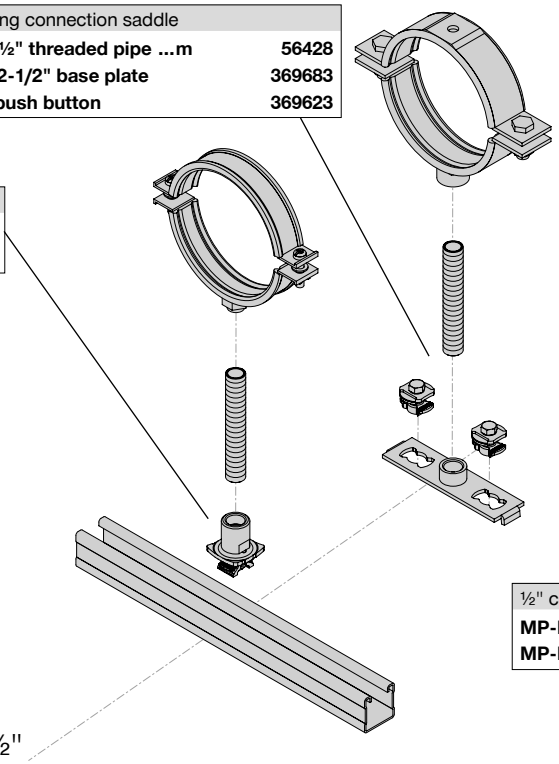
Quiet zone solutions ½"

½" pipe ring connection saddle	
1x GR-G ½" threaded pipe ...m	**56428**
1x MQG-2-1/2" base plate	**369683**
2x MQN push button	**369623**

½" pipe ring saddle with adapter	
1x GR-G ½" threaded pipe ...m	**56428**
1x MQA-½" saddle nut	**369633**

For quiet zone solutions

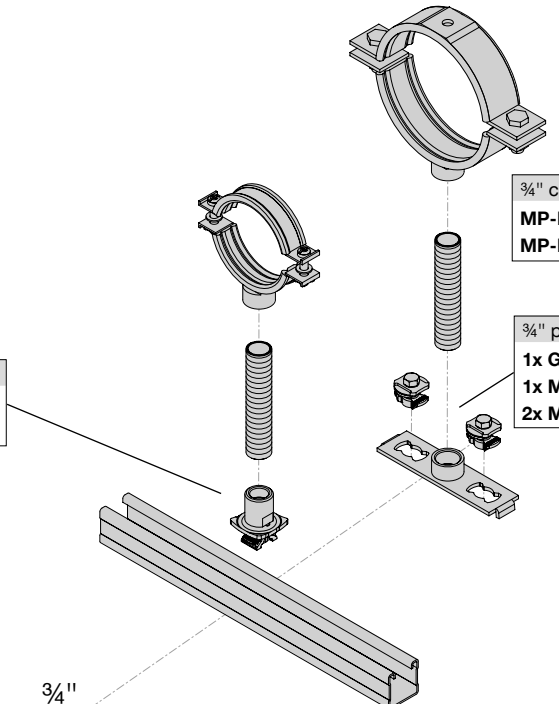




½" connection boss pipe rings	
MP-MI..DL	**Sizes ¾"- 2"**
MP-MXI..M16	**Sizes 4" - 508 mm**

½"

Quiet zone solutions ¾"

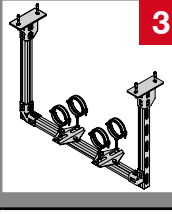


¾" connection boss pipe rings	
MP-MI..EL	**Sizes 117 mm - 267 mm**
MP-MXI..¾"	**Sizes 2" - 133 mm**

¾" pipe ring connection saddle	
1x GR-G ¾" threaded pipe ...m	**56429**
1x MQG-2-¾" base plate	**369684**
2x MQN push button	**369623**

¾" pipe ring saddle with adapter	
1x GR-G ¾" threaded pipe ...m	**56429**
1x MQA-¾" saddle nut	**369634**

¾"

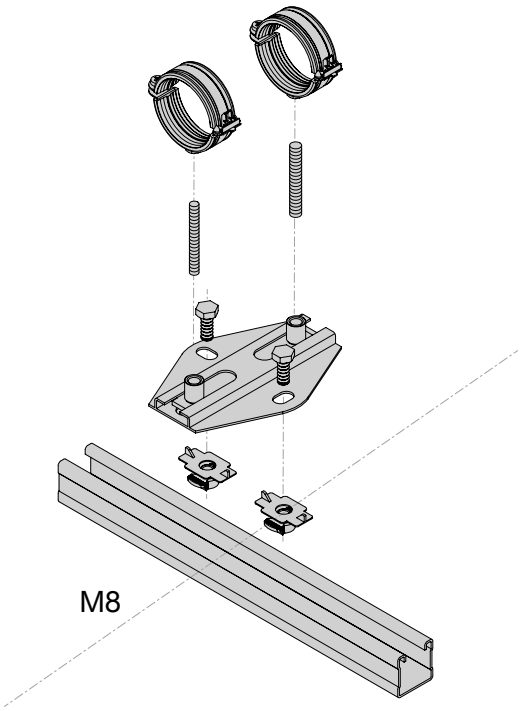
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
General comments		Pipe rings	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Trapeze On Concrete – Expansion Zone Pipe Fastening M8, M10

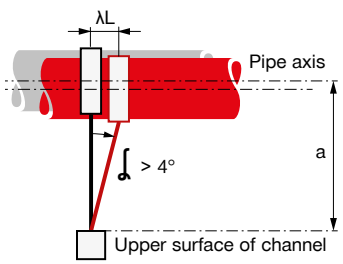
Expansion zone solutions M8

Double slider in channel	
1x MSG 1.75 M8/M10 slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M8 threaded bolts	
AM 8x 30	**216379**
AM 8x 40	**216380**
AM 8x 50	**216381**
AM 8x 60	**216382**
AM 8x 70	**216383**
AM 8x 80	**216384**
AM 8x100	**216385**
AM 8x120	**216386**
AM 8x150	**216387**
AM 8x180	**216388**

M8 pipe rings	
MP-LHI	**Sizes 8 mm- 2"**
MP-HI	**Sizes 8 mm- 6"**
MPN-LI	**Sizes 8 mm- 2"**
MPN-RC	**Sizes 8 mm- 6"**



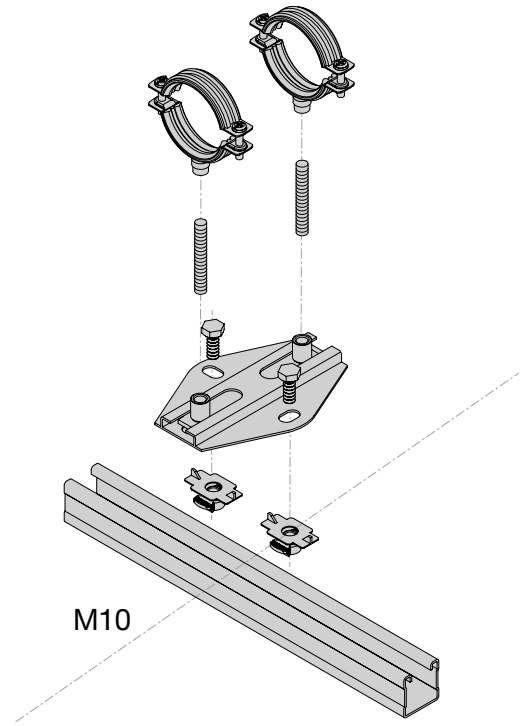
For quiet zone solutions



Expansion zone solutions M10

Double slider in channel	
1x MSG 1.75 M8/M10 slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

M10 pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**



Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Pipe rings	

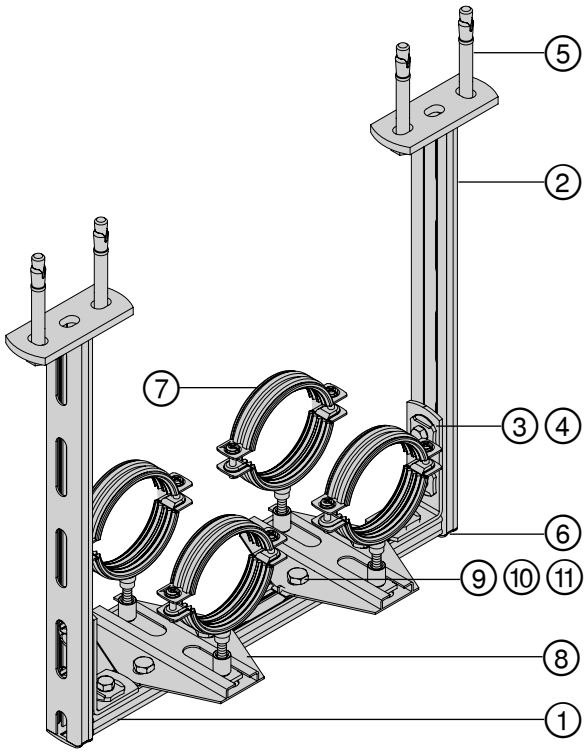
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Trapeze Frame

Type H-T1

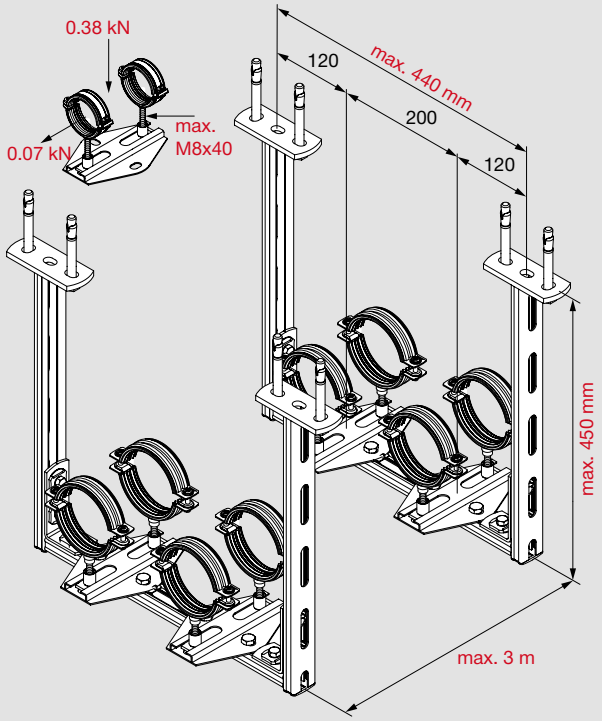
- Limited to max. 2 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 2 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369584**	**MQ-21 3 m channel**	1	0.44
②	**369608**	**MQK-21/450 bracket**	2	-
③	**369656**	**MQW-3 connector**	2	-
④	**369623**	**MQN push button**	6	-
⑤	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
⑥	**370598**	**MQZ-E21 plastic end cap**	2	-
⑦	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	4	-
⑧	**248209**	**MSG 1.75 M8/10D double slider**	2	-
⑨	**369626**	**MQM-M10 wing nut**	4	-
⑩	**216454**	**M10x25 hexagonal screw**	4	-
⑪	**216380**	**AM8x40 threaded bolt**	4	-

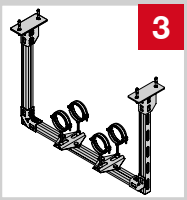
Application description

Heating - trapeze frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

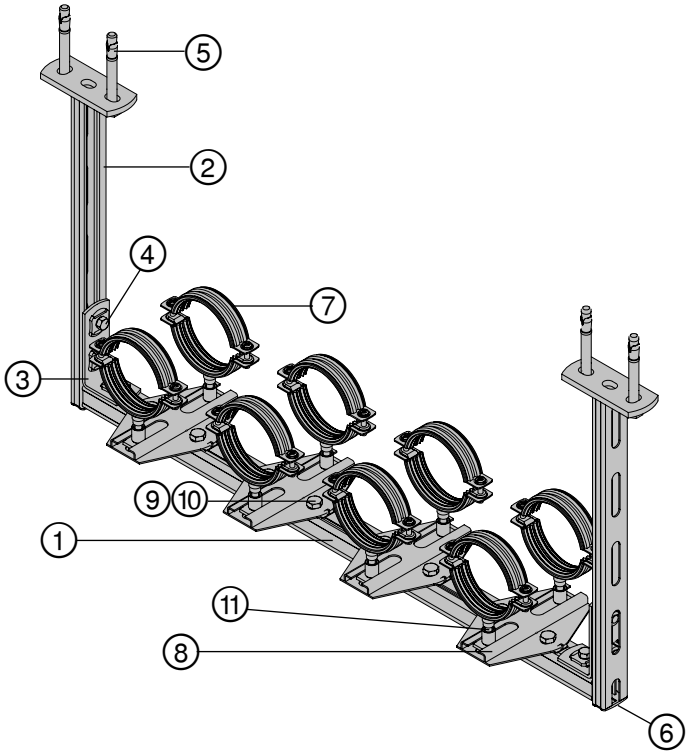


Base material	Concrete
Product line	MQ system, sliders
Capacity limit	2 x DN 80 concrete

Heating Applications - Trapeze Frame

Type H-T2

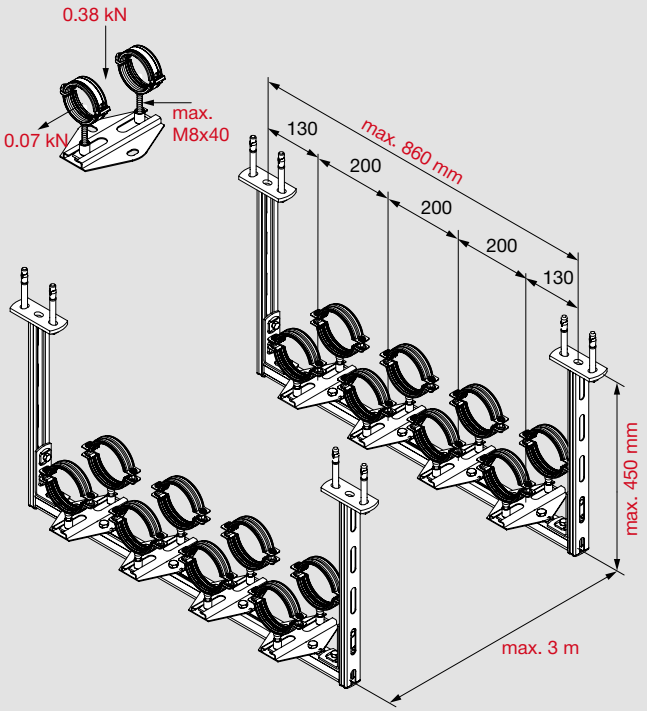
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369584**	**MQ-21 3 m channel**	1	0.86
②	**369608**	**MQK-21/450 bracket**	2	-
③	**369656**	**MQW-3 connector**	2	-
④	**369623**	**MQN push button**	6	-
⑤	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
⑥	**370598**	**MQZ-E21 plastic end cap**	2	-
⑦	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	8	-
⑧	**248209**	**MSG 1.75 M8/10D double slider**	4	-
⑨	**369626**	**MQM-M10 wing nut**	8	-
⑩	**216454**	**M10x25 hexagonal screw**	8	-
⑪	**216380**	**AM8x40 threaded bolt**	8	-

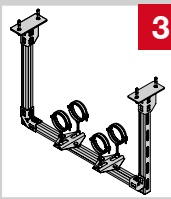
Application description

Heating - trapeze frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

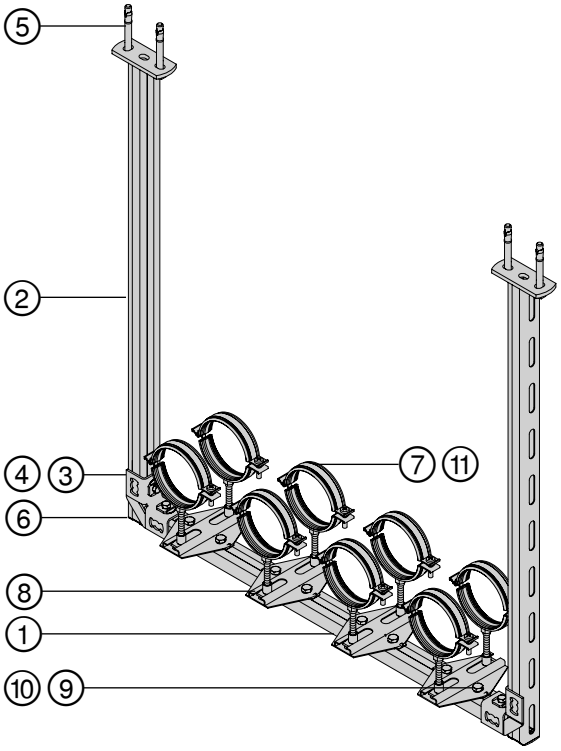


Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 80 concrete

Heating Applications - Trapeze Frame

Type H-T3

- Limited to max. 4 x DN 100 (O.D. 108 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

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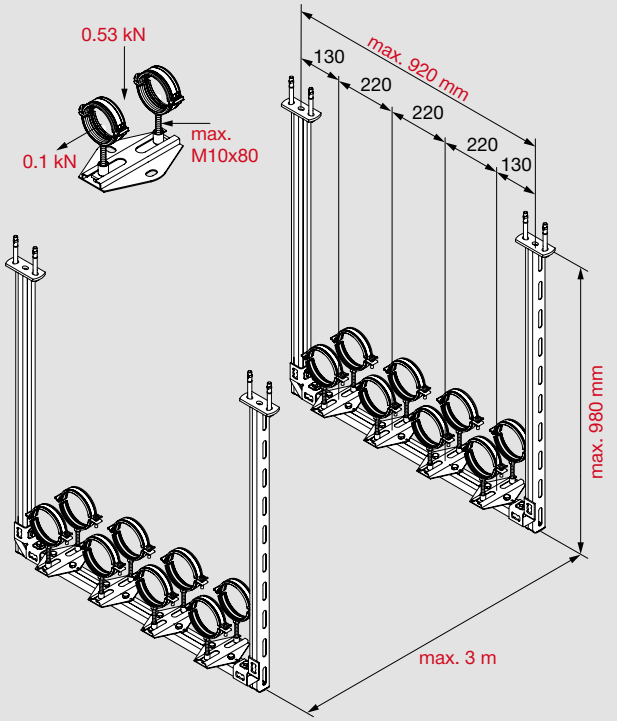
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 100 (O.D. 108 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3m channel**	1	0.91
②	**369612**	**MQK-41/1000 bracket**	2	-
③	**369658**	**MQW-4 connector**	2	-
④	**369623**	**MQN push button**	4	-
⑤	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
⑥	**369685**	**MQZ-E41 plastic end cap**	2	-
⑦	**335696**	**MPN-RC 110 B pipe ring**	8	-
⑧	**248209**	**MSG 1.75 M8/10D double slider**	4	-
⑨	**369626**	**MQM-M10 wing nut**	8	-
⑩	**216454**	**M10x25 hexagonal screw**	8	-
⑪	**216391**	**AM10x60 threaded bolt**	8	-

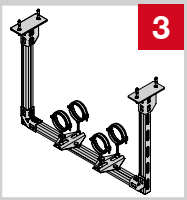
Application description

Heating - trapeze frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 100 concrete

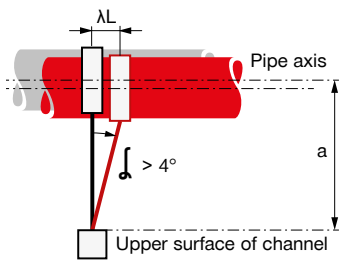
Trapeze On Concrete – Expansion Zone Pipe Fastening M12, M16

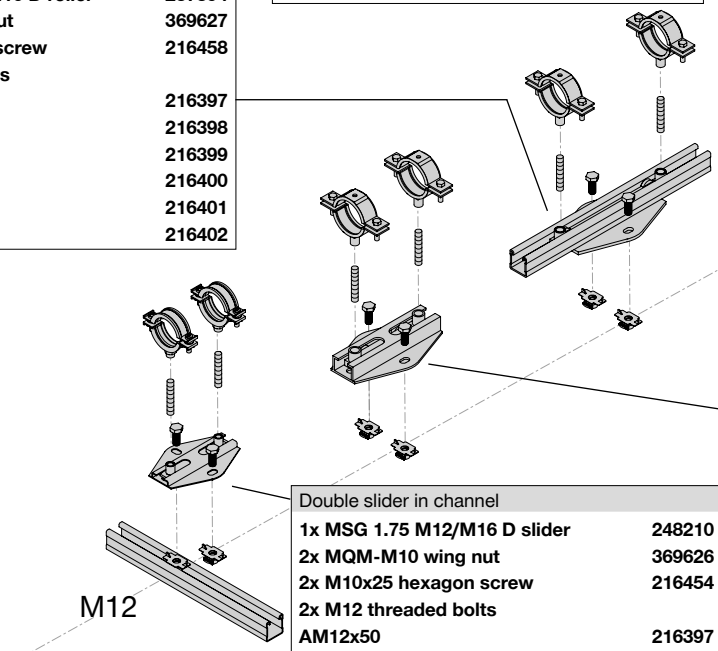
Expansion zone solutions M12

Long double roller in channel	
1x MRG-D225 M12/M16 D roller	**237394**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M12 threaded bolts	
AM12x50	**216397**
AM12x80	**216398**
AM12x100	**216399**
AM12x120	**216400**
AM12x150	**216401**
AM12x200	**216402**

M12 pipe rings	
MP-PI..M12	**Sizes 219 mm - 326 mm**
MP-MI..G	**Sizes 3/8" - 6"**
MP-MXI	**Sizes 2" - 3"**

For quiet zone solutions





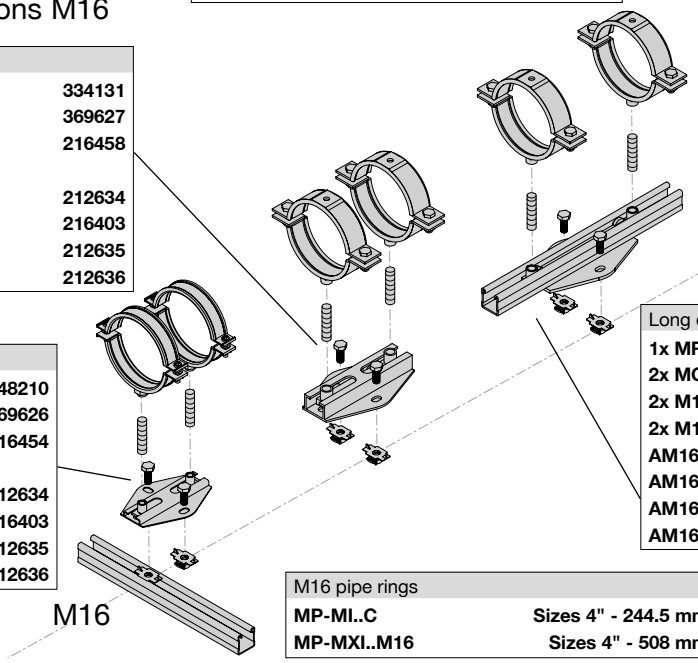
Double roller in channel	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M12 threaded bolts	
AM12x50	**216397**
AM12x80	**216398**
AM12x100	**216399**
AM12x120	**216400**
AM12x150	**216401**
AM12x200	**216402**

Double slider in channel	
1x MSG 1.75 M12/M16 D slider	**248210**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M12 threaded bolts	
AM12x50	**216397**
AM12x80	**216398**
AM12x100	**216399**
AM12x120	**216400**
AM12x150	**216401**
AM12x200	**216402**

Expansion zone solutions M16

Double roller in channel	
1x MRG-D6 M12/M16 D roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M16 threaded bolts	
AM16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

Double slider in channel	
1x MSG 1.75 M12/M16 slider	**248210**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M16 threaded bolts	
AM16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**



Long double roller in channel	
1x MRG-D225 M12/M16 roller	**237394**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M16 threaded bolts	
AM16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

M16 pipe rings	
MP-MI..C	**Sizes 4" - 244.5 mm**
MP-MXI..M16	**Sizes 4" - 508 mm**

Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Pipe rings	

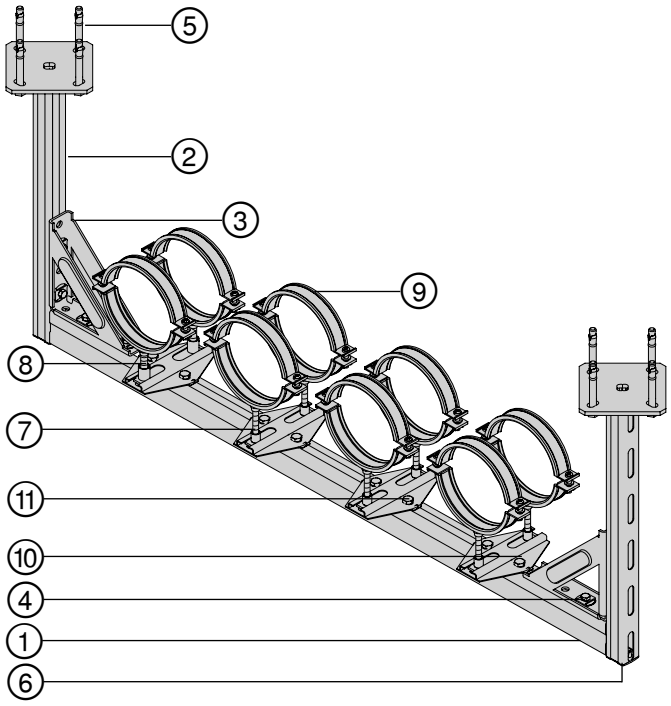
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Trapeze Frame

Type H-T4

- Limited to max. 4 x DN 150 (O.D. 159 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

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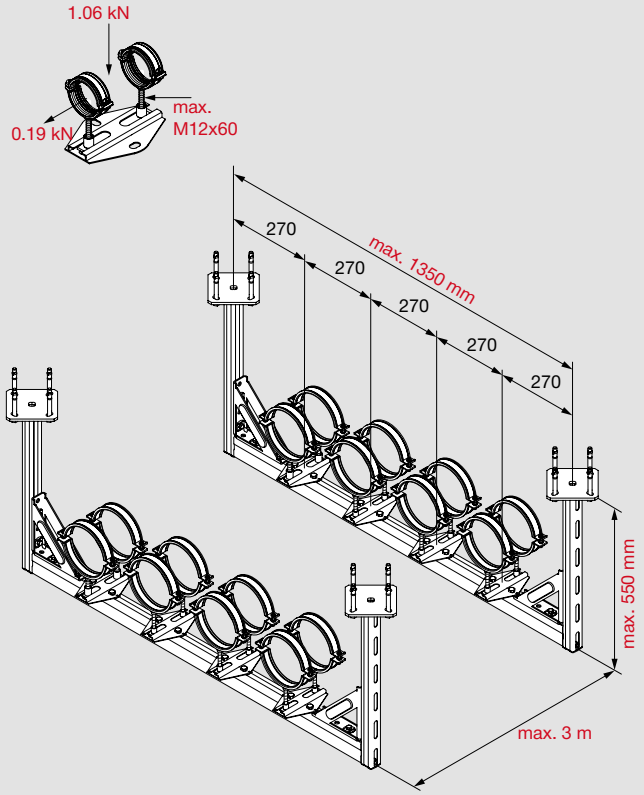
Limited to max. 4 x DN 150 (O.D. 159 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**373797**	**MQ-72 3 m channel**	1	1.36
②	**369613**	**MQK-41/600/4 bracket**	2	-
③	**369665**	**MQW-S/2 connector**	2	-
④	**369623**	**MQN push button**	8	-
⑤	**2105718**	**HST3 M12x105 30/10 stud anchor**	8	-
⑥	**369685**	**MQZ-E41 plastic end cap**	2	-
⑦	**248210**	**MSG 1.75 M12/16D slider**	4	-
⑧	**216397**	**AM12x50 threaded bolt**	8	-
⑨	**20885**	**MP-MI 159 G pipe ring**	8	-
⑩	**369626**	**MQM-M10 wing nut**	8	-
⑪	**216454**	**M10x25 hexagon screw**	8	-

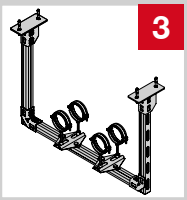
Application description

Heating - trapeze frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 150 concrete

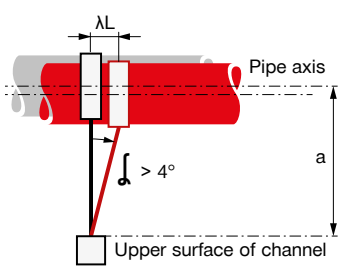
Trapeze On Concrete – Expansion Zone Pipe Fastening ½", ¾"

Expansion zone solutions ½"

Double roller in channel	
1x MRG-D6 M12/M16 roller	334131
2x MQM-M12 wing nut	369627
2x M12x25 hexagon screw	216458
2x MRA 1/2" M16 adapter	338992
2x ½" threaded pipe GR-G 1/2"x2000	56428

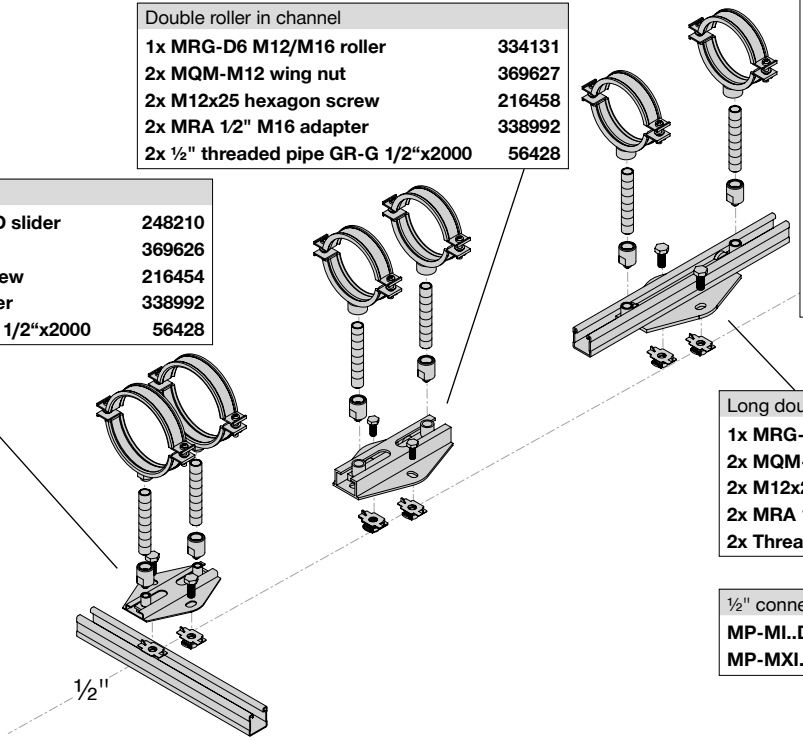
Double slider in channel	
1x MSG 1.75 M12/M16 D slider	248210
2x MQM-M10 wing nut	369626
2x M10x25 hexagon screw	216454
2x MRA 1/2" M16 adapter	338992
2x Threaded pipe GR-G 1/2"x2000	56428

For quiet zone solutions



Long double roller in channel	
1x MRG-D225 M12/M16 roller	237394
2x MQM-M12 wing nut	369627
2x M12x25 hexagon screw	216458
2x MRA 1/2" M16 adapter	338992
2x Threaded pipe GR-G 1/2"x2000	56428

½" connection boss pipe rings	
MP-MI..DL	Sizes 3/4"- 2"
MP-MXI..M16	Sizes 4" - 508 mm



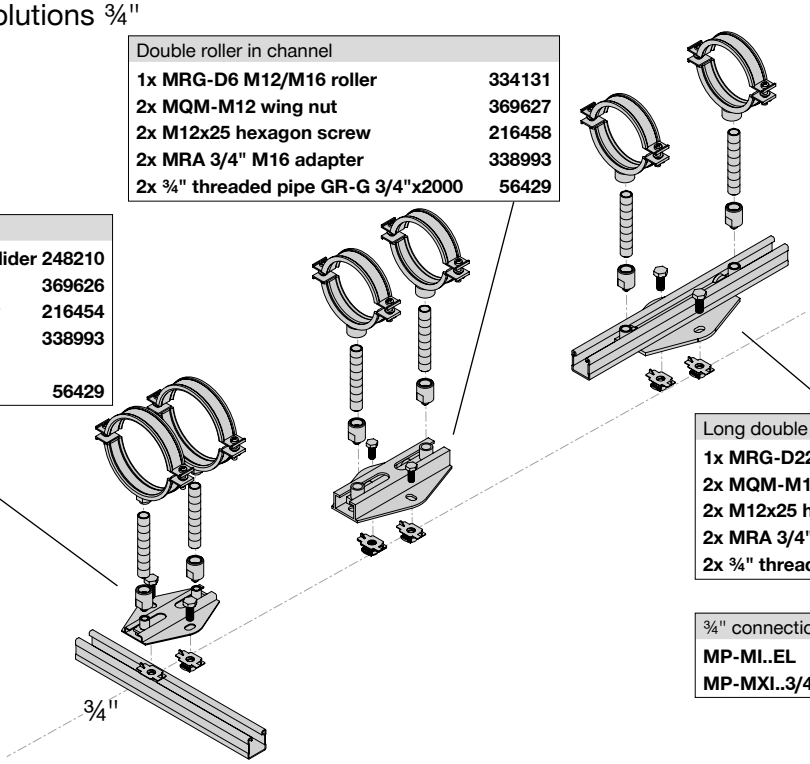
Expansion zone solutions ¾"

Double roller in channel	
1x MRG-D6 M12/M16 roller	334131
2x MQM-M12 wing nut	369627
2x M12x25 hexagon screw	216458
2x MRA 3/4" M16 adapter	338993
2x ¾" threaded pipe GR-G 3/4"x2000	56429

Double slider in channel	
1x MSG 1.75 M12/M16 D slider	248210
2x MQM-M10 wing nut	369626
2x M10x25 hexagon screw	216454
2x MRA 3/4" M16 adapter	338993
2x ¾" threaded pipe GR-G 3/4"x2000	56429

Long double roller in channel	
1x MRG-D225 M12/M16 roller	237394
2x MQM-M12 wing nut	369627
2x M12x25 hexagon screw	216458
2x MRA 3/4" M16 adapter	338993
2x ¾" threaded pipe GR-G 3/4"x2000	56429

¾" connection boss pipe rings	
MP-MI..EL	Sizes 117 mm - 267 mm
MP-MXI..3/4"	Sizes 2" - 133 mm



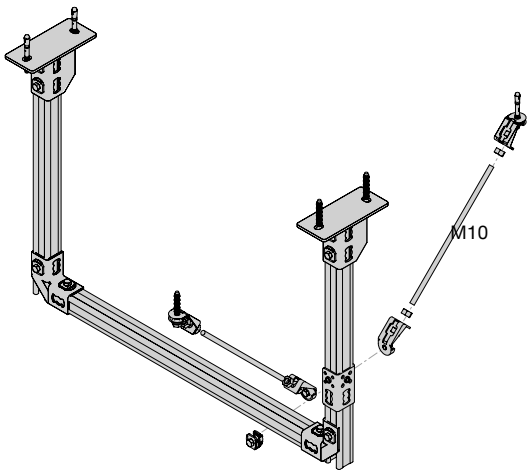
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Pipe rings	

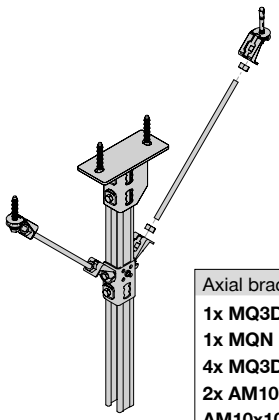
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Trapeze On Concrete – Main Frame Options: Axial Bracing

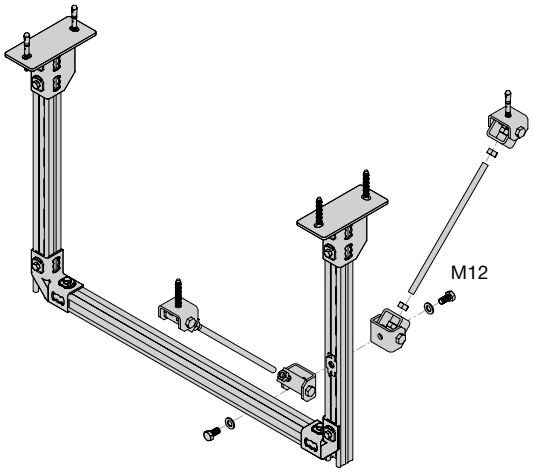
Using MQ-3D elements and threaded rods

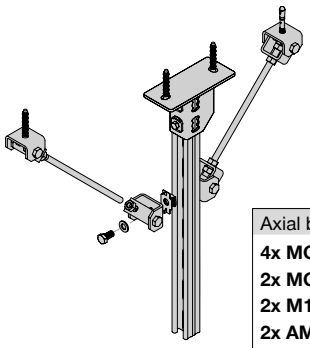




Axial bracing using 3D elements	
1x MQ3D-B 3D base	**369694**
1x MQN push button	**369623**
4x MQ3D-A brace connector	**369697**
2x AM10 threaded rod	
AM10x1000 t. rod	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
8x M10 hex. nut	**216466**
2x Anchor	
HUS3-H 8x55/-/- screw anchor	**2079794**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**

Using MQP-U hinge and threaded rods





Axial bracing using MQP-U hinge	
4x MQP-U M12 hinge	**284248**
2x MQM-M12	**369627**
2x M12x25 hex. screw	**216458**
2x AM12 threaded rod	
AM12x1000 t. rod	**339797**
AM12x2000 t. rod	**216420**
AM12x3000 t. rod	**216421**
8x M12 hex. nut	**216467**
2x anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

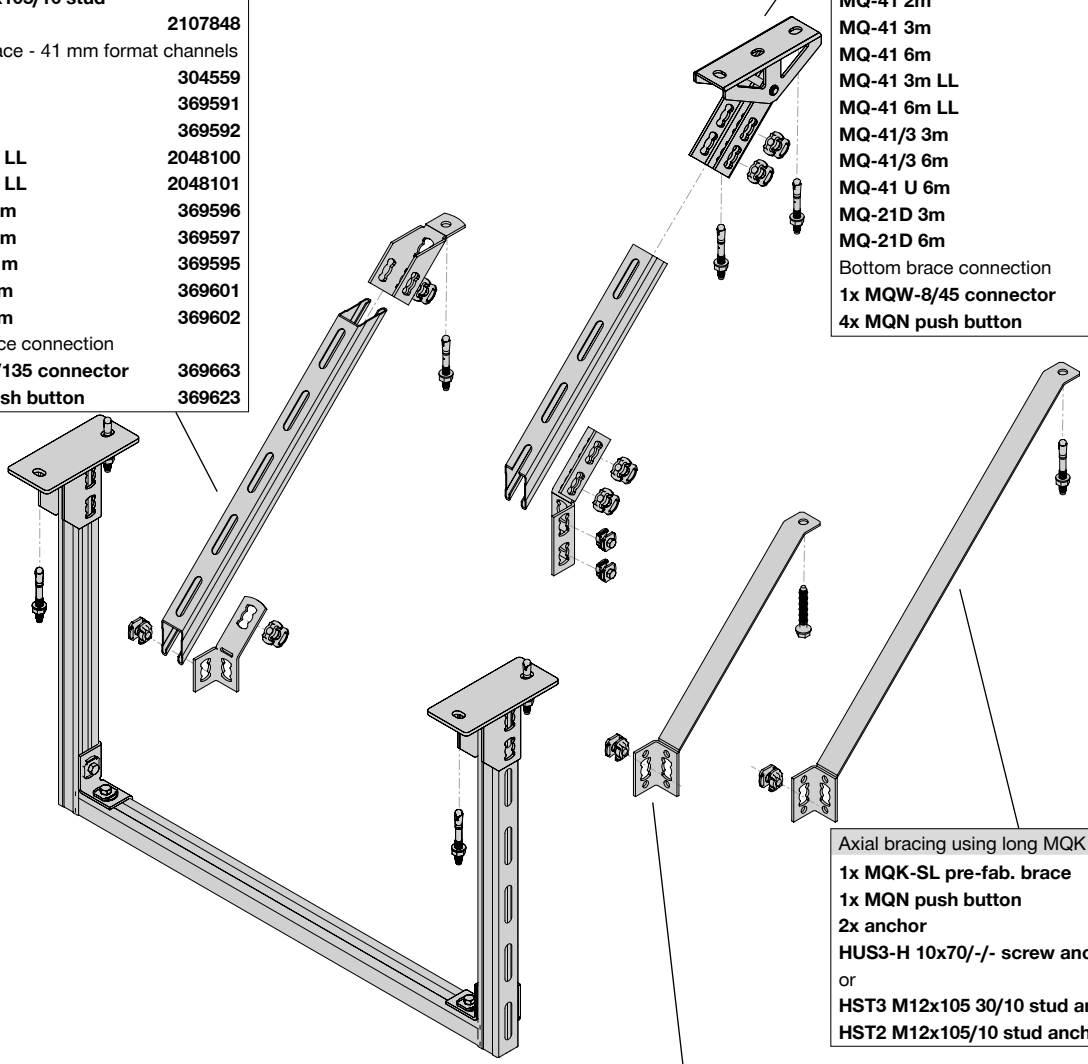
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
General comments		MQ3D System	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		MQP-U hinge	

Trapeze On Concrete – Main Frame Options: Axial Bracing

Using MQ channels or pre-fab. braces

Axial bracing using MQP-45 connector	
Upper brace connection	
1x MQP-45 channel base	**369649**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Channel brace - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Bottom brace connection	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Axial bracing using MQP-45 connector	
Upper brace connection	
1x MQP-G pivot base	**369654**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Channel brace - 41 mm format channels	
MQ-41 2m	**304559**
MQ-41 3m	**369591**
MQ-41 6m	**369592**
MQ-41 3m LL	**2048100**
MQ-41 6m LL	**2048101**
MQ-41/3 3m	**369596**
MQ-41/3 6m	**369597**
MQ-41 U 6m	**369595**
MQ-21D 3m	**369601**
MQ-21D 6m	**369602**
Bottom brace connection	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**



Axial bracing using long MQK brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
2x anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing using short MQK brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ system	Concrete
		Anchors	

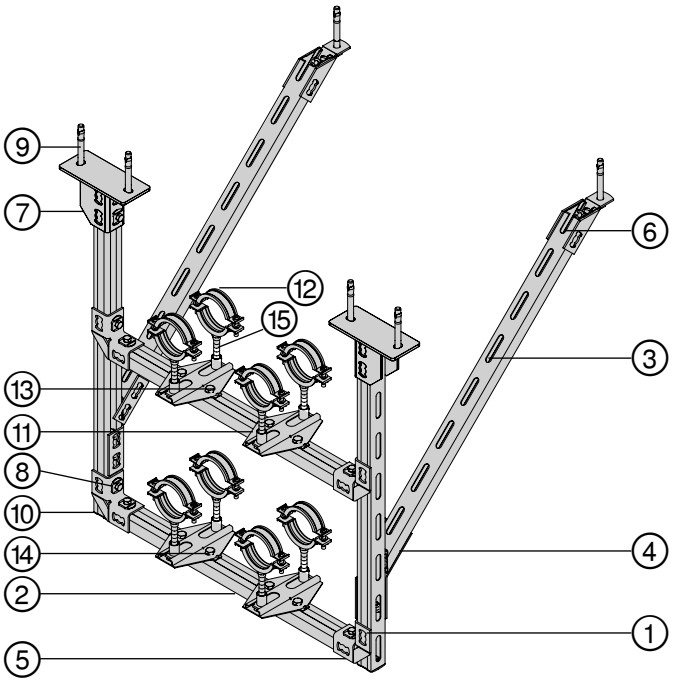
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Trapeze Frame

Type H-T5

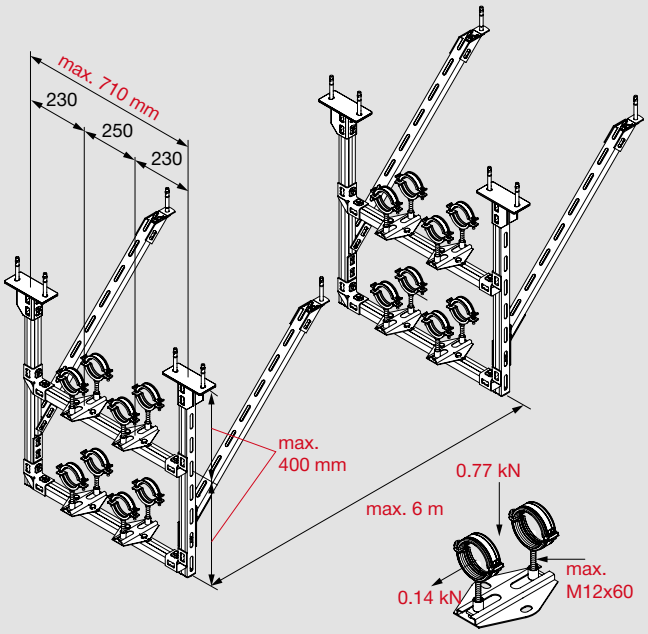
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 6 m
- Insulation 40 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	369591	MQ-41 3 m channel (vertical)	2	0.75
②	369591	MQ-41 3 m channel	2	0.71
③	369591	MQ-41 3 m channel (brace)	2	0.82
④	369660	MQW-8/45 connector	2	-
⑤	369658	MQW-4 connector	4	-
⑥	369649	MQP-45 base material connector	2	-
⑦	369651	MQP-21-72 channel base connector	2	-
⑧	369623	MQN push button	22	-
⑨	2105718	HST3 M12x105 30/10 stud anchor	6	-
⑩	369685	MQT-E41 plastic end cap	2	-
⑪	248210	MSG 1.75 M12/16D slider	4	-
⑫	20866	MP-MI 3" G pipe ring	8	-
⑬	369626	MQM-M10 wing nut	8	-
⑭	216454	M10x25 hexagon screw	8	-
⑮	216397	AM12x50 threaded bolt	8	-

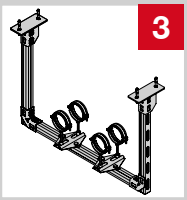
Application description

Heating - trapeze frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

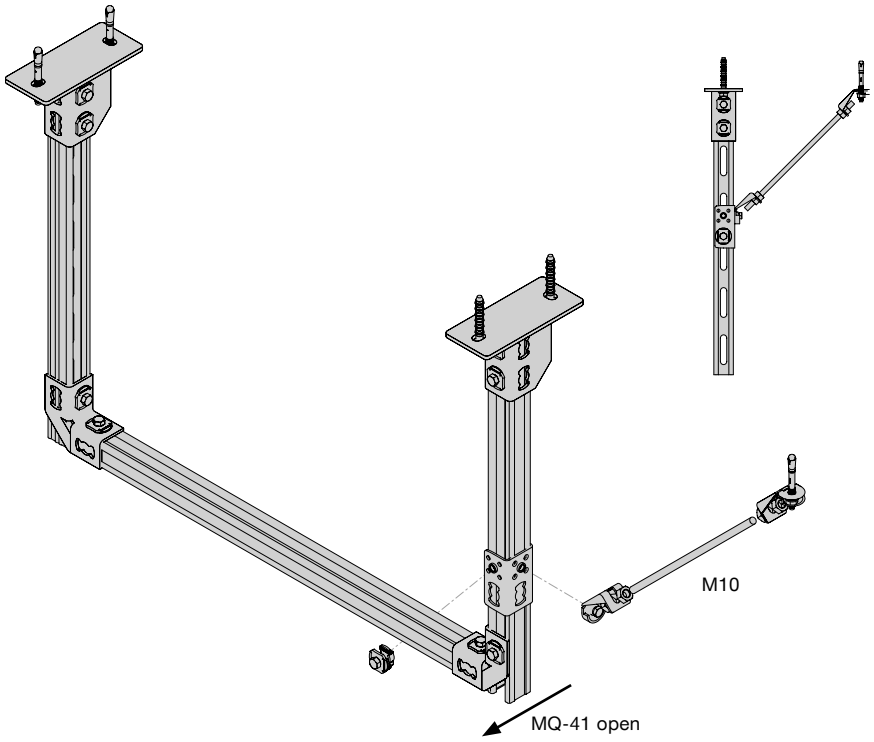
Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 80 concrete

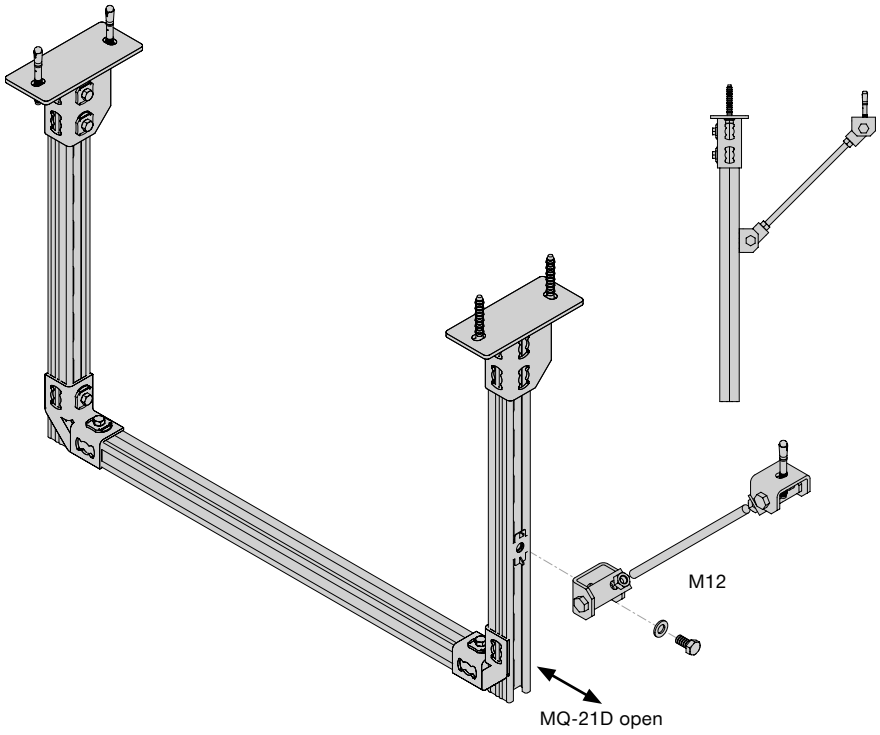
Trapeze On Concrete – Main Frame Options: Lateral Bracing

Using MQ - 3D elements and threaded rods



Lateral bracing using 3D elements	
Set of 2 braces	
2x MQ3D-B 3D base	**369694**
2x MQN push button	**369623**
4x MQ3D-A brace connector	**369697**
2x AM10 threaded rod	
AM10x1000 t. rod	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
8x M10 hex. nut	**216466**
2x Anchor	
HUS3-H 8x55/-/- screw anchor	**2079794**
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**

Using MQP-U hinge and threaded rods



Lateral bracing using MQP-U hinge	
Set of 2 braces	
4x MQP-U M12 hinge	**284248**
2x MQM-M12	**369627**
2x M12x25 hex. screw	**216458**
2x AM12 threaded rod	
AM12x1000 t. rod	**339797**
AM12x2000 t. rod	**216420**
AM12x3000 t. rod	**216421**
8x M12 hex. nut	**216467**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

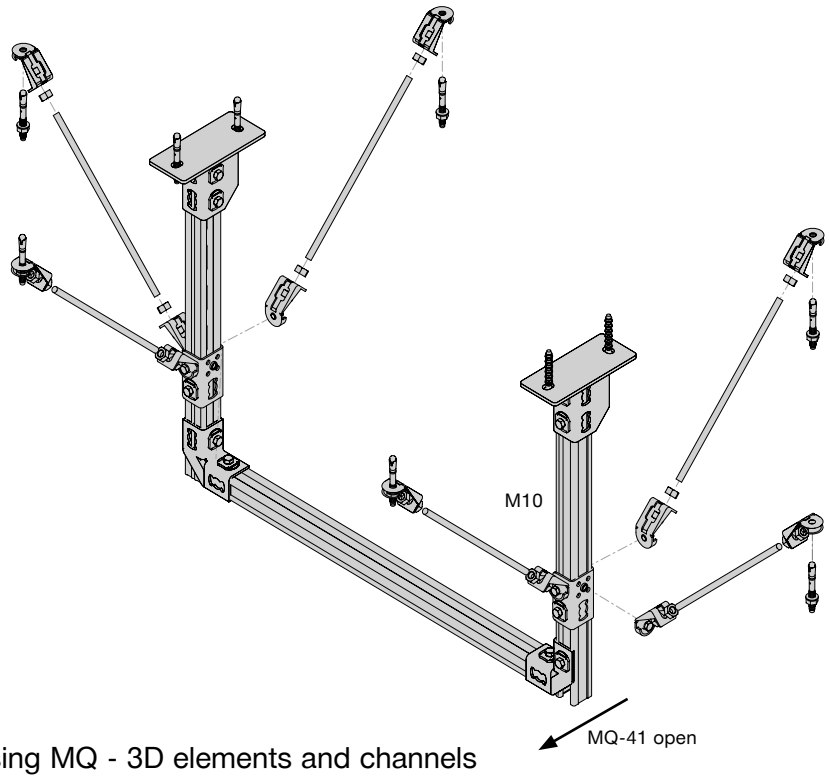
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

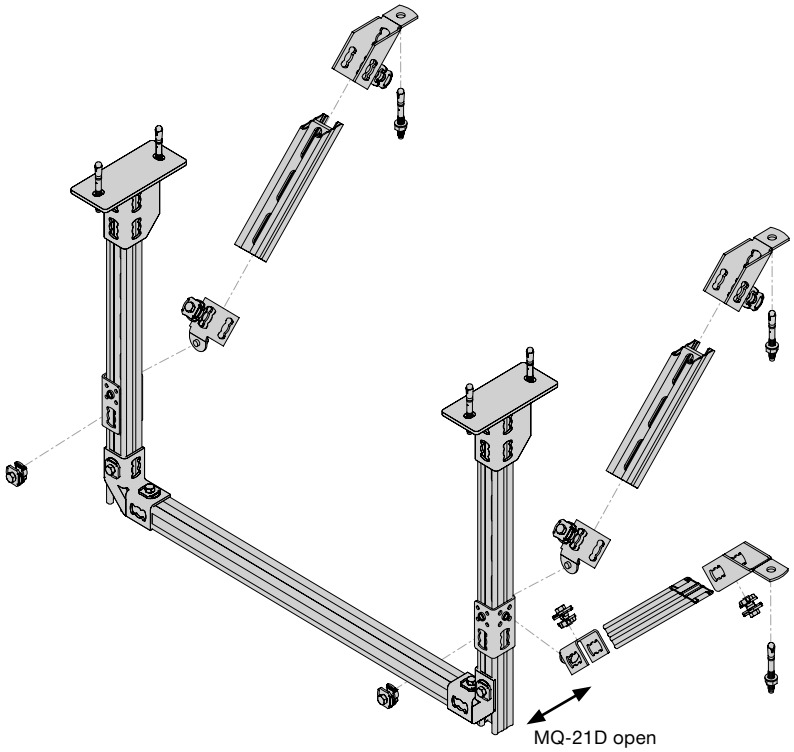
Trapeze On Concrete – Main Frame Options: Lateral Bracing

Using MQ - 3D elements and threaded rods



Axial and lateral bracing using 3D elements	
Set of axial bracing (4 braces)	
2x MQ3D-B 3D base	**369694**
2x MQN push button	**369623**
8x MQ3D-A brace connector	**369697**
4x AM10 threaded rod	
AM10x1000 t. rodv	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
16x M10 hex. nut	**216466**
4x anchor	
HUS3-H 8x55/-/- screw anchor	**2079794**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
Set of lateral bracing (2 braces)	
2x MQ3D-B 3D base in case it is independent	**369694**
2x MQN push button	**369623**
4x MQ3D-A brace connector	**369697**
2x AM10 threaded rod	
AM10x1000 t. rod	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
8x M10 hex. nut	**216466**
2x anchor	
HUS3-H 8x55/-/- screw anchor	**2079794**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**

Using MQ - 3D elements and channels



Axial and lateral bracing using 3D elements	
Set of axial bracing (2 braces)	
2x MQ3D-B 3D base	**369694**
6x MQN push button	**369623**
2x MQ3D-W45channel brace connector	**369696**
2x MQ-21D 3m...m channel	**369601**
2x MQP-45 base connector	**369649**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Set of lateral bracing (1 brace)	
1x MQ3D-B 3D base	**369694**
3x MQN push button	**369623**
1x MQ3D-W45channel brace connector	**369696**
1x MQ-21D 3m...m channel	**369601**
1x MQP-45 base connector	**369649**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

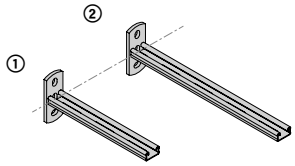
Application description	Application	Product lines	Base material
Heating - trapeze frame	3	MQ System	Concrete
		Anchors	

General comments

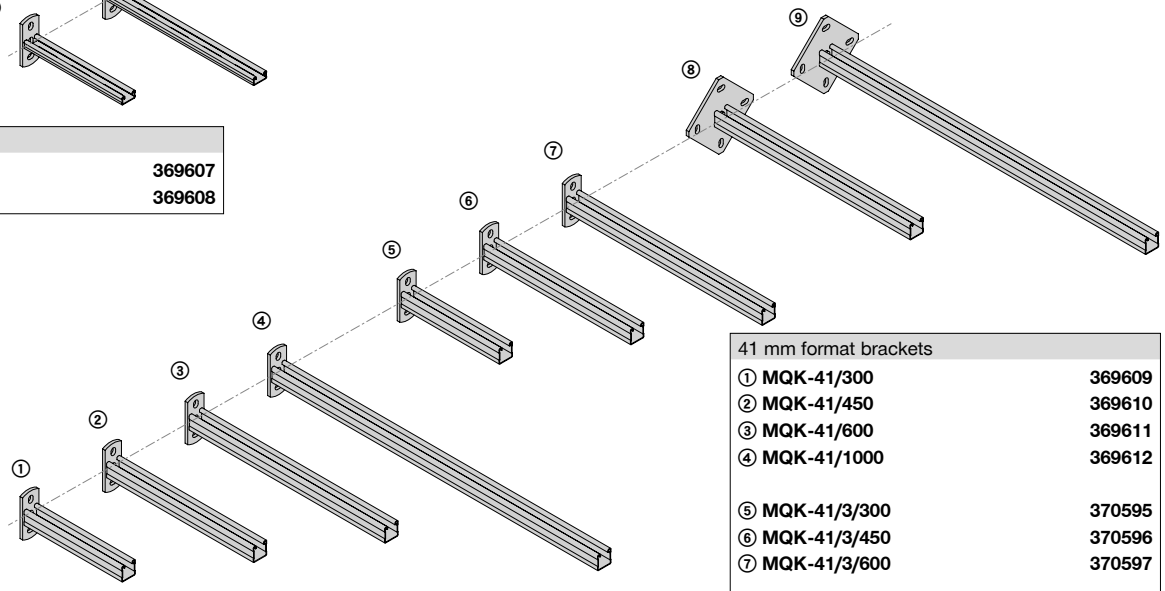
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Options

Single profile brackets - galvanized portfolio

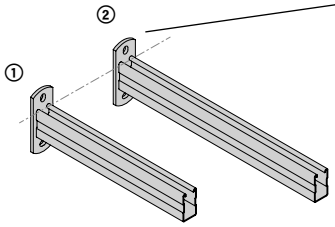


21 mm format brackets	
① **MQK-21/300**	**369607**
② **MQK-21/450**	**369608**



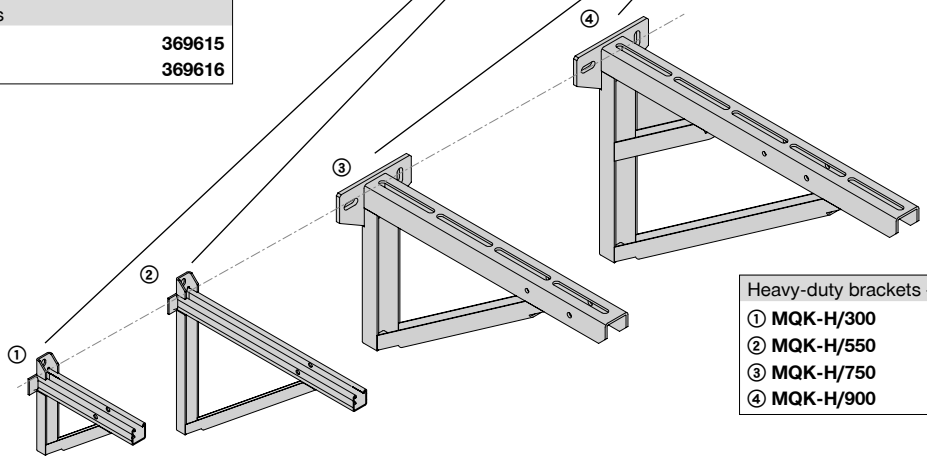
41 mm format brackets	
① **MQK-41/300**	**369609**
② **MQK-41/450**	**369610**
③ **MQK-41/600**	**369611**
④ **MQK-41/1000**	**369612**
⑤ **MQK-41/3/300**	**370595**
⑥ **MQK-41/3/450**	**370596**
⑦ **MQK-41/3/600**	**370597**
⑧ **MQK-41/600/4**	**369613**
⑨ **MQK-41/1000/4**	**369614**

Associated anchors	
2x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

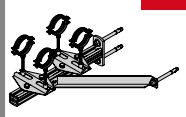


Associated anchors	
3x Anchor	
HST3 M16x135 35/15 stud anchor	**2105858**
HST2 M16x140/25 stud anchor	**2108160**

72 mm format brackets	
① **MQK-72/450**	**369615**
② **MQK-72/600**	**369616**



Heavy-duty brackets – hot-dip galvanized	
① **MQK-H/300**	**2048096**
② **MQK-H/550**	**2048097**
③ **MQK-H/750**	**2048098**
④ **MQK-H/900**	**2048099**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4 	MQ system	Concrete
		Anchors	

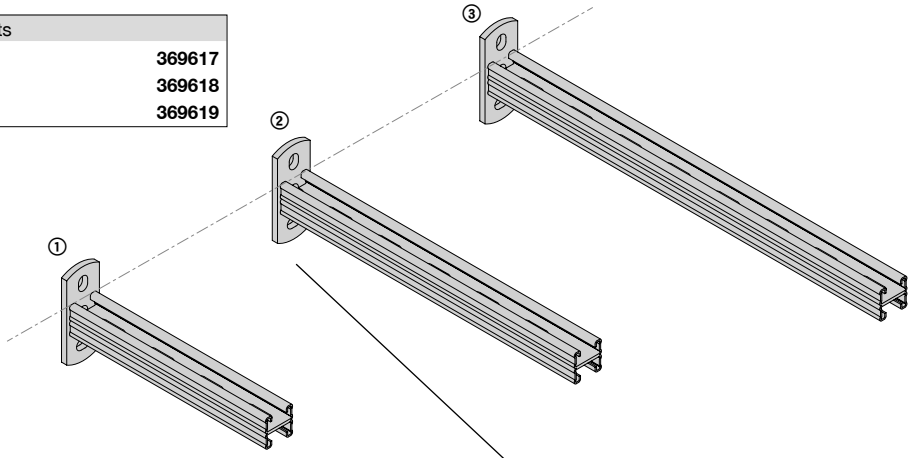
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

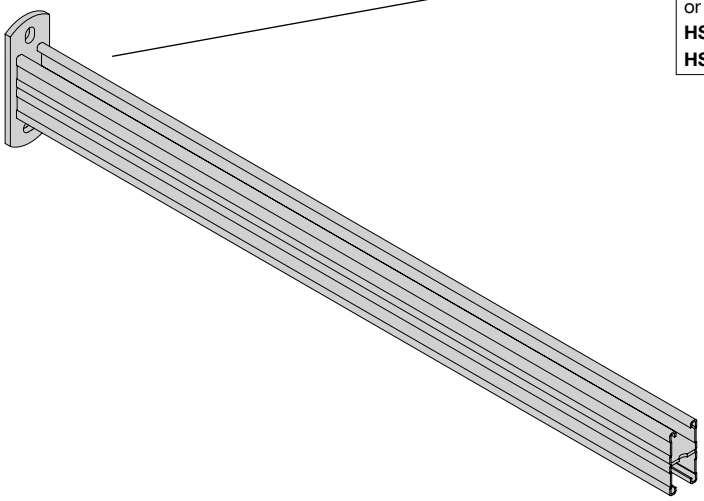
Cantilever Arm On Concrete – Options

Double - B2B profile brackets – galvanized

21D mm format brackets	
① **MQK-21D/300**	**369617**
② **MQK-21D/450**	**369618**
③ **MQK-21D/600**	**369619**

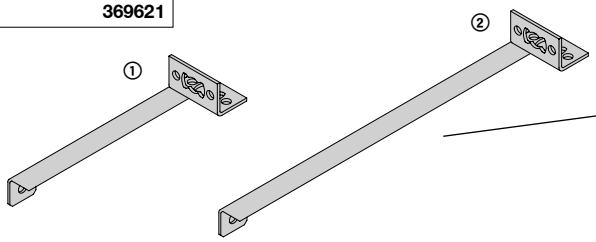


41D mm format brackets	
MQK-41D/1000	**369620**

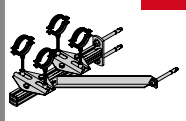


Associated anchors	
2x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Pre-fab braces	
① **MQK-SK**	**369622**
② **MQK-SL**	**369621**



Associated anchors	
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

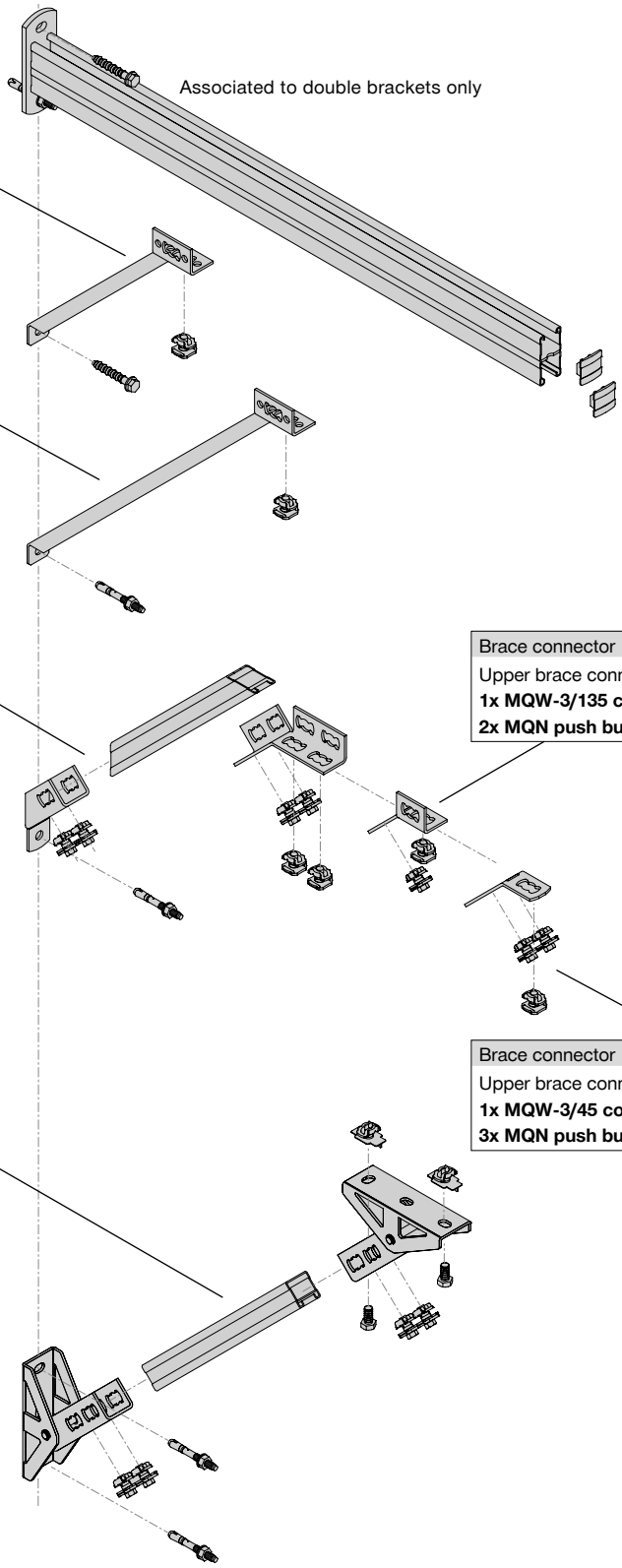
Cantilever Arm On Concrete – Vertical Bottom Bracing

Short pre-fab. brace for min. bracket arm 450mm	
Pre-fab brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Long pre-fab. brace for min. bracket arm 600mm	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing using MQP-45 connector	
Upper brace connection	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**
Channel brace - 41 mm format channels	
MQ-41 3m	**369591**
Bottom brace connection	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing using MQP-G pivot connector	
Upper brace connection	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x M12x25 hex. screw	**216458**
2x MQM-M12 wing nut	**369627**
Channel brace - 41 mm format channels	
MQ-41 3m	**369591**
Bottom brace connection	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



Brace connector	
Upper brace connection alternative	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Brace connector	
Upper brace connection alternative	
1x MQW-3/45 connector	**369657**
3x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Anchors	

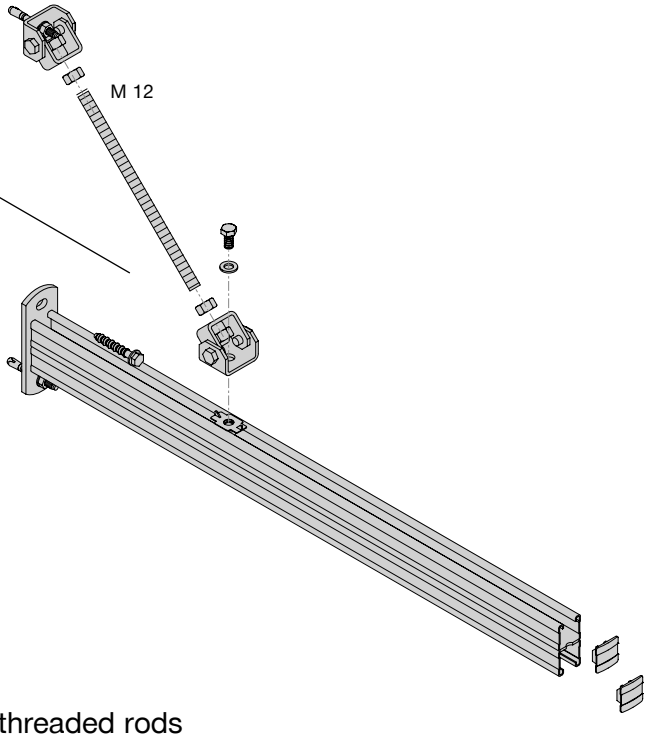
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Vertical Upper Bracing With Threaded Rods

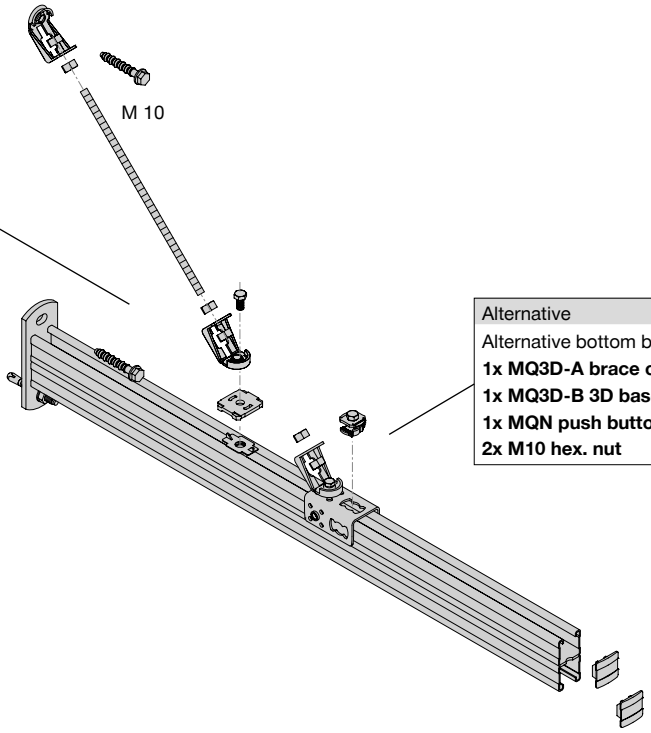
Using MQP-U hinge connectors and M12 threaded rods

Vertical upper bracing using MQP-U M12 hinge	
Upper brace connection	
1x MQP-U M12 hinge	**284248**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
2x M12 hex. nut	**216467**
Brace	
1x M12 threaded rod	
AM12x1000 t. rod	**339797**
AM12x2000 t. rod	**216420**
AM12x3000 t. rod	**216421**
Bottom brace connection	
1x MQP-U M12 hinge	**284248**
1x M12x25 hexagon screw	**216458**
2x M12 hex. nut	**216467**
1x MQM-M12 wing nut	**369627**
1x A13/24 washer	**282852**



Using MQ - 3D elements and M10 threaded rods

Vertical upper bracing using MQ3D elements	
Upper brace connection	
1x MQ3D-A brace connector with removed screw	**369697**
2x M10 hex. nut	**216466**
1x Anchor	
HUS3-H 8x65 15/5/- screw anchor	**2079795**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
Brace	
1x AM10 threaded rod	
AM10x1000 t. rod	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
Bottom brace connection	
1x MQ3D-A brace connector with removed screw	**369697**
2x M10 hex. nut	**216466**
1x M10x25 hex. Screw	**216454**
1x MQZ-L11 square washer	**369679**
1x MQM-M10 wing nut	**369626**



Alternative	
Alternative bottom brace connection	
1x MQ3D-A brace connector	**369697**
1x MQ3D-B 3D base	**369694**
1x MQN push button	**369623**
2x M10 hex. nut	**216466**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Anchors	

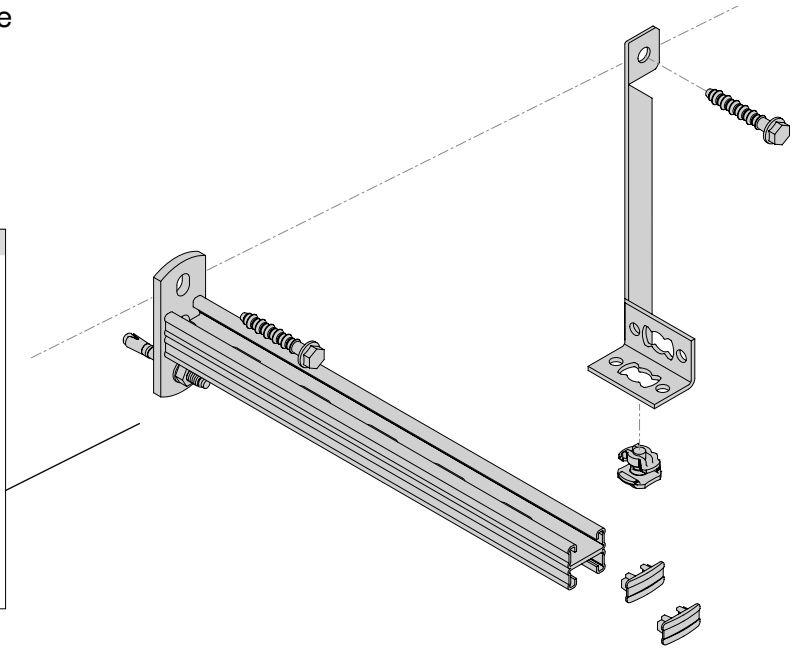
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Side (Axial) Bracing With Pre-fab. Braces

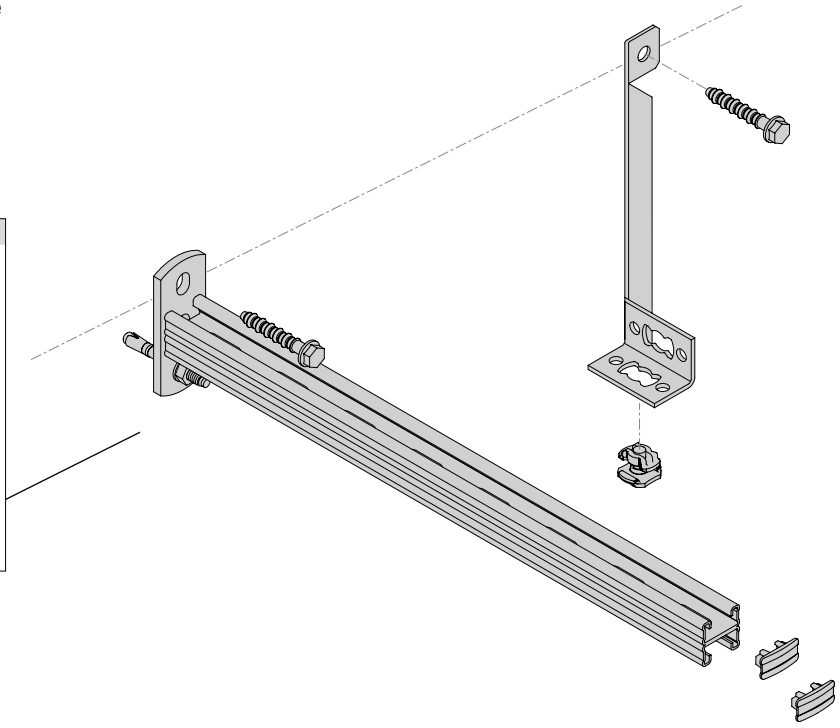
Bracket with short pre-fab. brace

For double brackets min. arm 450 mm	
Cantilever arm	
1x MQK cantilever arm	
MQK-21D/450	**369618**
MQK-21D/600	**369619**
MQK-41D/1000	**369620**
Side brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
3x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



Bracket with long pre-fab. brace

For double brackets min. arm 600 mm	
Cantilever arm	
1x MQK cantilever arm	
MQK-21D/600	**369619**
MQK-41D/1000	**369620**
Side brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
3x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Anchors	

General comments

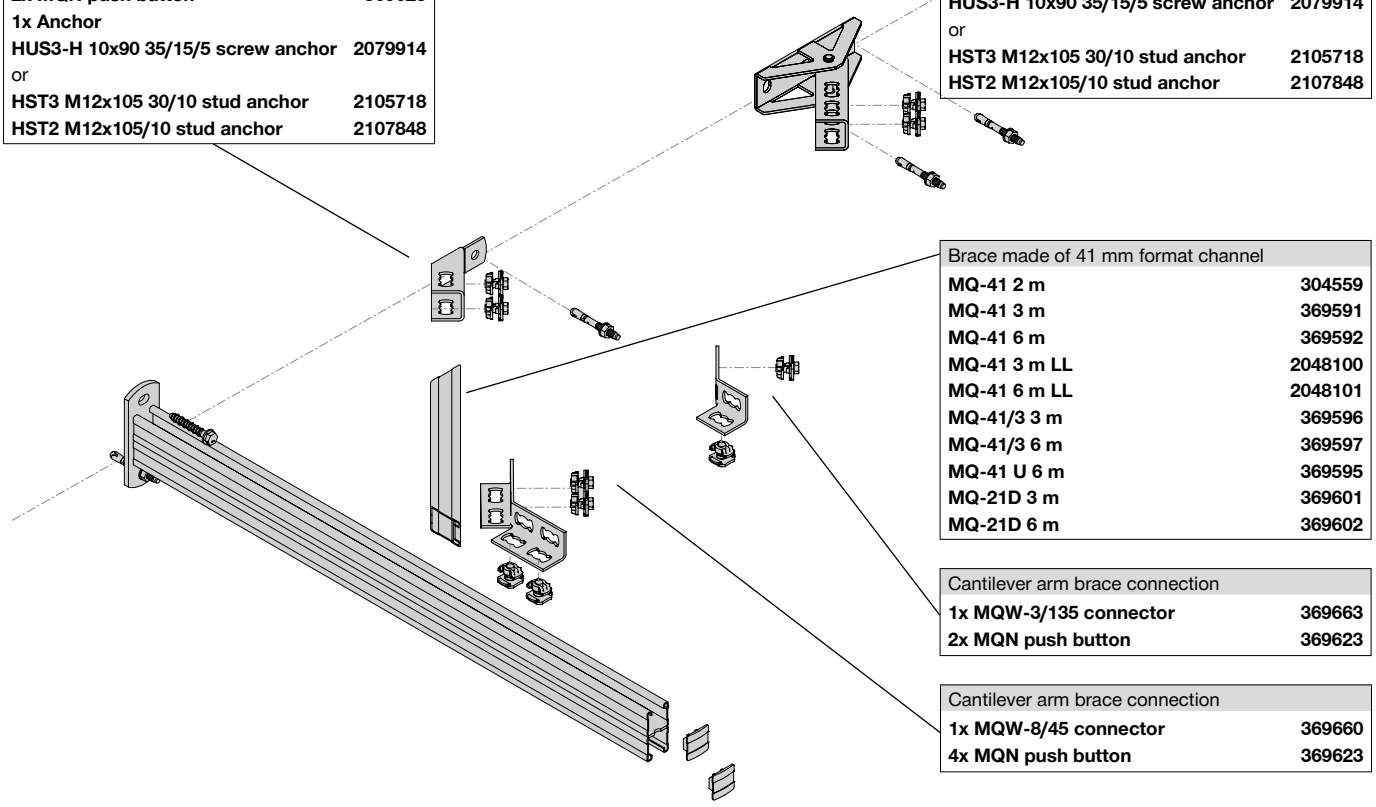
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Side (Axial) Bracing Using Channel

Double bracket with standard connectors and braced with channel

Base material brace connection MQP-45	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Base material brace connection MQP-G	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



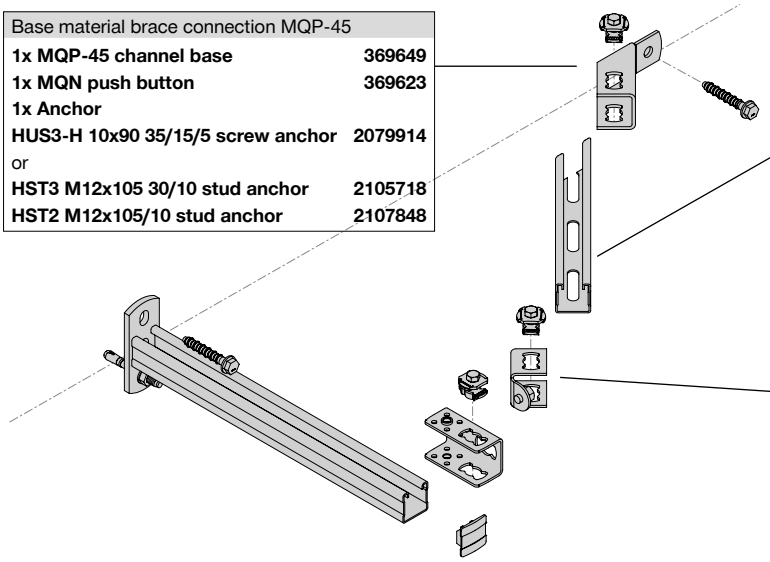
Brace made of 41 mm format channel	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Cantilever arm brace connection	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Cantilever arm brace connection	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**

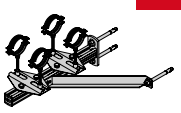
Bracket 41 mm format with MQ3D elements and braced with channel

Base material brace connection MQP-45	
1x MQP-45 channel base	**369649**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



Brace made of 41 mm format channel	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Cantilever arm brace connection	
1x MQ3D-B 3D base	**369694**
2x MQN push button	**369623**
1x MQ3D-W45 channel brace connector	**369696**

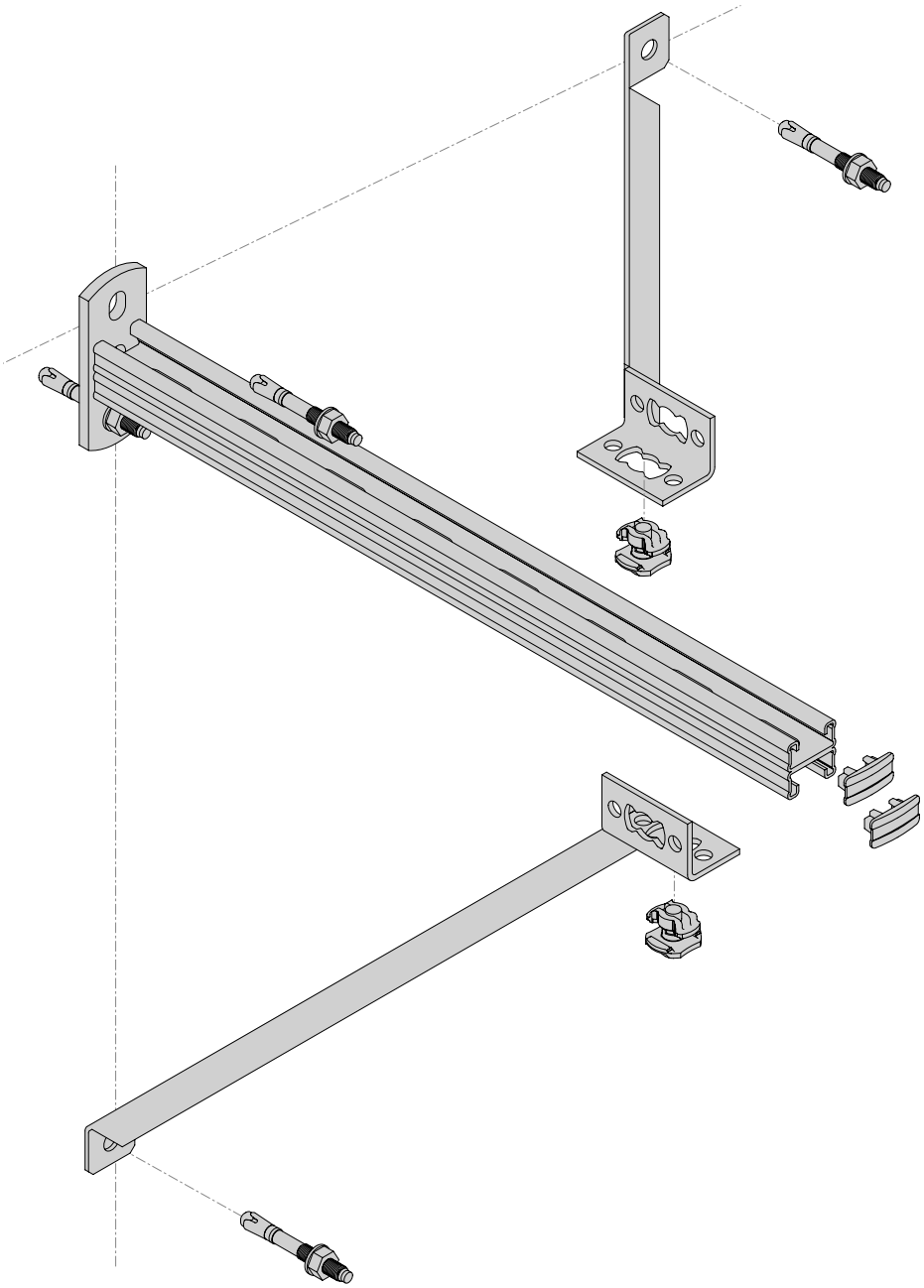
Application description	Application	Product lines	Base material
Heating - cantilever arm	4 	MQ system	Concrete
		Anchors	

General comments

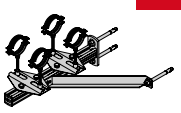
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Vertical And Side Bracing (Pre-fab.)

Cantilever arm with vertical and side (axial) bracing using pre-fab. braces
For brackets with min. arm of 600 mm



For double brackets min. arm 600 mm	
Cantilever arm	
1x MQK cantilever arm	
MQK-21D/600	**369619**
MQK-41D/1000	**369620**
2x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Plastic end cap	
1x MQZ-E41 end cap for MQK-41	**369685**
or	
2x MQZ-E21 end cap for MQ-21D	**370598**
Side brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Vertical brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Slider Fastening

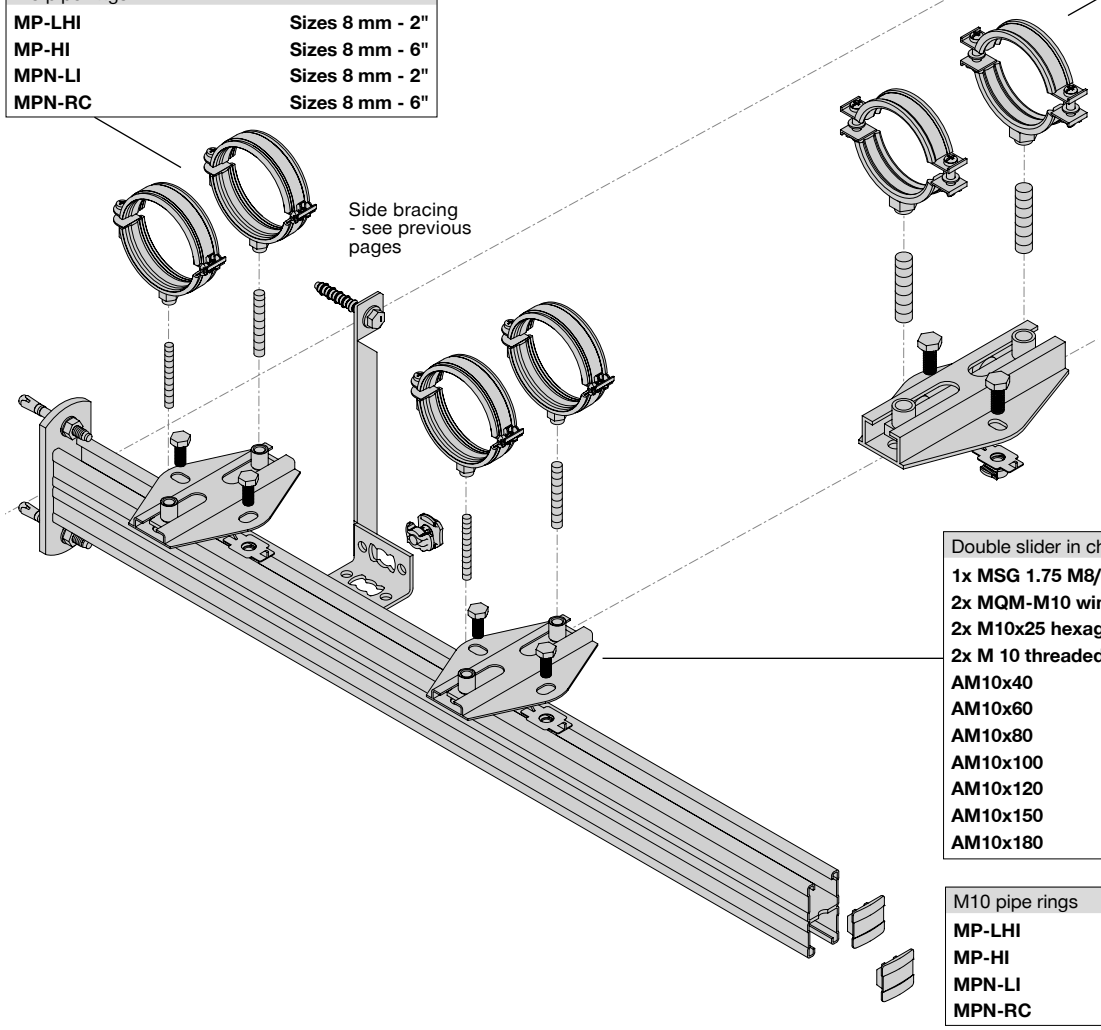
Use of slider is associated with axial loads, making side (axial) bracing necessary

Double slider in bracket with M8 connections	
1x MSG 1.75 M8/M10 D slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M8 threaded bolts	
AM 8x 30	**216379**
AM 8x 40	**216380**
AM 8x 50	**216381**
AM 8x 60	**216382**
AM 8x 70	**216383**
AM 8x 80	**216384**
AM 8x100	**216385**
AM 8x120	**216386**
AM 8x150	**216387**
AM 8x180	**216388**

Double roller in bracket with M16 connection	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M 16 threaded bolts	
AM 16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

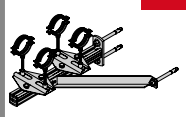
M16 pipe rings	
MP-MI..C	**Sizes 4" - 244.5 mm**
MP-MXI..M16	**Sizes 4" - 508 mm**

M8 pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**



Double slider in channel with M10 connections	
1x MSG 1.75 M8/M10 D slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M 10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

M10 pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Sliders / rollers	

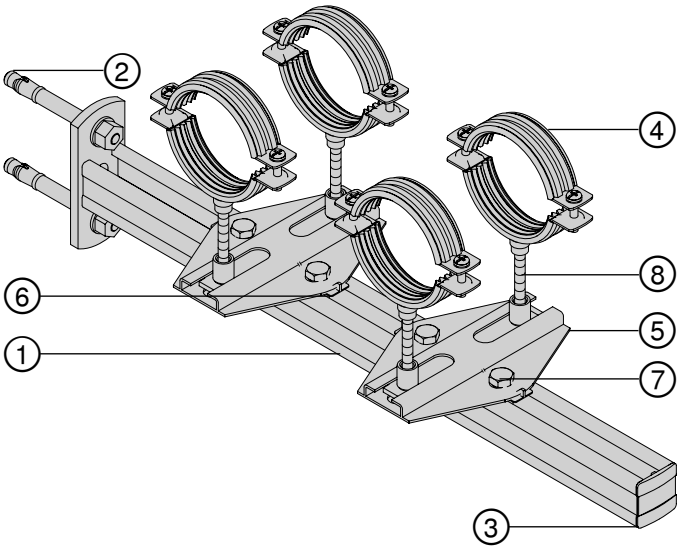
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications - Cantilever Arm

Type H-CA1

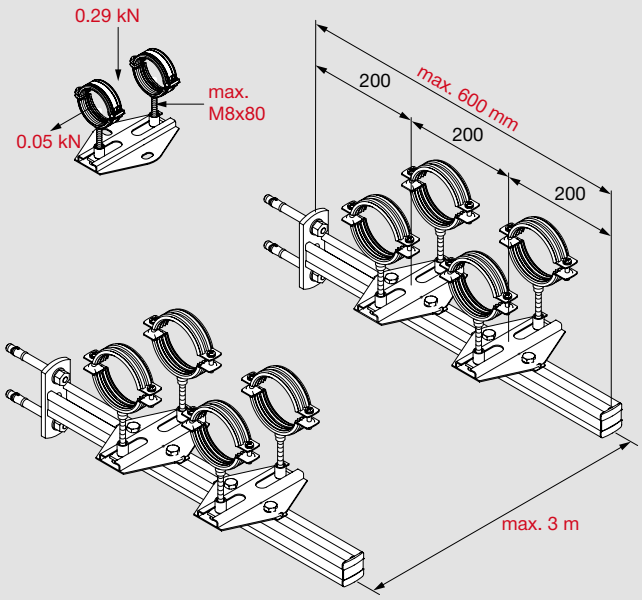
- Limited to max. 2 x DN 65 (O.D. 76.1 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 2 x DN 65 (O.D. 76.1 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369611**	**MQK-41/600 bracket**	1	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
③	**369685**	**MQZ-E41 plastic end cap**	1	-
④	**386413**	**MP-HI 75-84 M8/M10 pipe ring**	4	-
⑤	**248209**	**MSG 1.75 M8/10D slider**	2	-
⑥	**369626**	**MQM-M10 wing nut**	4	-
⑦	**216454**	**M10x25 hexagonal screw**	4	-
⑧	**216384**	**AM8x80 threaded bolt**	4	-

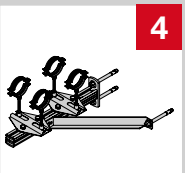
Application description

Heating - cantilever arm

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

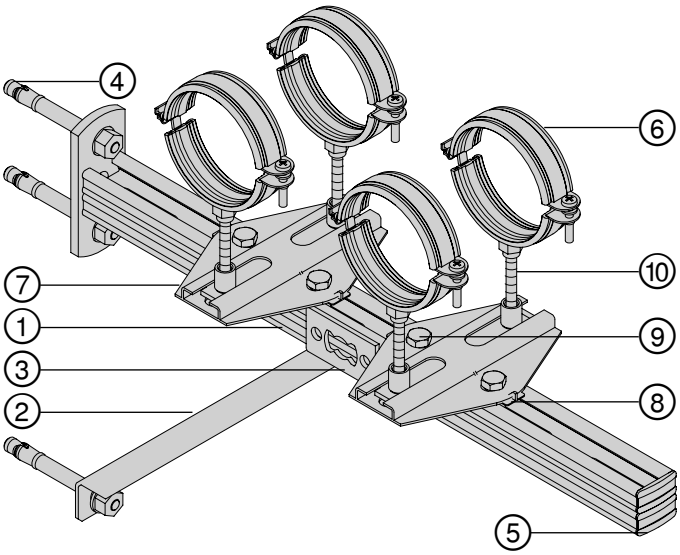


Base material	Concrete
Product line	MQ system, sliders
Capacity limit	2 x DN 65 concrete

Heating Applications - Cantilever Arm

Type H-CA2

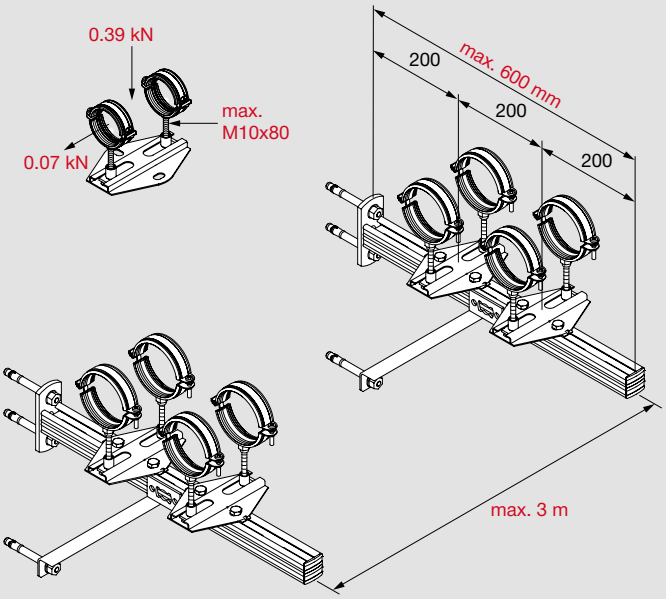
- Limited to max. 2 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 2 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369619**	**MQK-21 D/600 bracket**	1	-
②	**369622**	**MQK-SK pre-fab. brace short**	1	-
③	**369623**	**MQN push button**	1	-
④	**2105718**	**HST3 M12x105 30/10 stud anchor**	3	-
⑤	**370598**	**MQZ-E21 plastic end cap**	2	-
⑥	**335692**	**MPN-RC 3" B pipe ring**	4	-
⑦	**248209**	**MSG 1.75 M8/10D slider**	2	-
⑧	**369626**	**MQM-M10 wing nut**	4	-
⑨	**216453**	**M10x20 hexagonal screw**	4	-
⑩	**216392**	**AM10x80 threaded bolt**	4	-

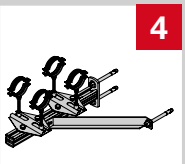
Application description

Heating - cantilever arm

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

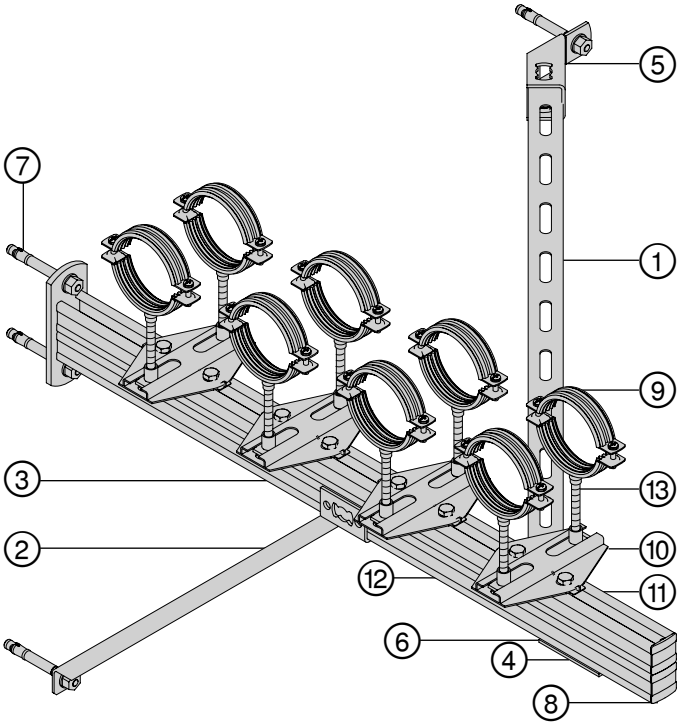


Base material	Concrete
Product line	MQ system, sliders
Capacity limit	2 x DN 80 concrete

Heating Applications - Cantilever Arm

Type H-CA3

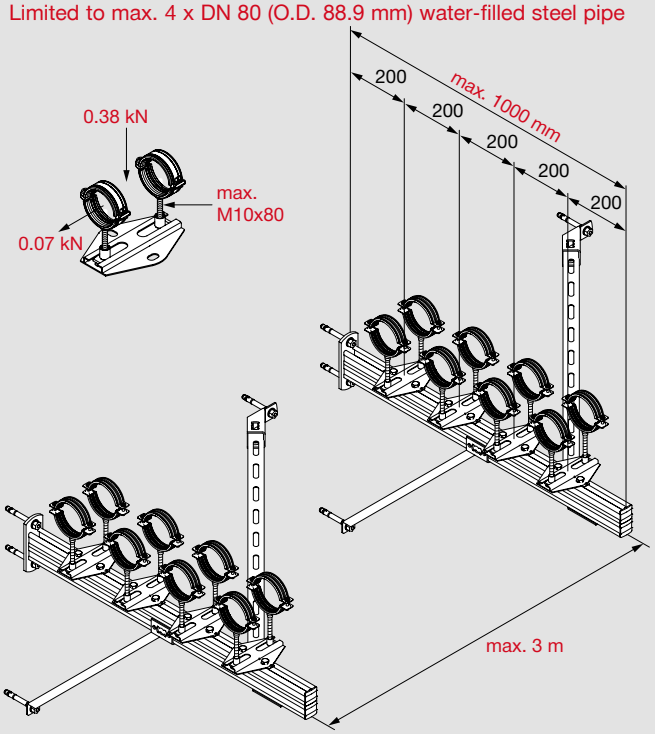
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369584**	**MQ-21 3m channel**	1	1.01
②	**369621**	**MQK-SL pre-fab. brace**	1	-
③	**369620**	**MQK-41 D/1000 bracket**	1	-
④	**369660**	**MQW-8/45 connector**	1	-
⑤	**369649**	**MQP-45 base material connector**	1	-
⑥	**369623**	**MQN push button**	7	-
⑦	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
⑧	**369685**	**MQZ-E41 plastic end cap**	2	-
⑨	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	8	-
⑩	**248209**	**MSG 1.75 M8/10D slider**	4	-
⑪	**369626**	**MQM-M10 wing nut**	8	-
⑫	**216454**	**M10x25 hexagon screw**	8	-
⑬	**216392**	**AM10x80 threaded bolt**	8	0.21

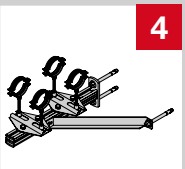
Application description

Heating - cantilever arm

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

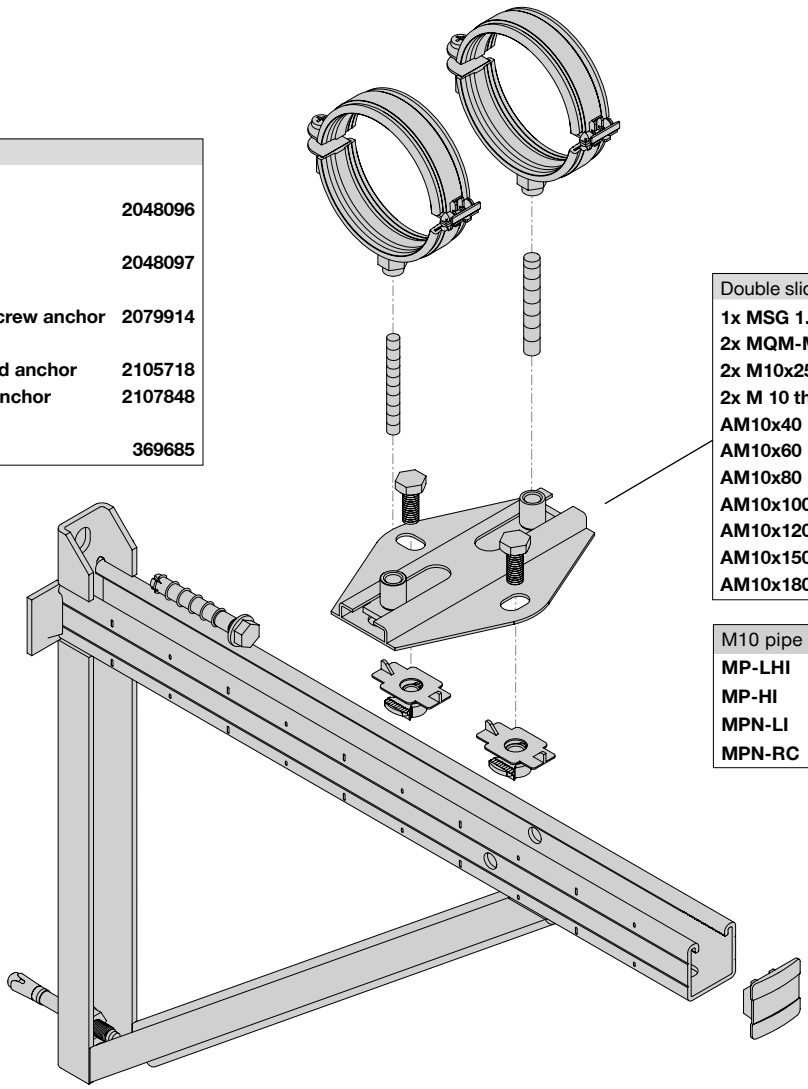
Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 80 concrete

Heavy Cantilever Arm On Concrete – Slider Fastening On MQK-H Brackets

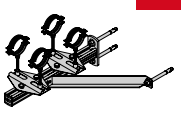
Sliders / rollers on MQK-H300 and MQK-H500



Heavy bracket	
Bracket	
1x MQK-H/300 bracket	**2048096**
or	
1x MQK-H/550 bracket	**2048097**
2x Anchors	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Plastic end cap	
1x MQZ-E41 end cap	**369685**

Double slider in channel with M10 connections	
1x MSG 1.75 M8/M10 D slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M 10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**

M10 pipe rings	
MP-LHI	**Sizes 8mm- 2"**
MP-HI	**Sizes 8mm- 6"**
MPN-LI	**Sizes 8mm- 2"**
MPN-RC	**Sizes 8mm- 6"**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		Sliders / rollers	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

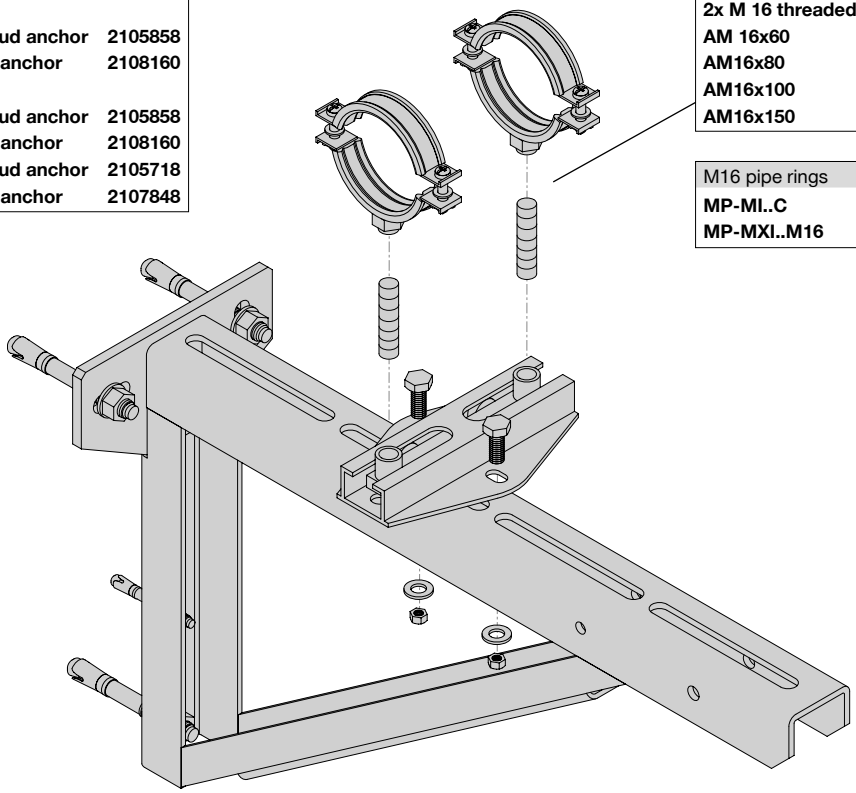
Heavy Cantilever Arm On Concrete – Slider Fastening On MQK-H Brackets

Sliders / rollers on MQK-H750 and MQK-H900

Heavy bracket	
Bracket	
1x MQK-H/550 bracket	**2048098**
or	
1x MQK-H/900 bracket	**2048099**
Anchors	
3x HST3 M16x135 35/15 stud anchor	**2105858**
3x HST2 M16x140/25 stud anchor	**2108160**
or	
2x HST3 M16x135 35/15 stud anchor	**2105858**
HST2 M16x140/25 stud anchor	**2108160**
1x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Double roller in bracket with M16 connection	
1x MRG-D6 M12/M16 roller	**334131**
2x M12x25 hexagon screw	**216458**
2x A13/24 washer	**282852**
2x M12 hex. nut	**216467**
2x M 16 threaded bolts	
AM 16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

M16 pipe rings	
MP-MI..C	**Sizes 4" - 244.5 mm**
MP-MXI..M16	**Sizes 4" - 508 mm**

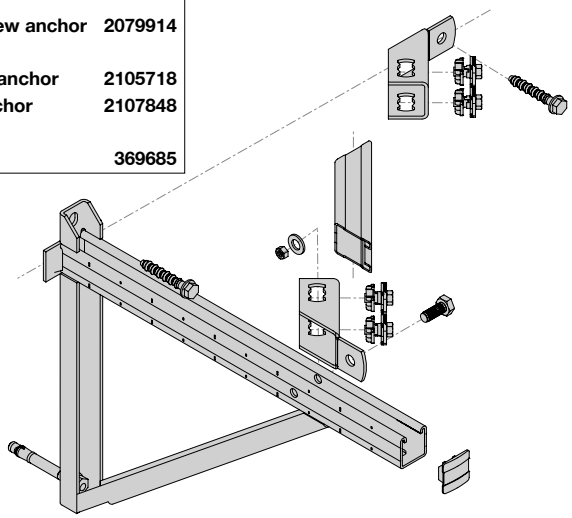


Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
General comments		Heavy brackets	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Sliders / rollers	

Heavy Cantilever Arm On Concrete – Side Bracing For MQK Heavy Brackets

Side (axial) bracing with channel for MQK-H300 and MQK-H550

Heavy bracket	
Bracket	
1x MQK-H/300 bracket	**2048096**
or	
1x MQK-H/550 bracket	**2048097**
2x Anchors	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Plastic end cap	
1x MQZ-E41 end cap	**369685**



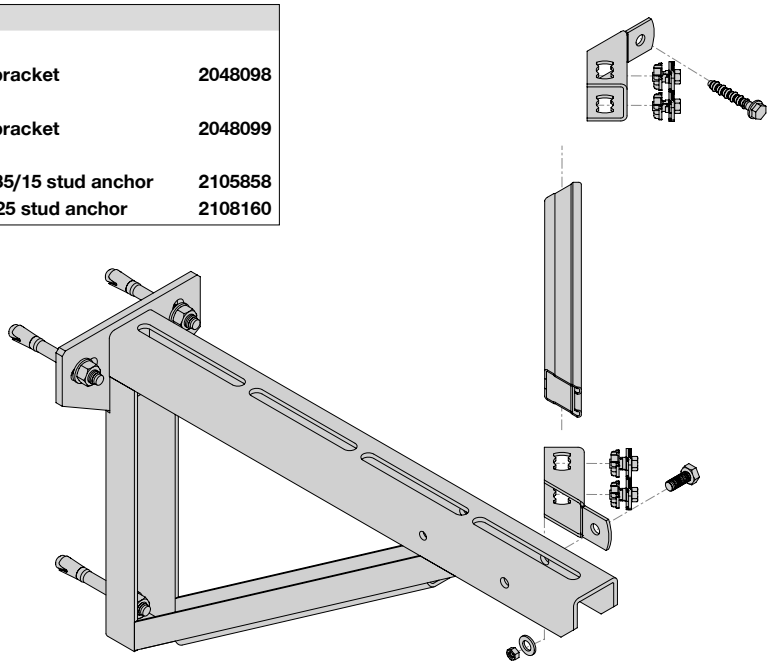
Base material brace connection MQP-45	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Brace made of 41 mm format channel	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Cantilever arm brace connection	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x M12x25 hexagon screw	**216458**
1x A13/24 washer	**282852**
1x M12 hex. nut	**216467**

Side (axial) bracing with channel for MQK-H750 and MQK-H900

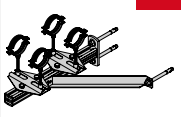
Heavy bracket	
Bracket	
1x MQK-H/750 bracket	**2048098**
or	
1x MQK-H/900 bracket	**2048099**
3x Anchors	
HST3 M16x135 35/15 stud anchor	**2105858**
HST2 M16x140/25 stud anchor	**2108160**



Base material brace connection MQP-45	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Brace made of 41 mm format channel	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Cantilever arm brace connection	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x M12x25 hexagon screw	**216458**
1x A13/24 washer	**282852**
1x M12 hex. nut	**216467**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4 	MQ system	Concrete
		Heavy brackets	

General comments

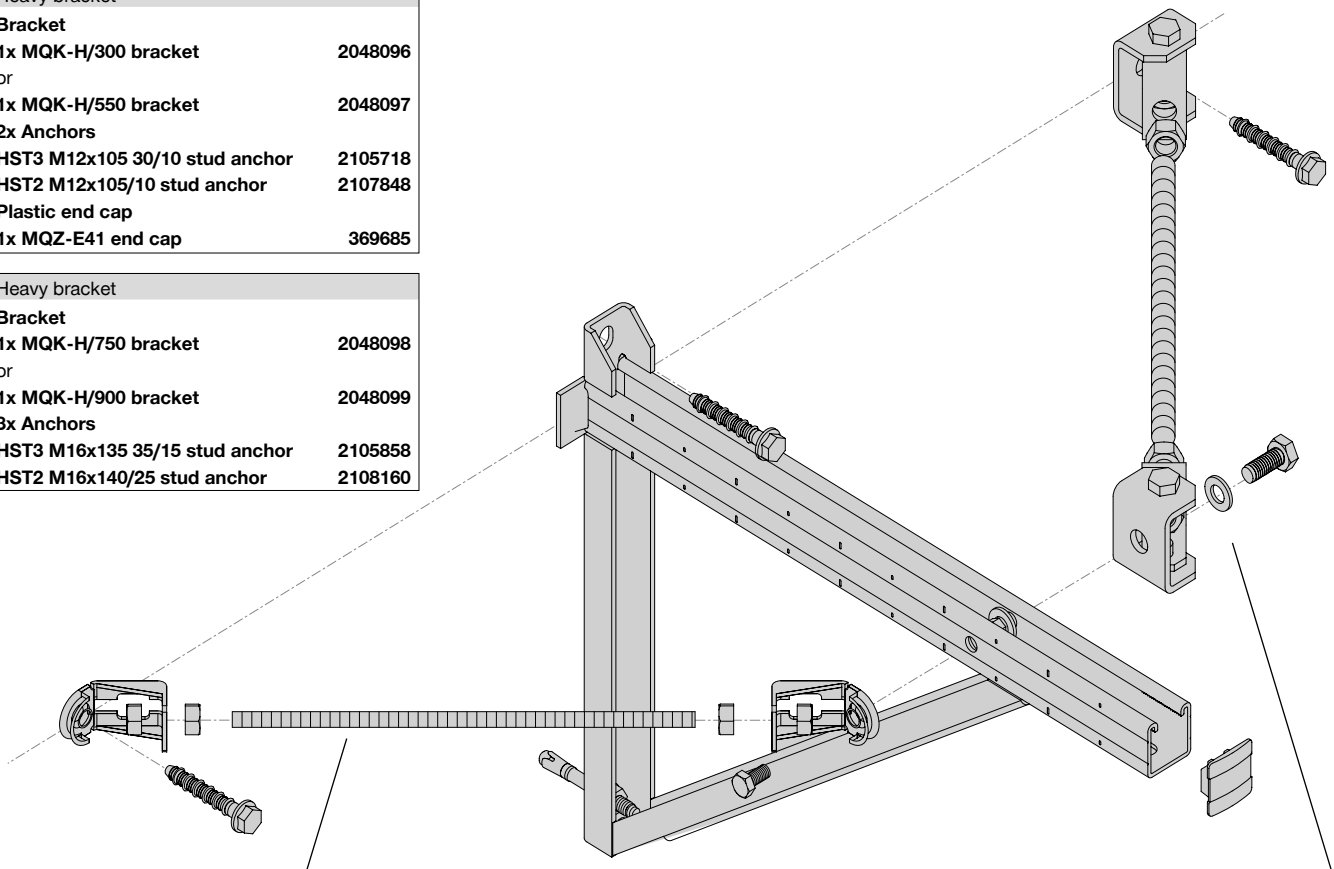
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heavy Cantilever Arm On Concrete – Side Bracing For MQK Heavy Brackets

Side (axial) bracing with threaded rod for MQK-H300, 550, 750, 900

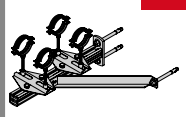
Heavy bracket	
Bracket	
1x MQK-H/300 bracket	**2048096**
or	
1x MQK-H/550 bracket	**2048097**
2x Anchors	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Plastic end cap	
1x MQZ-E41 end cap	**369685**

Heavy bracket	
Bracket	
1x MQK-H/750 bracket	**2048098**
or	
1x MQK-H/900 bracket	**2048099**
3x Anchors	
HST3 M16x135 35/15 stud anchor	**2105858**
HST2 M16x140/25 stud anchor	**2108160**



Side (axial) bracing using MQ3D elements	
Base material brace connector	
1x MQ3D-A brace connector with removed screw	**369697**
2x M10 hex. nut	**216466**
1x Anchor	
HUS3-H 8x65 15/5/- screw anchor	**2079795**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
Brace	
1x AM10 threaded rod	
AM10x1000 t. rod	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
Bracket brace connection	
1x MQ3D-A brace connector with removed screw	**369697**
1x A0.5/20 washer	**282851**
1x M10x25 hex. screw	**216454**
3x M10 hex. nut	**216466**

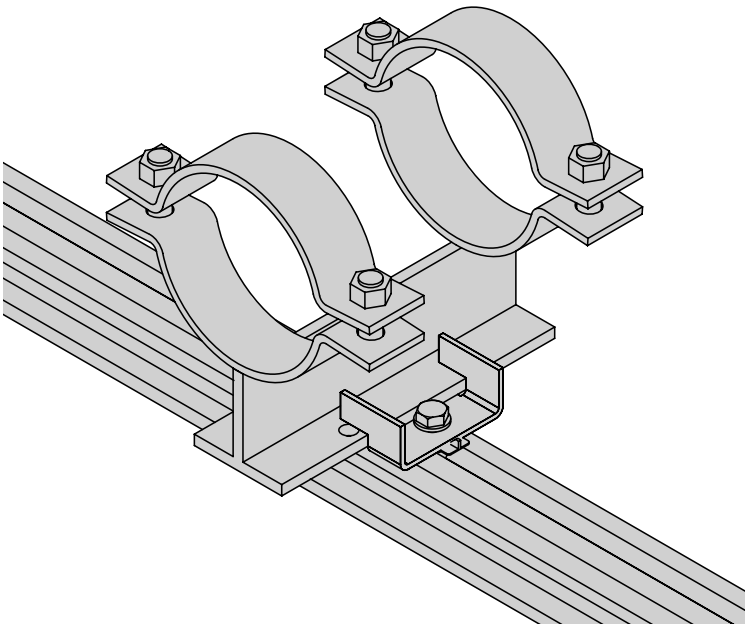
Side (axial) bracing using MQP-U M12 hinge	
Base material brace connection	
1x MQP-U M12 hinge	**284248**
1x Anchor	
HUS3-H 10x90 35/15/5 screw anchor	**2079914**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
2x M12 hex. nut	**216467**
Brace	
1x M12 threaded rod	
AM12x1000 t. rod	**339797**
AM12x2000 t. rod	**216420**
AM12x3000 t. rod	**216421**
Bracket brace connection	
1x MQP-U M12 hinge	**284248**
1x M12x25 hexagon screw	**216458**
1x A13/24 washer	**282853**
3x M12 hex. nut	**216467**

Application description	Application	Product lines	Base material
Heating - cantilever arm	4 	MQ system	Concrete
		Heavy brackets	

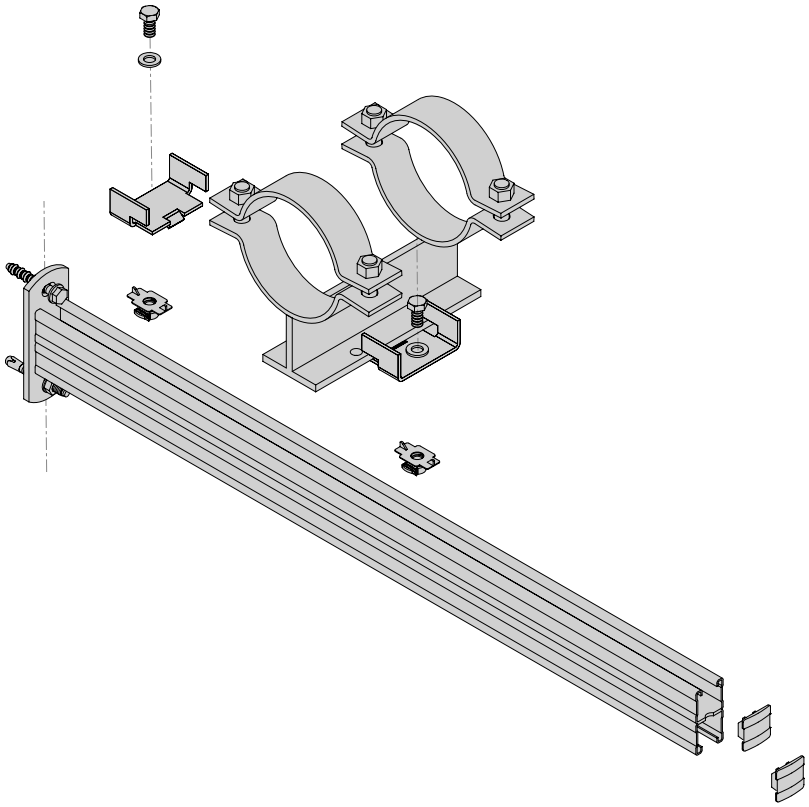
General comments

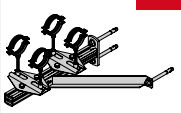
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Cantilever Arm On Concrete – Fastening Pipe Shoes On MQK Bracket

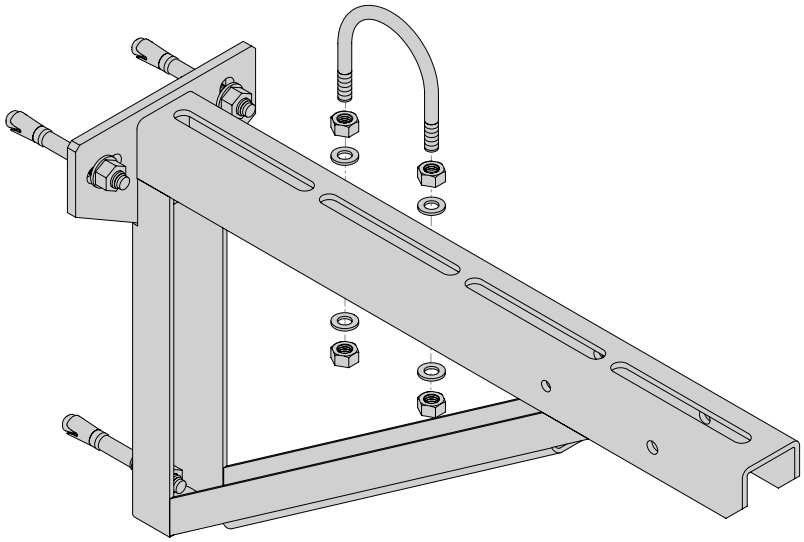


Fastening pipe shoe on MQK bracket	
1x Pipe shoe	
MI-PS2/1 25-85	**304852**
MI-PS2/1 25-140	**286965**
MI-PS2/1 40-85	**304853**
MI-PS2/1 40-140	**286966**
MI-PS2/1 50-85	**304854**
MI-PS2/1 50-140	**286967**
MI-PS2/1 65-85	**304855**
MI-PS2/1 65-140	**286968**
MI-PS2/1 80-85	**304856**
MI-PS2/1 80-140	**286969**
MI-PS2/1 100-85	**304857**
MI-PS2/1 100-140	**286970**
MI-PS2/1 125-85	**304858**
MI-PS2/1 125-140	**286971**
MI-PS2/1 150-85	**304859**
MI-PS2/1 150-140	**286972**
MI-PS2/1 200-107	**304860**
MI-PS2/1 200-142	**286973**
1x MQV-PS connector (pair)	**304886**
2x MQM-M10 wing nut	**369626**
2x A10,5/20 washer	**282851**
2x M10x25 hexagon screw	**216454**



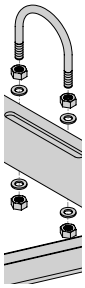
Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
General comments		Pipe shoes	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Cantilever Arm On Concrete – Mounting U-bolts



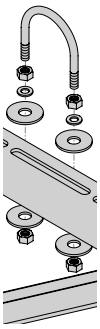
Heavy bracket	
Bracket	
1x MQK-H/750 bracket	**2048098**
or	
1x MQK-H/900 bracket	**2048099**
Anchors	
3x HST3 M16x135 35/15 stud anchor	**2105858**
3x HST2 M16x140/25 stud anchor	**2108160**

Mounting U-bolt on MQK-H750,900 bracket	
1x MI-UB U-bolt	
MI - UB 25 - M10	**431587**
MI - UB 40 - M10	**431588**
MI - UB 50 - M12	**431589**
MI - UB 65 - M12	**431590**
MI - UB 80 - M12	**431591**
MI - UB 100 - M16	**431592**
MI - UB 125 - M16	**431593**
MI - UB 150 - M16	**431594**
MI - UB 200 - M16	**431595**
MI - UB 250 - M16	**431598**



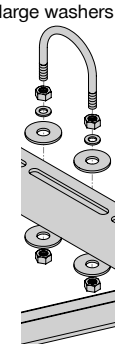
MI UB-bolt contains 4x washer and 4x hex. nut

M-UB U-bolts M8	
1x M8 U-bolt	
M-UB 1/2"	**409319**
M-UB 3/4"	**409320**
M-UB 1"	**409321**
M-UB 1 1/4"	**409322**
4x A 8,4/28 washer	**282861**
2x M8 hex. nut	**216465**



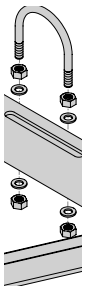
Notice: Additional set of large washers needed

M-UB U-bolts M10	
1x M10 U-bolt	
M-UB 1 1/2"	**409323**
M-UB 2"	**409324**
M-UB 2 1/2"	**409325**
M-UB 3"	**409326**
4x A10,5/28 washer	**282862**
2x M10 hex. nut	**216466**

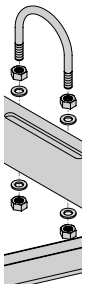


Notice: Additional set of large washers needed

M-UB U-bolts M12	
1x M12 U-bolt	
M-UB 3 1/2"	**409327**
M-UB 4"	**409328**
M-UB 5"	**409329**
M-UB 6"	**409330**
2x A13/24 washer	**282852**
2x M12 hex. nut	**216467**



M-UB U-bolts M16	
1x M16 U-bolt	
M-UB 8"	**409331**
M-UB 10"	**409332**
2x A17/30 washer	**282853**
2x M16 hex. nut	**216468**

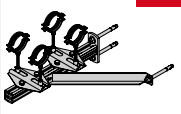


M-UB bolt contain 2x washer and 2x nut

Application description	Application	Product lines	Base material
Heating - cantilever arm	4	MQ system	Concrete
		U-bolts	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application



Natural Compensation Zone Trapeze – Options

Connection to concrete – channel base	
1x MQP 1/3 channel base	**369647**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 1/1 channel base	**369646**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQV -2/2 D-14 channel base	**369639**
2x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**

41 format cantilever arms 4 hole base	
MQK-41/600/4	**369613**
MQK-41/1000/4	**369614**

41 format cantilever arms 2 hole base	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**

Relevant anchors for channel bases	
2x HUS3-H 10x70/-/-	
screw anchor	**2079912**
or	
2x HST3 M12x105 30/10	
stud anchor	**2105718**
HST2 M12x105/10	
stud anchor	**2107848**

1x

Connector	
1x MQW-Q2 connector	**369655**

Connector	
1x MQW-3 connector	**369656**
3x MQN push button	**369623**

Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**

Pipe fastening:
please see following pages

41 format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Plastic end caps	
1x MQZ-E41 for 41 channel	**369685**
2x MQZ-E21 for 21D channel	**370598**

Connector	
1x MQW-S1 connector	**369664**
4x MQN push button	**369623**

Connector	
1x MQW-S2 connector	**369665**
4x MQN push button	**369623**

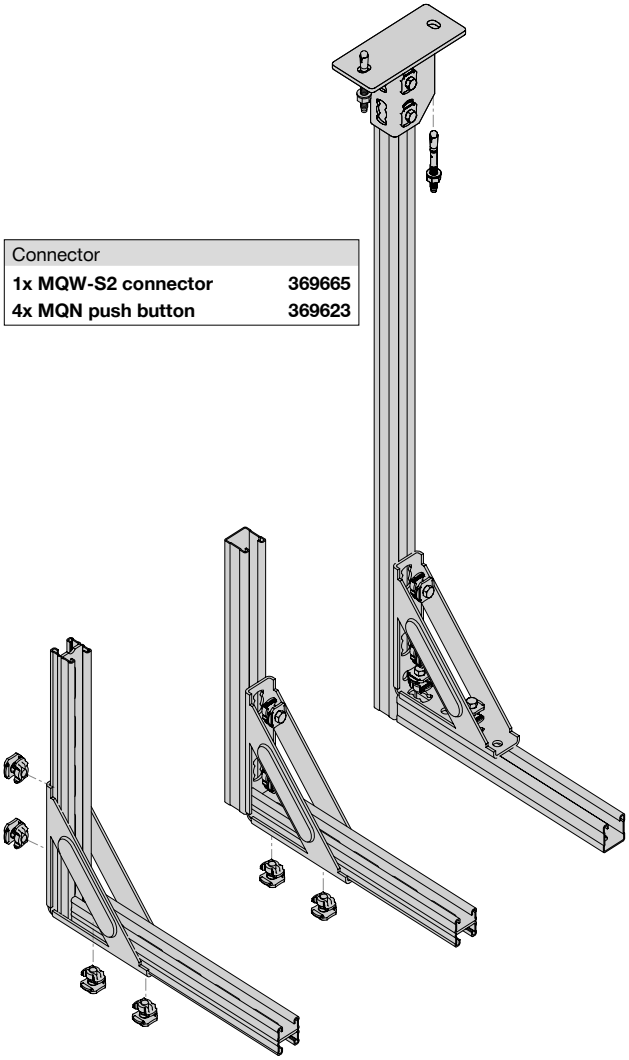
Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

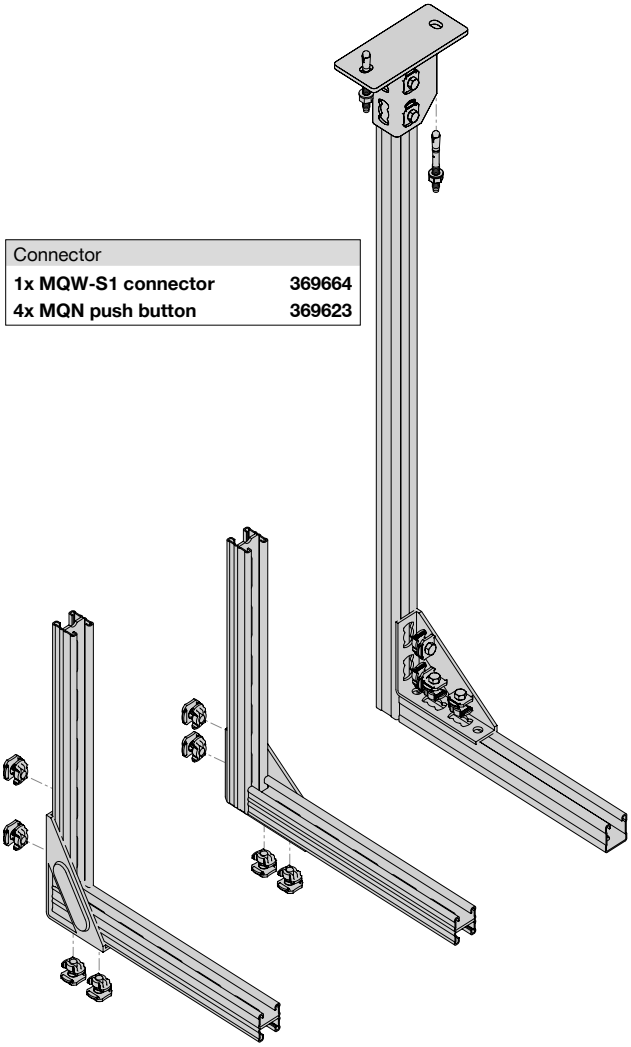
Natural Compensation Zone Trapeze – Node Stiffening Options 1

Stiffening by using MQW-S2

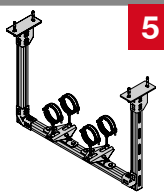


Connector	
1x MQW-S2 connector	**369665**
4x MQN push button	**369623**

Stiffening by using MQW-S1



Connector	
1x MQW-S1 connector	**369664**
4x MQN push button	**369623**

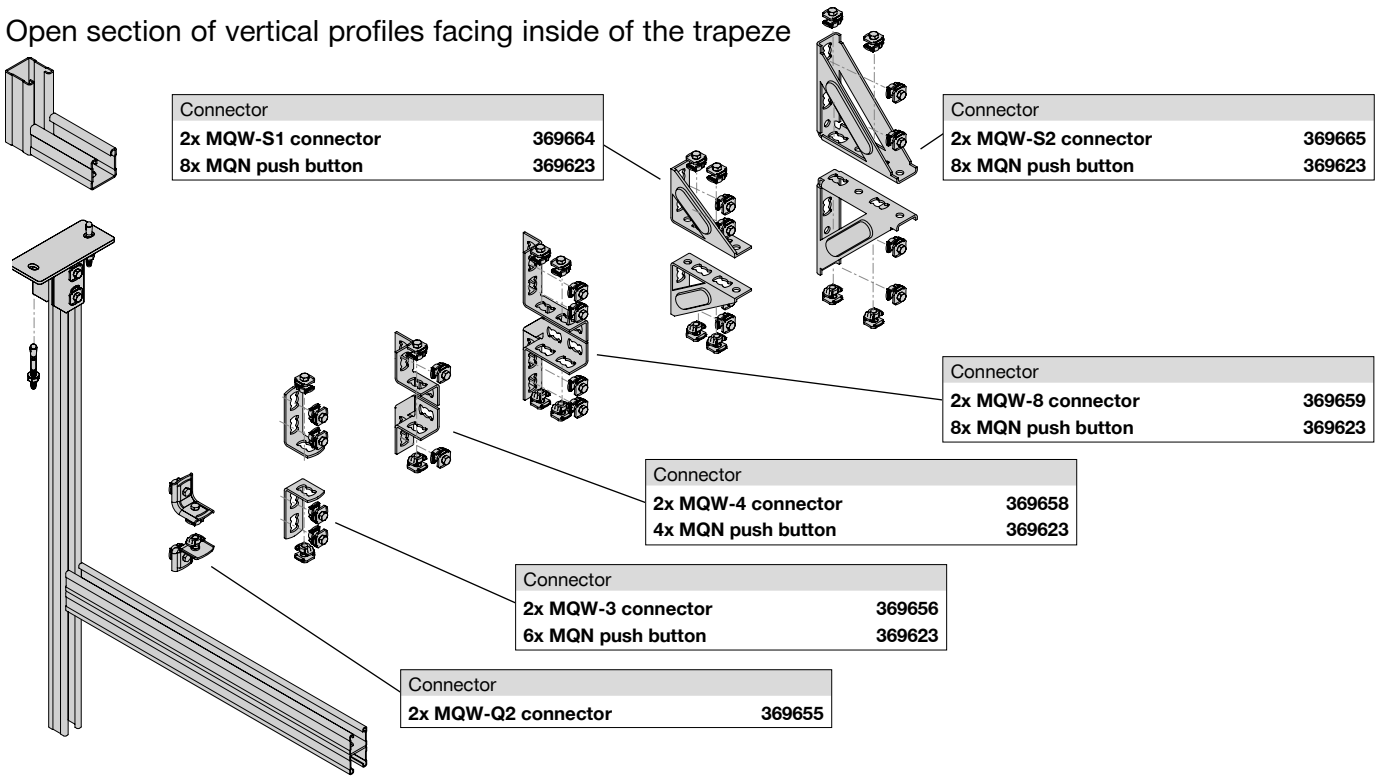
Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5 	MQ system	Concrete

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Natural Compensation Zone Trapeze – Node Stiffening Options 2

Open section of vertical profiles facing inside of the trapeze



Connector	
2x MQW-S1 connector	**369664**
8x MQN push button	**369623**

Connector	
2x MQW-S2 connector	**369665**
8x MQN push button	**369623**

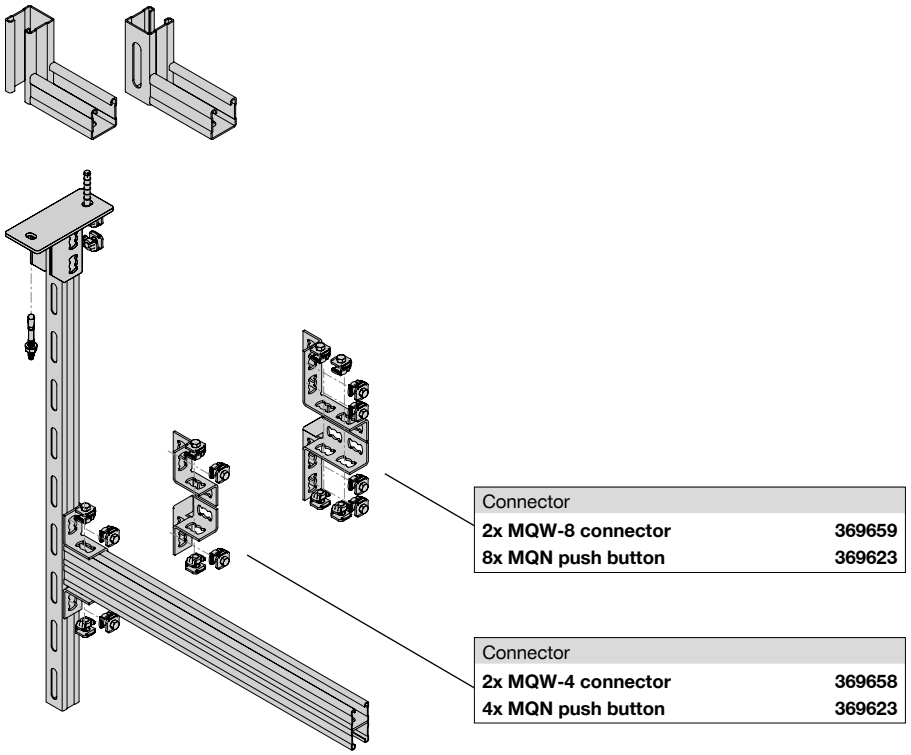
Connector	
2x MQW-8 connector	**369659**
8x MQN push button	**369623**

Connector	
2x MQW-4 connector	**369658**
4x MQN push button	**369623**

Connector	
2x MQW-3 connector	**369656**
6x MQN push button	**369623**

Connector	
2x MQW-Q2 connector	**369655**

Open section of vertical profiles facing pipe axis



Connector	
2x MQW-8 connector	**369659**
8x MQN push button	**369623**

Connector	
2x MQW-4 connector	**369658**
4x MQN push button	**369623**

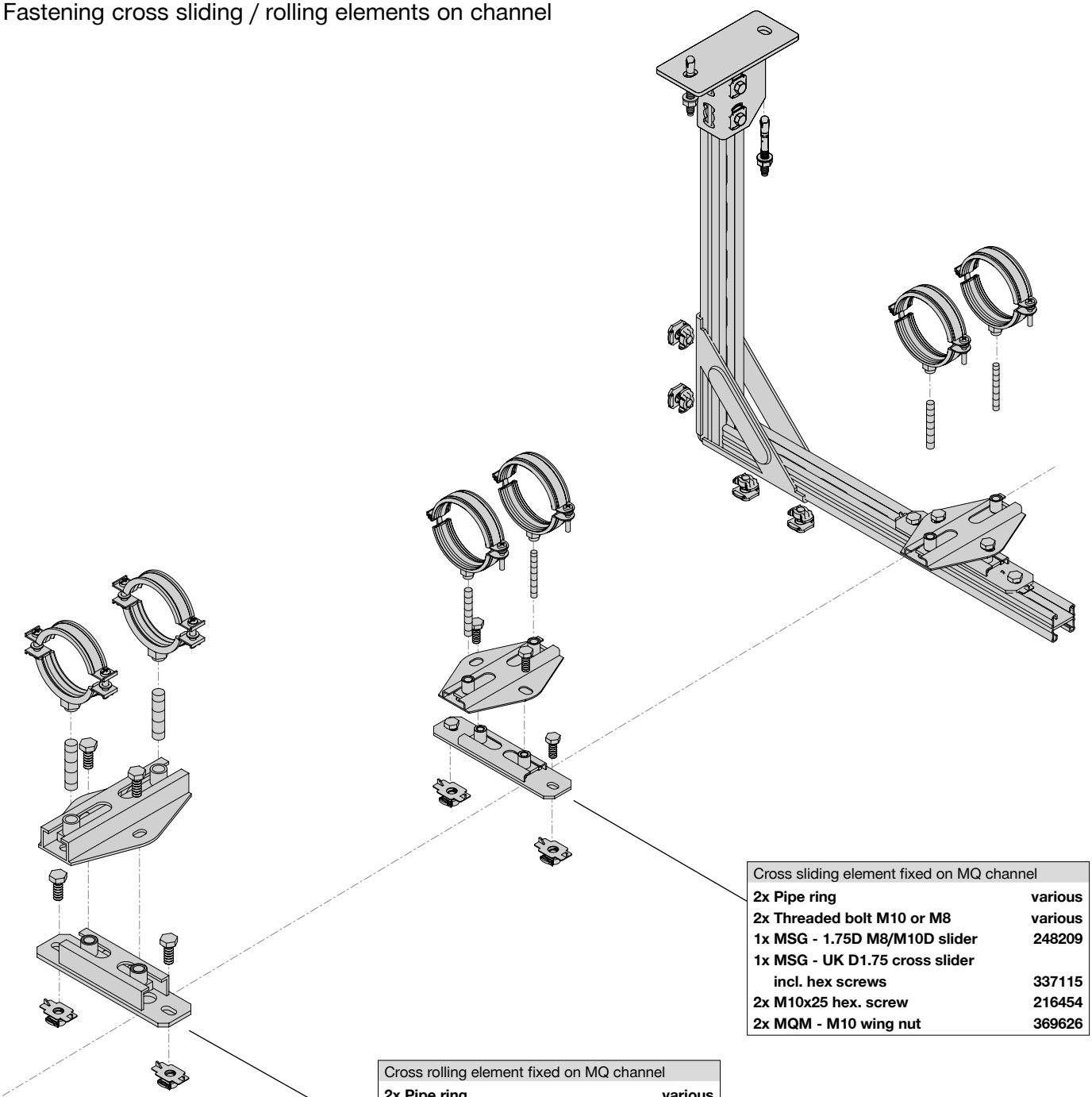
Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Natural Compensation Zone Trapeze - Fastening Cross Sliding / Rolling Elements

Fastening cross sliding / rolling elements on channel



Cross sliding element fixed on MQ channel	
2x Pipe ring	**various**
2x Threaded bolt M10 or M8	**various**
1x MSG - 1.75D M8/M10D slider	**248209**
1x MSG - UK D1.75 cross slider incl. hex screws	**337115**
2x M10x25 hex. screw	**216454**
2x MQM - M10 wing nut	**369626**

Cross rolling element fixed on MQ channel	
2x Pipe ring	**various**
2x Threaded bolt M16 or M12	**various**
1x MRG - D6 roller	**334131**
1x MRG - UK D6 cross roller incl. hex screws	**336755**
2x M12x25 hex. screw	**216458**
2x MQM - M12 wing nut	**369627**

Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
		Sliders / rollers	

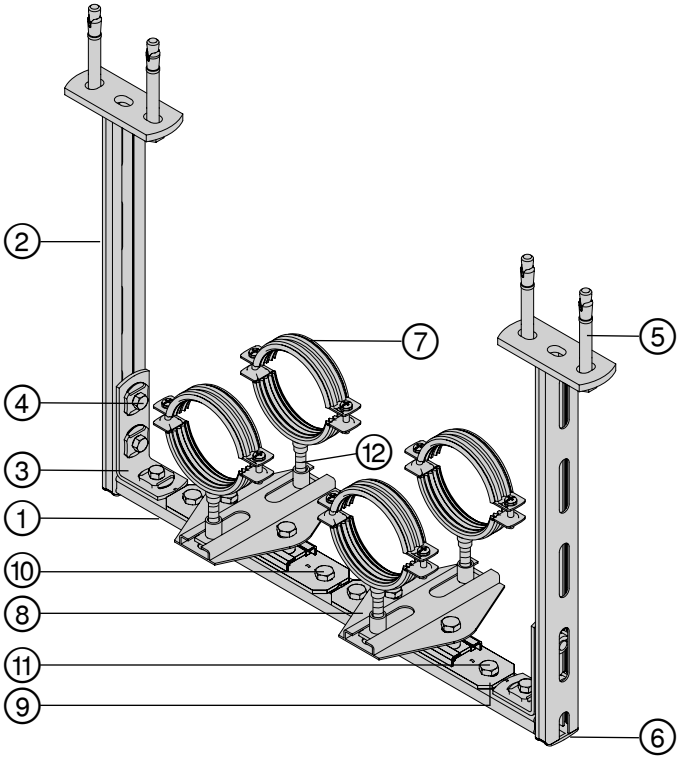
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Natural Compensation Zone Trapeze

Type H-NCZT1

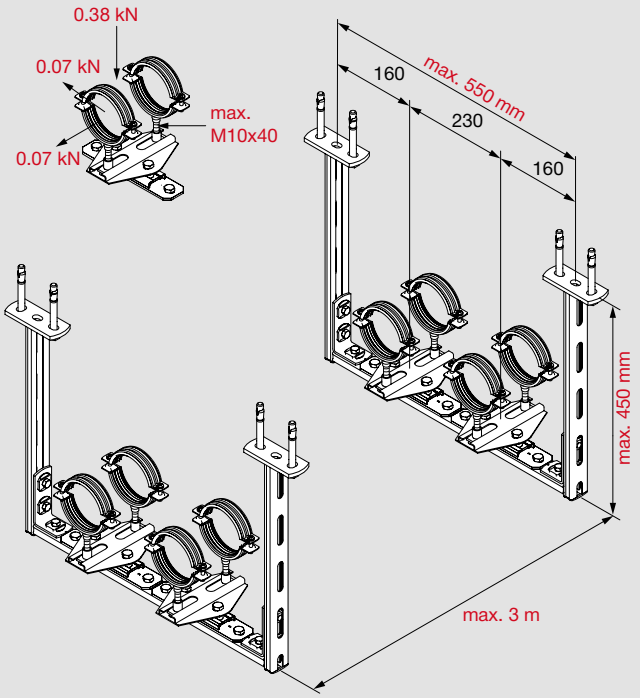
- Limited to max. 2 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 2 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369584**	**MQ-21 3 m channel**	1	0.55
②	**369608**	**MQK-21/450 bracket**	2	-
③	**369656**	**MQW-3 connector**	2	-
④	**369623**	**MQN push button**	6	-
⑤	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
⑥	**370598**	**MQZ-E21 plastic end cap**	2	-
⑦	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	4	-
⑧	**248205**	**MSG 1.0 M8/10 slider**	2	-
⑨	**337115**	**MSG-UK D1.75 cross slider**	2	-
⑩	**216454**	**M10x25 hexagon screw**	4	-
⑪	**369626**	**MQM-M10 wing nut**	4	-
⑫	**216390**	**AM10x40 threaded bolt**	4	-

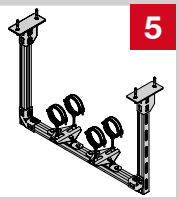
Application description

Heating - natural compensation zone trapeze

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

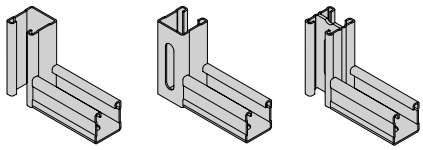
Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	2 x DN 80 concrete

Natural Compensation Zone Trapeze – Axial Bracing Options

Open section of vertical profiles facing pipe axis

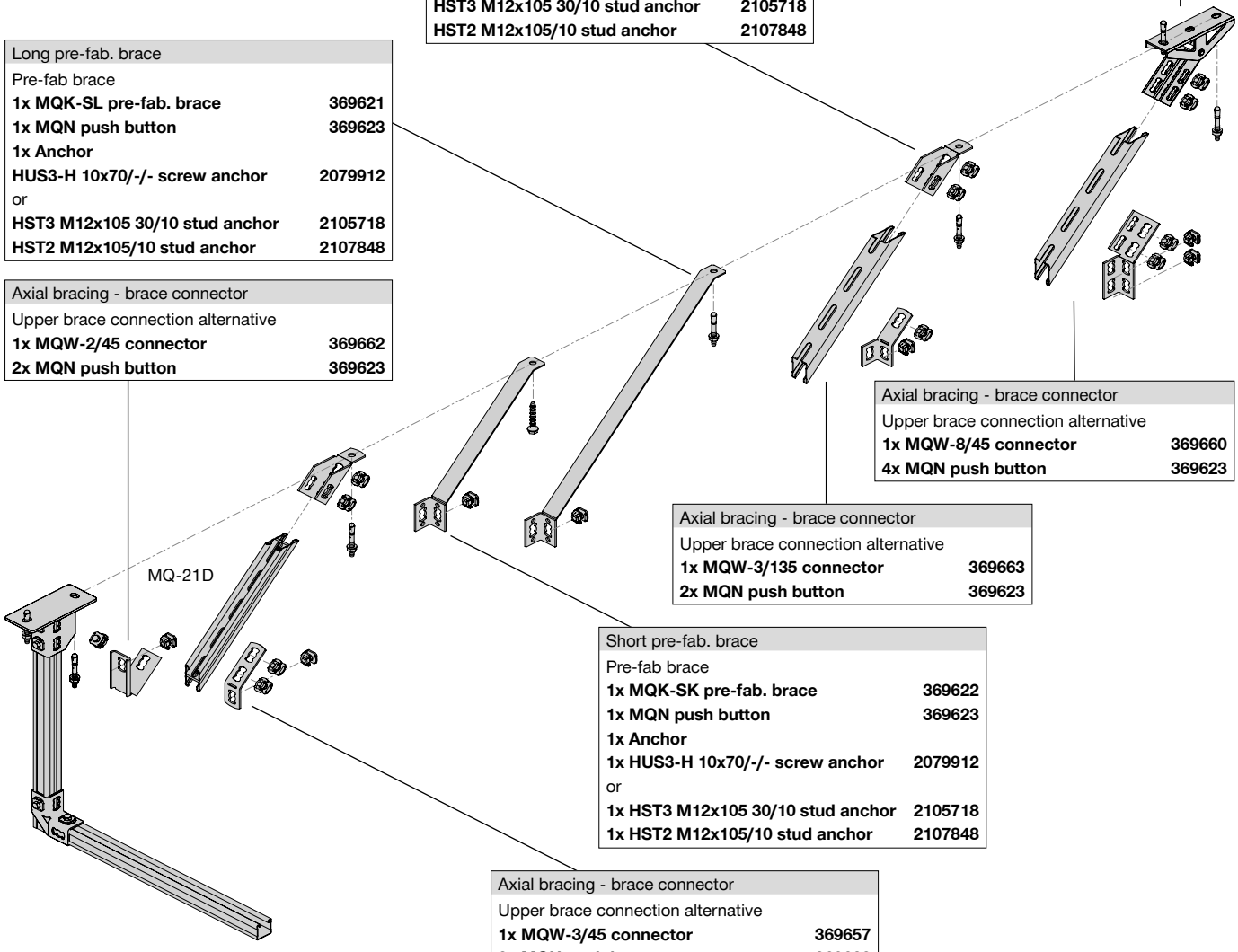


Axial bracing base material hinge connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing - base material connector	
Upper brace connection alternative	
1x MQP-45 connector	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Long pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing - brace connector	
Upper brace connection alternative	
1x MQW-2/45 connector	**369662**
2x MQN push button	**369623**



Axial bracing - brace connector	
Upper brace connection alternative	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**

Axial bracing - brace connector	
Upper brace connection alternative	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Short pre-fab. brace	
Pre-fab brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
1x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
1x HST3 M12x105 30/10 stud anchor	**2105718**
1x HST2 M12x105/10 stud anchor	**2107848**

Axial bracing - brace connector	
Upper brace connection alternative	
1x MQW-3/45 connector	**369657**
3x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
		Anchors	

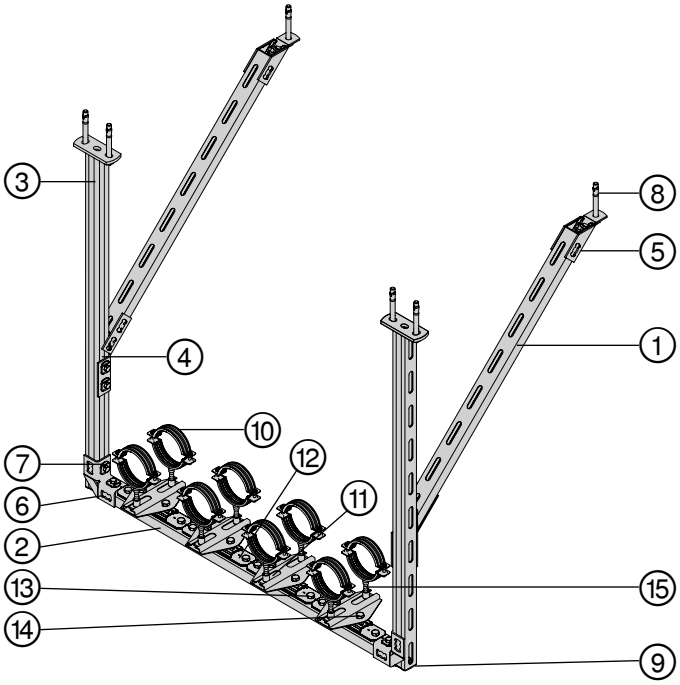
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Natural Compensation Zone Trapeze

Type H-NCZT2

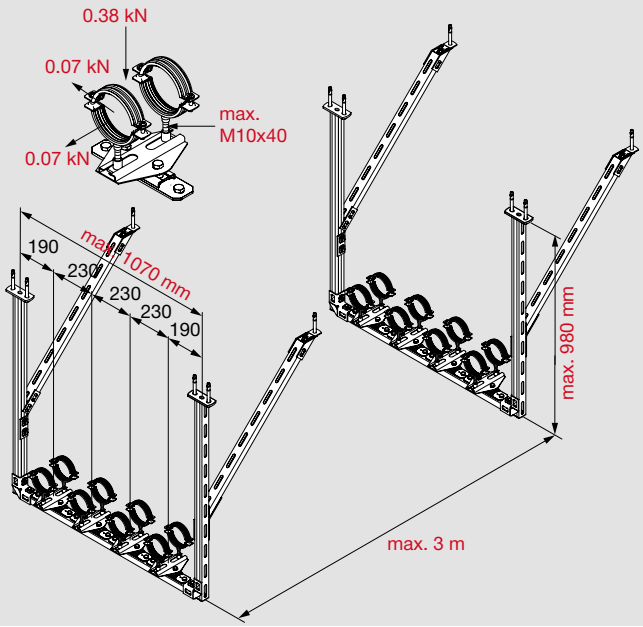
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3 m channel - brace**	2	0.75
②	**369591**	**MQ-41 3 m channel**	1	1.06
③	**369612**	**MQK-41/1000 bracket**	2	-
④	**369660**	**MQW-8/45 connector**	2	-
⑤	**369649**	**MQP-45 base material connector**	2	-
⑥	**369658**	**MQW-4 connector**	2	-
⑦	**369623**	**MQN push button**	16	-
⑧	**2105718**	**HST3 M12x105 30/10 stud anchor**	6	-
⑨	**369685**	**MQZ-E41 plastic end cap**	2	-
⑩	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	8	-
⑪	**248205**	**MSG 1.0 M8/10 slider**	4	-
⑫	**337115**	**MSG-UK D1.75 cross slider**	4	-
⑬	**216454**	**M10x25 galvanized hex screw**	8	-
⑭	**369626**	**MQM-M10 wing nut**	8	-
⑮	**216390**	**AM10x40 threaded bolt**	8	-

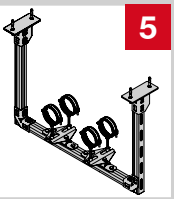
Application description

Heating - natural compensation zone trapeze

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

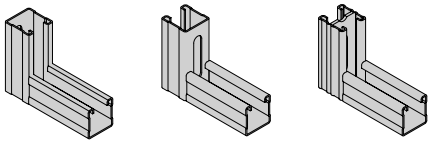
Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 80 concrete

Natural Compensation Zone Trapeze – Axial Bracing Options

Open section of vertical profiles opened towards inside / outside of the trapeze



Axial bracing base material hinge connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing - base material connector	
Upper brace connection alternative	
1x MQP-45 connector	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Long pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing - brace connector	
Upper brace connection alternative	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**

Axial bracing - brace connector	
Upper brace connection alternative	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Short pre-fab. brace	
Pre-fab brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw ancho	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

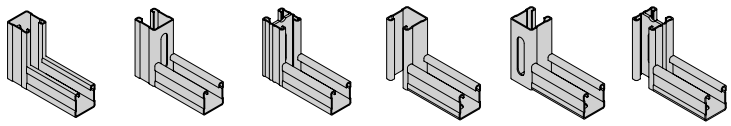
Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
		Anchors	

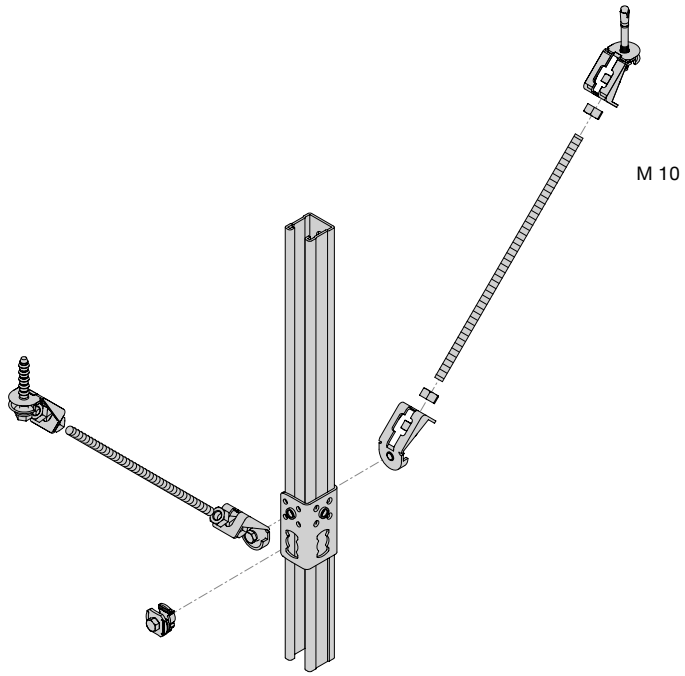
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Natural Compensation Zone Trapeze – Axial Bracing Options Using Threaded Rods

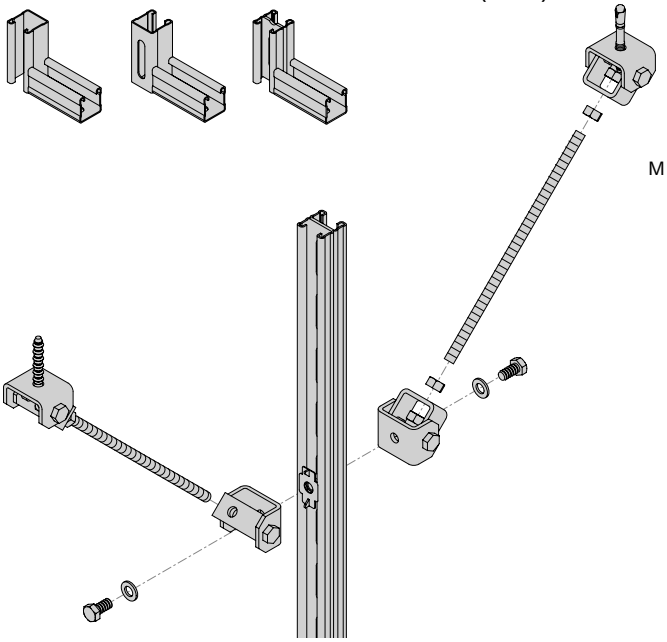
For any orientation of the vertical channel





Axial bracing using 3D elements	
Set of axial braces (2 braces)	
1x MQ3D-B 3D base	**369694**
1x MQN push button	**369623**
4x MQ3D-A brace connector	**369697**
2x AM10 threaded rod	
AM10x1000 t. rod	**339795**
AM10x2000 t. rod	**339796**
AM10x3000 t. rod	**216418**
8x M10 hex. nut	**216466**
2x Anchor	
HUS3-H 8x55/-/- screw anchor	**2079794**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**

For orientation of the vertical double (B2B) channel with open side facing pipe axis



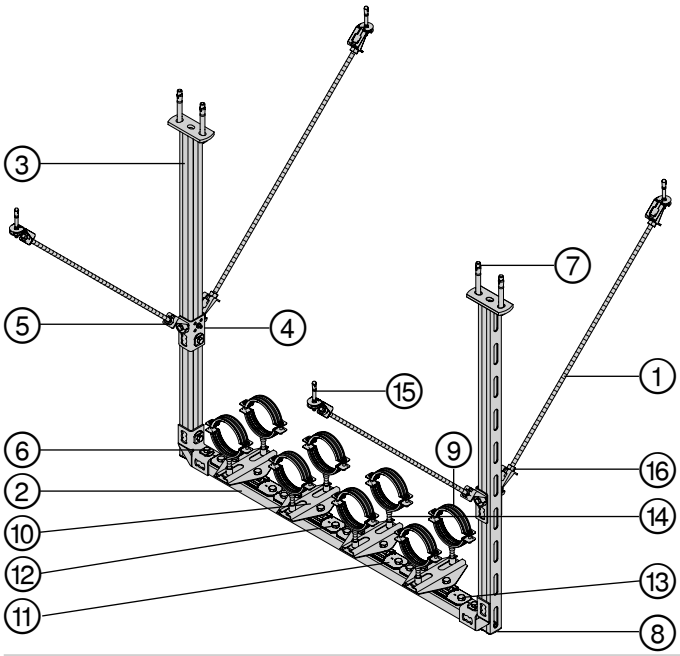
Axial bracing using MQP-U hinge	
Set of axial braces (2 braces)	
4x MQP-U M12 hinge	**284248**
2x MQM-M12	**369627**
2x M12x22 hex. screw	**216457**
2x AM12 threaded rod	
AM12x1000 t. rod	**339797**
AM12x2000 t. rod	**216420**
AM12x3000 t. rod	**216421**
8x M12 hex. nut	**216467**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
General comments		Anchors	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Heating Applications – Natural Compensation Zone Trapeze

Type H-NCZT3

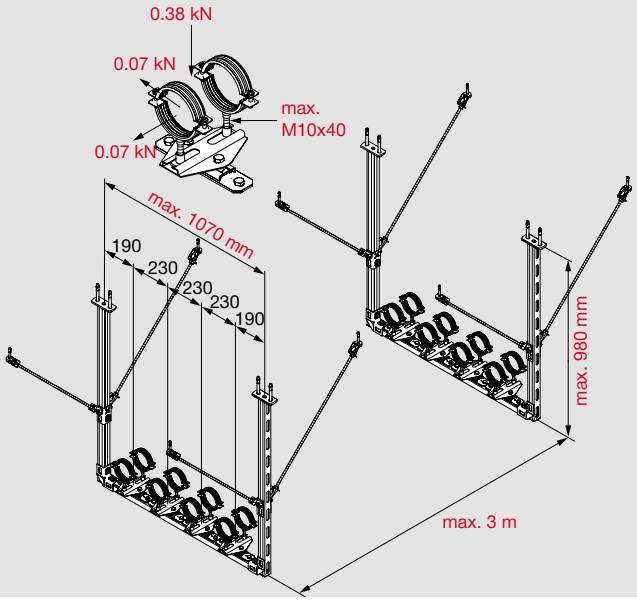
- Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 80 (O.D. 88.9 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**339795**	**AM10x1000 threaded rod**	4	0.75
②	**369591**	**MQ-41 3 m channel**	1	1.06
③	**369612**	**MQK-41/1000 bracket**	2	-
④	**369694**	**MQ3D-B 3D base**	2	-
⑤	**369697**	**MQ3D-A brace connector**	8	-
⑥	**369623**	**MQN push button**	6	-
⑦	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
⑧	**369685**	**MQZ-E41 plastic end cap**	2	-
⑨	**386414**	**MP-HI 84-93 M8/M10 pipe ring**	8	-
⑩	**248205**	**MSG 1.0 M8/10 slider**	4	-
⑪	**337115**	**MSG-UK D1.75 cross slider**	4	-
⑫	**216454**	**M10x25 galvanized hex screw**	8	-
⑬	**369626**	**MQM-M10 wing nut**	8	-
⑭	**216390**	**AM10x40 threaded bolt**	8	-
⑮	**2105712**	**HST3 M10x90 30/10 anchor**	4	-
⑯	**216466**	**M10 hexagon nut**	16	-

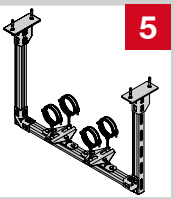
Application description

Heating - natural compensation zone trapeze

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

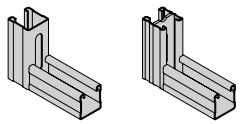
Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 80 concrete

Natural Compensation Zone Trapeze – Lateral Bracing Options Using Channel

Orientation of the vertical channel: open side to the outside of the trapeze



Lateral bracing base material hinge connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Lateral bracing - base material connector	
Upper brace connection alternative	
1x MQP-45 connector	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

MQ-41

MQ-41

MQ-21D

Lateral bracing - Short pre-fab. brace	
Pre-fab brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Lateral bracing using MQP-G pivot connector - brace connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x M12x22 hex. screw	**216457**
2x MQM-M12 wing nut	**369627**

Lateral bracing - brace connector	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Lateral bracing - brace connector	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**

Lateral bracing - brace connector	
1x MQW-2/45 connector	**369662**
2x MQN push button	**369623**

Lateral bracing - Long pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
		Anchors	

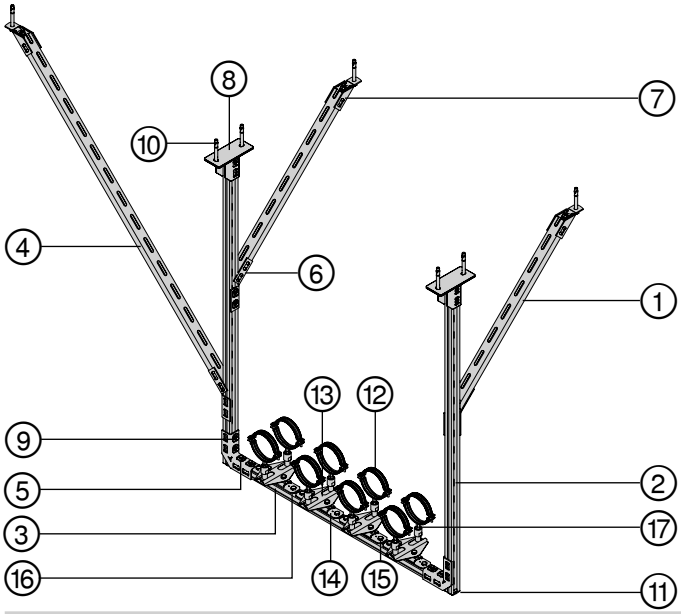
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Natural Compensation Zone Trapeze

Type H-NCZT4

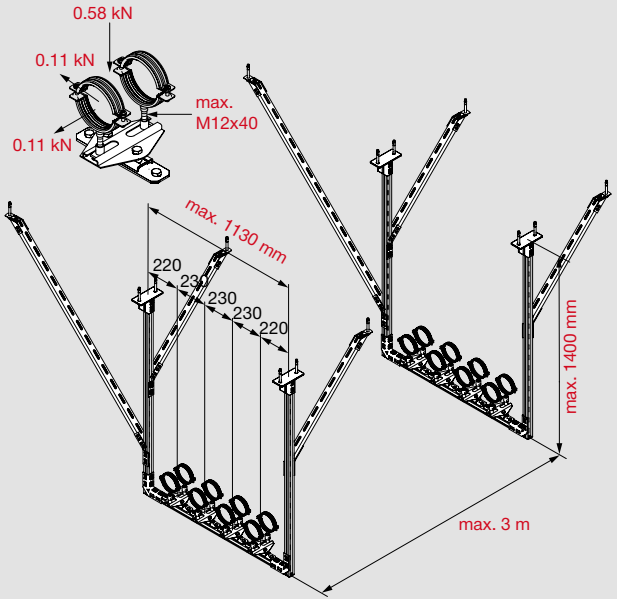
- Limited to max. 4 x DN 100 (O.D. 114.3 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 100 (O.D. 114.3 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3 m channel - axial brace**	2	0.75
②	**369601**	**MQ-21 D 3 m channel**	2	1.42
③	**369596**	**MQ-41/3 3 m channel**	1	1.13
④	**369591**	**MQ-41 3 m channel - lateral brace**	1	1.46
⑤	**369659**	**MQW-8/90 connector**	2	-
⑥	**369660**	**MQW-8/45 connector**	3	-
⑦	**369649**	**MQP-45 base material connector**	3	-
⑧	**369651**	**MQP-21-72 base material connector**	2	-
⑨	**369623**	**MQN push button**	30	-
⑩	**2105718**	**HST3 M12x105 30/10 stud anchor**	7	-
⑪	**370598**	**MQZ-E21 plastic end cap**	4	-
⑫	**20871**	**MP-MI 4" G pipe ring**	8	-
⑬	**248210**	**MSG 1.75 M12/16D slider**	4	-
⑭	**337115**	**MSG-UK D1.75 cross slider**	4	-
⑮	**216453**	**M10x20 hexagon screw**	8	-
⑯	**369626**	**MQM-M10 wing nut**	8	-
⑰	**216397**	**AM12x50 threaded bolt**	8	-

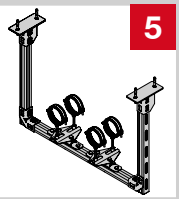
Application description

Heating - natural compensation zone trapeze

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

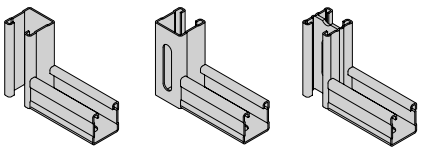
Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 100 concrete

Natural Compensation Zone Trapeze – Lateral Bracing Options Using Channel

Open section of vertical profiles facing pipe axis



Lateral bracing base material hinge connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Lateral bracing - base material connector	
Upper brace connection alternative	
1x MQP-45 connector	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

MQ-21D

Lateral bracing - Long pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 studanchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Lateral bracing - brace connector	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**

Lateral bracing - brace connector	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

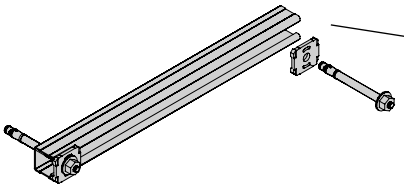
Lateral bracing - Short pre-fab. brace	
Pre-fab brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - natural compensation zone trapeze	5	MQ system	Concrete
		Anchors	

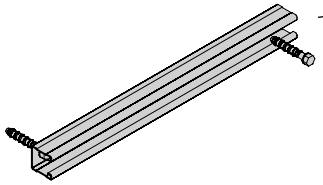
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

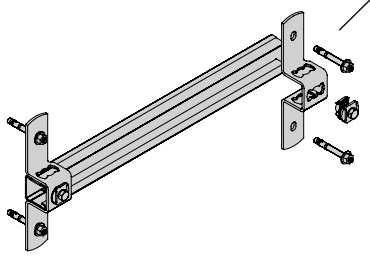
Riser Guides – Wall Rail On Concrete



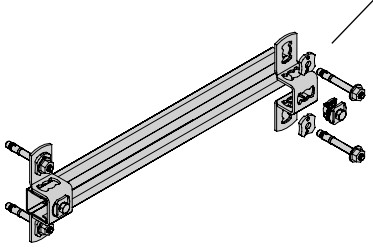
Through-bolted with M12 stud anchor	
HST3 M12x145 70/50 stud anchor	**21058511x**
MQZ-L13 sq. washer	**369680**



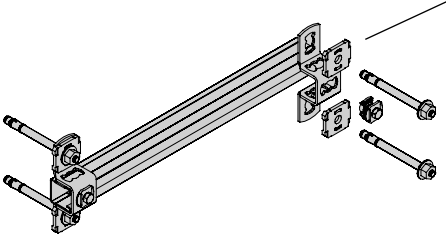
Screw anchor with HUS3 for channel back	
1x HUS3-H 10x70/-/- screw anchor	**2079912**



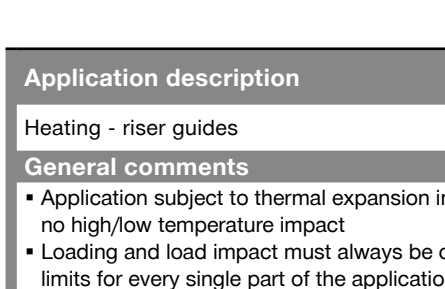
Clamp MQB channel to concrete	
1x MQB-G41 clamp	**369674**
1x MQN pushbutton	**369623**
2x Anchors	
HUS3-H 8x55/-/- screw anchor	**2079794**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**



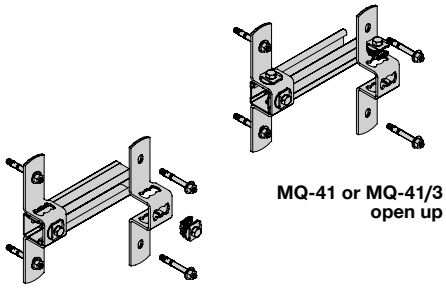
Clamp MQB channel to concrete	
For M10 only	
1x MQB-41 clamp	**369668**
1x MQN pushbutton	**369623**
2x MQZ-U reduction	**369692**
2x Anchors	
HUS3-H 8x55/-/- screw anchor	**2079794**
or	
HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**



Clamp MQB to channel as to concrete	
for M8	
1x MQB-41 clamp	**369668**
1x MQN pushbutton	**369623**
2x MQZ-L9 sq. washer	**369678**
2x HST3 M8x75 -/10	**2105888**
HST2 M8x75/10	**2108161**
for M10	
1x MQB-41 clamp	**369668**
1x MQN pushbutton	**369623**
2x MQZ-L11 sq. washer	**369679**
2x HST3 M10x90 30/10	**2105712**
HST2 M10x90/10	**2107847**
for M12	
1x MQB-41 clamp	**369668**
1x MQN pushbutton	**369623**
2x MQZ-L13 sq. washer	**369680**
2x HST3 M12x105 30/10	**2105718**
HST2 M12x105/10	**2107848**
for M16	
1x MQB-41 clamp	**369668**
1x MQN pushbutton	**369623**
MQZ-L17 Sq. washer	**369681**
2x HST3 M16x135 35/15	**2105858**

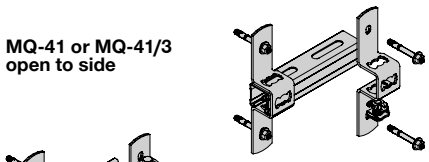


All the clamps allow different positions of the channel in the clamp or even using back-to-back channels of the same format in the clamp.

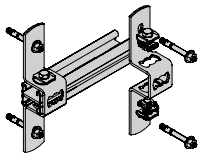


MQ-41 or MQ-41/3 open up

MQ-41 or MQ-41/3 open to side



MQ-41 or MQ-41/3 open down

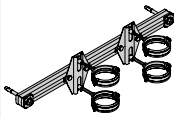


MQ-21D
Option to use
2x MQN pushbutton
for greater stability

Application description	Application	Product lines	Base material
Heating - riser guides	6	MQ system	Concrete
		Anchors	

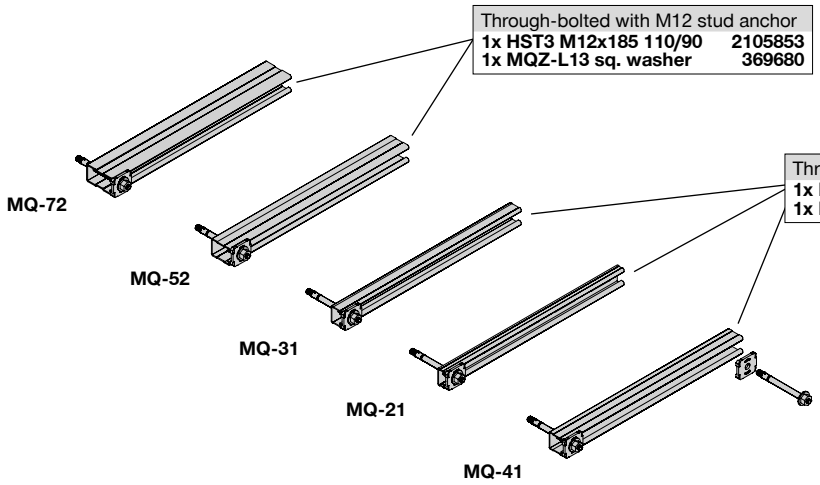
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application



Riser Guides – Wall Rail On Concrete

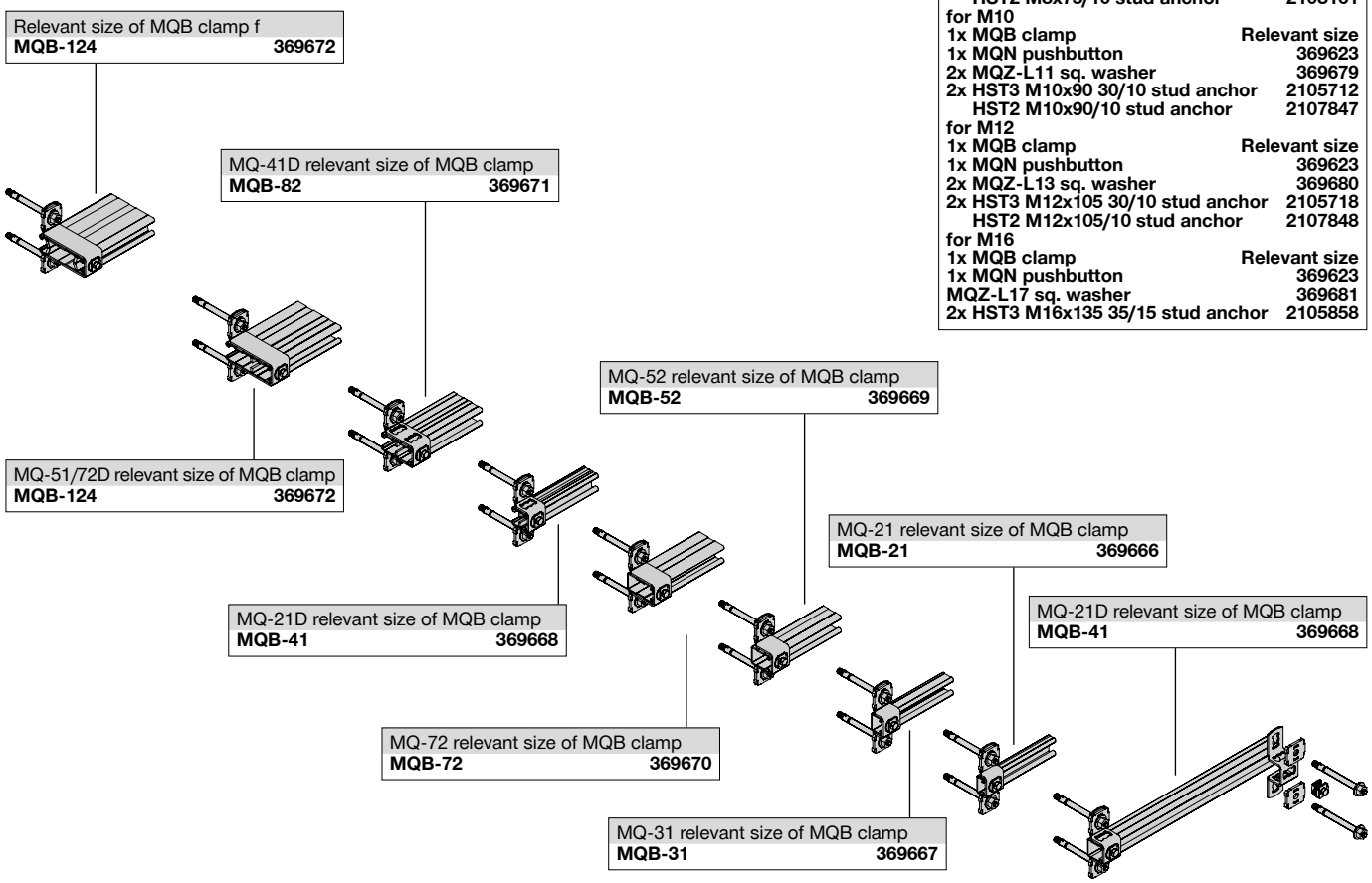
Using all sizes of single channel



Using all sizes of channel

Clamp MQB to channel as to concrete

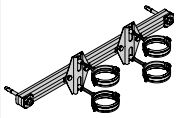
for M8	
1x MQB clamp	**Relevant size**
1x MQN pushbutton	**369623**
2x MQZ-L9 sq. washer	**369678**
2x HST3 M8x75 -/10 stud anchor	**2105888**
HST2 M8x75/10 stud anchor	**2108161**
for M10	
1x MQB clamp	**Relevant size**
1x MQN pushbutton	**369623**
2x MQZ-L11 sq. washer	**369679**
2x HST3 M10x90 30/10 stud anchor	**2105712**
HST2 M10x90/10 stud anchor	**2107847**
for M12	
1x MQB clamp	**Relevant size**
1x MQN pushbutton	**369623**
2x MQZ-L13 sq. washer	**369680**
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
for M16	
1x MQB clamp	**Relevant size**
1x MQN pushbutton	**369623**
MQZ-L17 sq. washer	**369681**
2x HST3 M16x135 35/15 stud anchor	**2105858**



Application description	Application	Product lines	Base material
Heating - riser guides	6	MQ system	Concrete

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

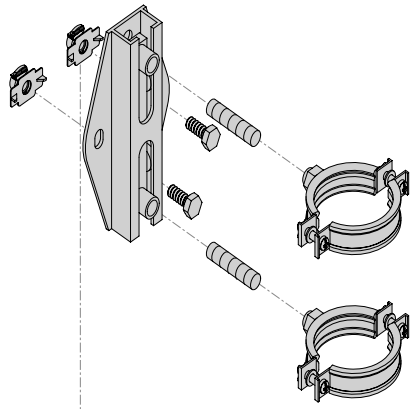


Riser Guides – Wall Rail On Concrete

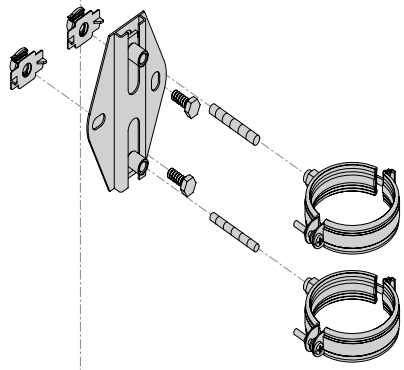
Fixing slider / roller on wall rail

Double roller in bracket with M16 connection	
1x MRG-D6 M12/M16 roller	**334131**
2x MQM-M12 wing nut	**369627**
2x M12x25 hexagon screw	**216458**
2x M16 threaded bolts	
AM16x60	**212634**
AM16x80	**216403**
AM16x100	**212635**
AM16x150	**212636**

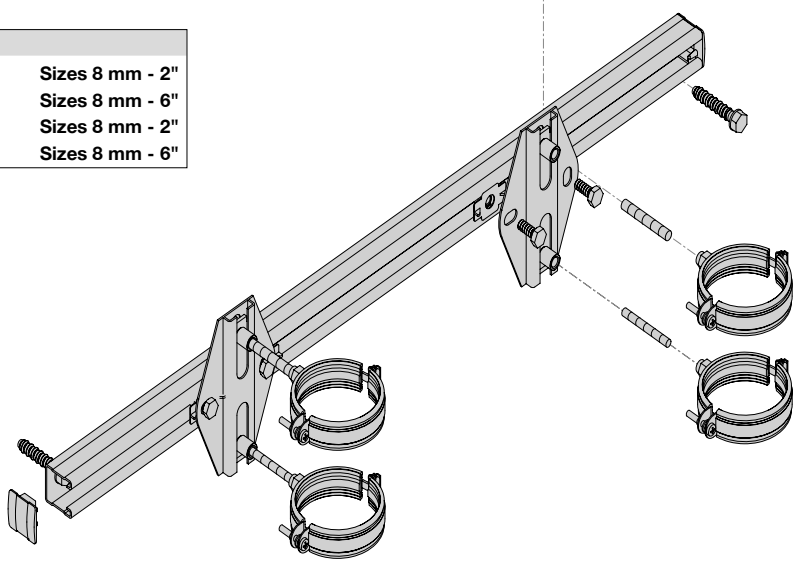
M16 pipe rings	
MP-MI..C	**Sizes 4" - 244.5 mm**
MP-MXI..M16	**Sizes 4" - 508 mm**



Double slider in channel with M10 connections	
1x MSG 1.75 M8/M10 D slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**



M10 pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**

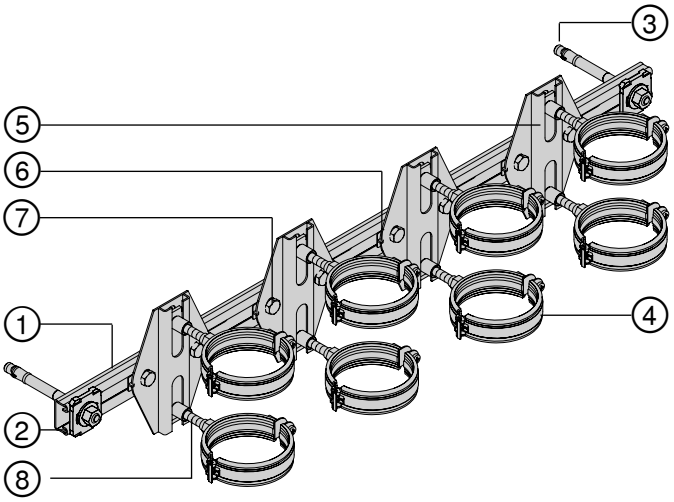


Application description	Application	Product lines	Base material
Heating - riser guides	6	MQ system	Concrete
General comments		Sliders/rollers	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Heating Applications - Cantilever Arm

Type H-RG1

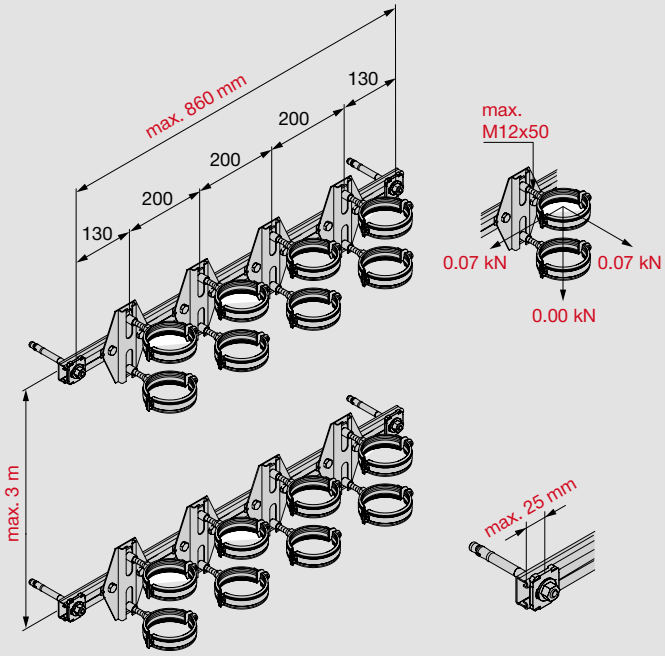
- Limited to max. 4 x DN 80 (O.D. 89.1 mm) water-filled steel pipe
- Spacing - support distance 3 m
- Insulation 20 mm elastomeric caoutchouc



Additional loading capacity limits

The loading capacity limit is set by many different parameters for this complex case. Exceeding any (even only one) of the parameters shown in red would result in exceeding the limitation factors for this particular case.
This would make it necessary to carry out the complete static calculations and may lead to selection of different products and dimensions.

Limited to max. 4 x DN 80 (O.D. 89.1 mm) water-filled steel pipe



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369584**	**MQ-21 3 m channel**	1	0.90
②	**369680**	**MQZ-L13 square washer**	2	-
③	**2105851**	**HST3 M12x145 70/50 anchor**	2	-
④	**20866**	**MI-MI 3" G pipe ring**	8	-
⑤	**248210**	**MSG 1.75 M12/16D slider**	4	-
⑥	**369626**	**MQM-M10 wing nut**	8	-
⑦	**216453**	**M10x20 hexagon screw**	8	-
⑧	**216397**	**AM12x50 threaded bolt**	8	-

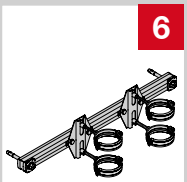
Application description

Heating - riser guides

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MQ system, sliders
Capacity limit	4 x DN 80 concrete

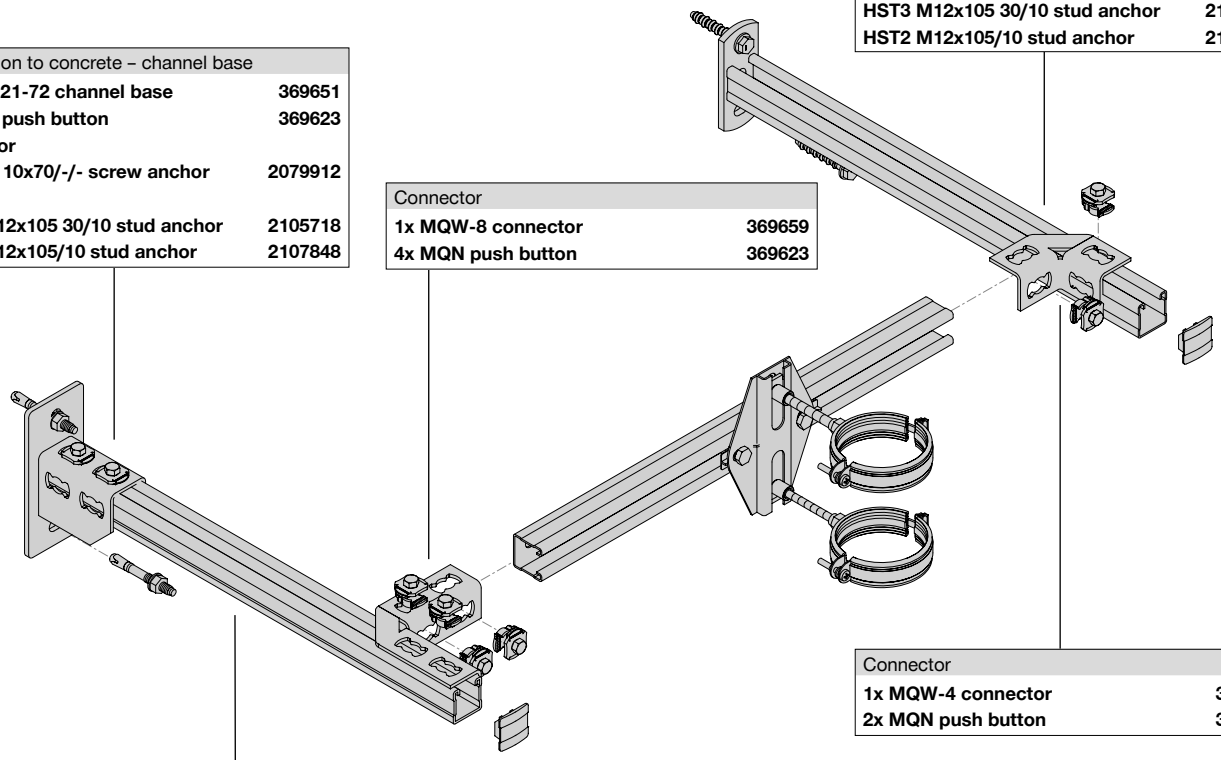
Riser Guides – Off-set Frame

Using pre-fab. or assembled cantilever arms for off-set frame

41 format cantilever arms 2 hole base	
1x MQK bracket	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**



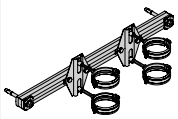
Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

41 format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Application description	Application	Product lines	Base material
Heating - riser guides	6	MQ system	Concrete
		Anchors	

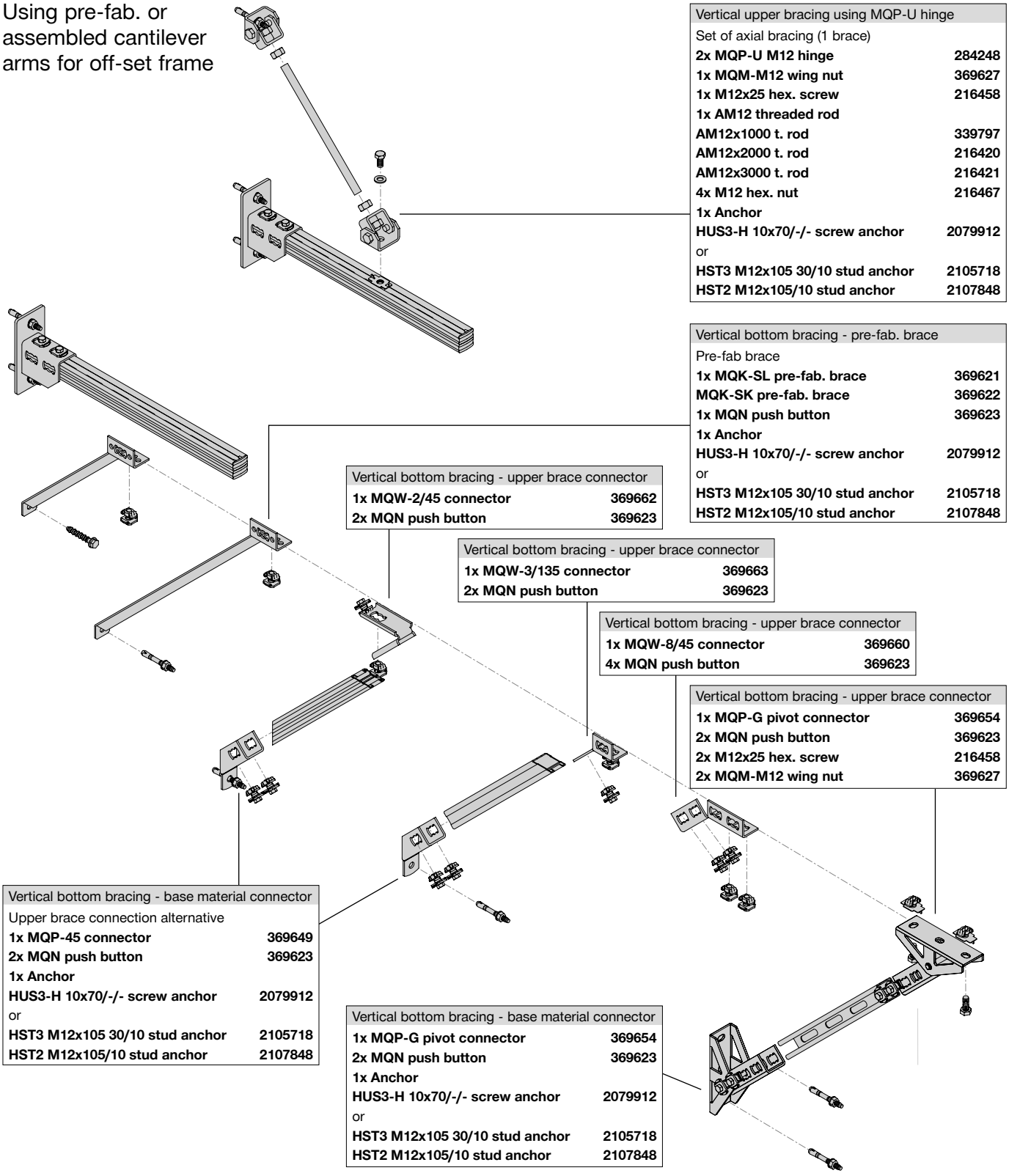
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application



Riser Guides – Off-set Frame: Vertical Bracing

Using pre-fab. or assembled cantilever arms for off-set frame



Vertical upper bracing using MQP-U hinge	
Set of axial bracing (1 brace)	
2x MQP-U M12 hinge	**284248**
1x MQM-M12 wing nut	**369627**
1x M12x25 hex. screw	**216458**
1x AM12 threaded rod	
AM12x1000 t. rod	**339797**
AM12x2000 t. rod	**216420**
AM12x3000 t. rod	**216421**
4x M12 hex. nut	**216467**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Vertical bottom bracing - pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Vertical bottom bracing - upper brace connector	
1x MQW-2/45 connector	**369662**
2x MQN push button	**369623**

Vertical bottom bracing - upper brace connector	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Vertical bottom bracing - upper brace connector	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**

Vertical bottom bracing - upper brace connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x M12x25 hex. screw	**216458**
2x MQM-M12 wing nut	**369627**

Vertical bottom bracing - base material connector	
Upper brace connection alternative	
1x MQP-45 connector	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

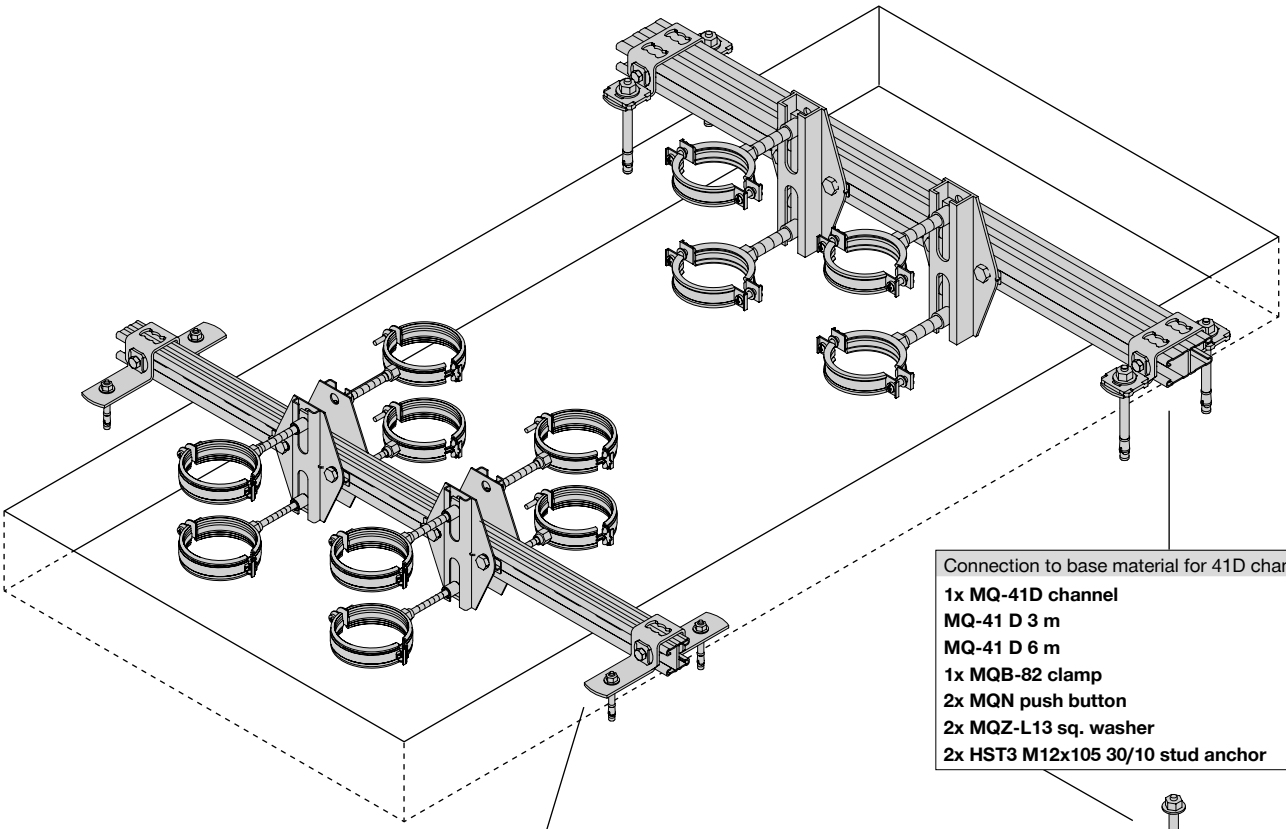
Vertical bottom bracing - base material connector	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - riser guides	6	MQ system	Concrete
		Anchors	

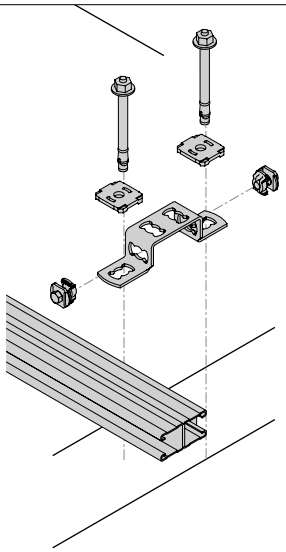
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

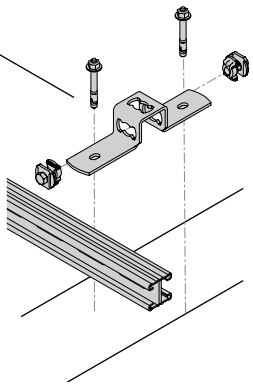
Riser Guides – Shaft Sub-structure



Connection to base material for 41D channel	
1x MQ-41D channel	
MQ-41 D 3 m	**369603**
MQ-41 D 6 m	**369604**
1x MQB-82 clamp	**369671**
2x MQN push button	**369623**
2x MQZ-L13 sq. washer	**369680**
2x HST3 M12x105 30/10 stud anchor	**2105718**

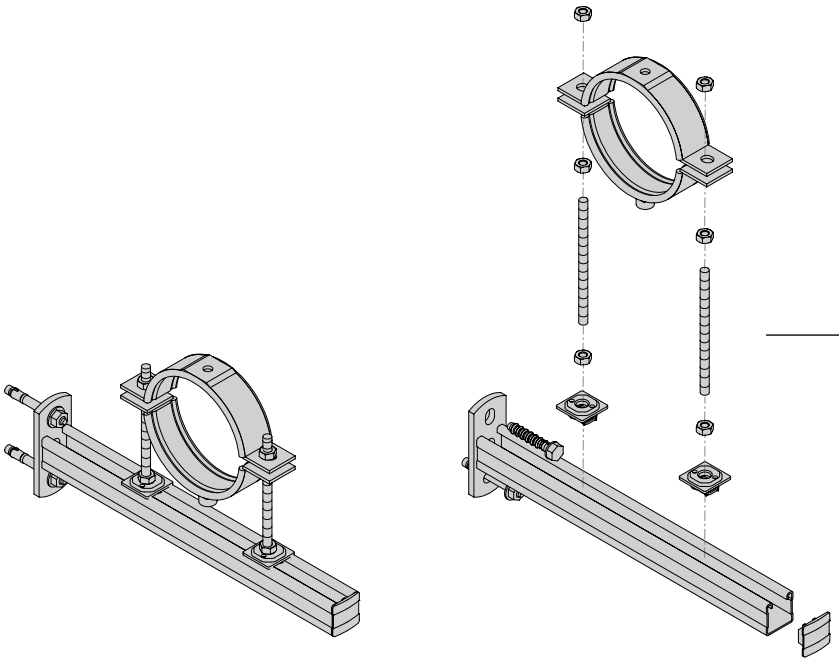


Connection to base material for 41 format channels	
1x MQ 41 mm format channel	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
MQB-G41 clamp	**369674**
1x MQN pushbutton	**369623**
2x HST3 M10x90 30/10 stud anchor	**2105712**

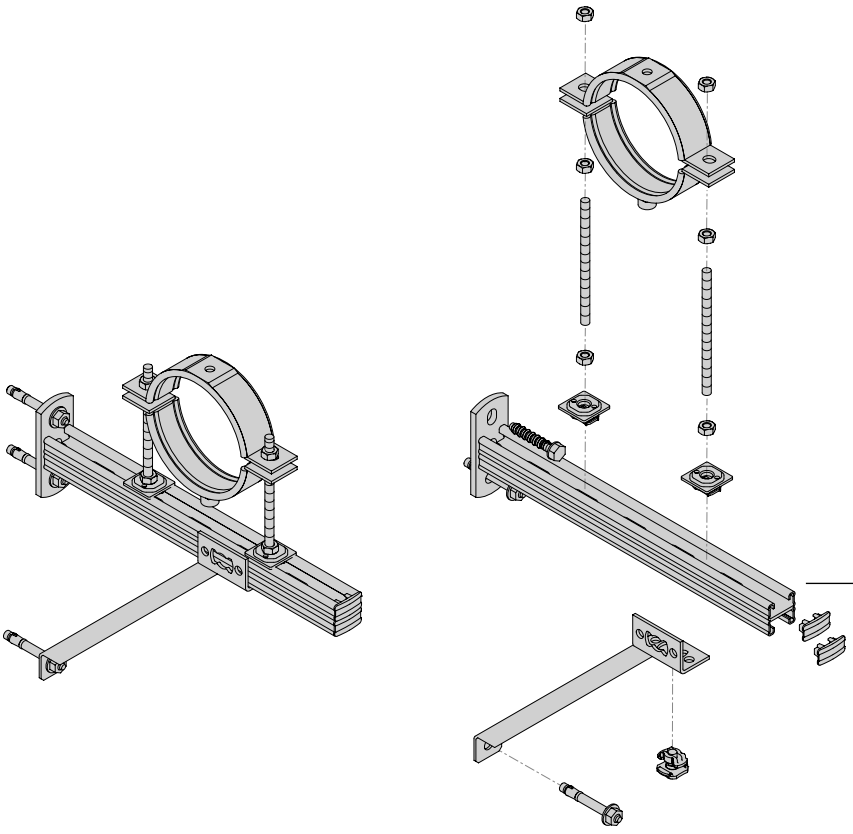


Application description	Application	Product lines	Base material
Heating - riser guides	6	MQ system	Concrete
General comments		Anchors	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

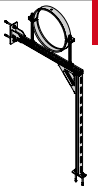
Plant Room Equipment Support – Splitter Frame Options



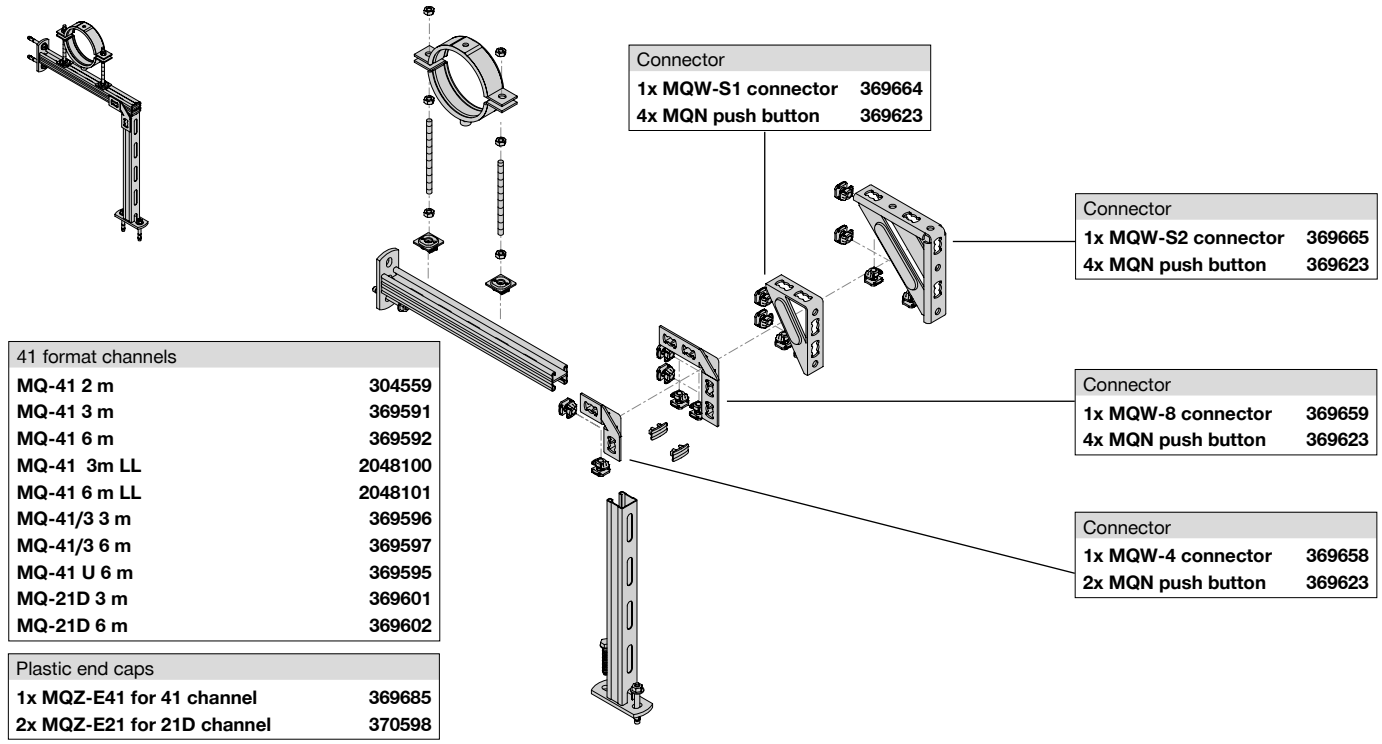
Splitter bracket (1 bracket)	
1x MQK bracket	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
2x MQA-M16 saddle nut	**369632**
2x M16 threaded rod	
AM16x1000 ..m	**216422**
AM16x2000..m	**216423**
AM16x3000..m	**216424**
4x M16 hex. nut	**216468**
1x MP-MXI pipe ring >177.8 mm	



Vertical bracing – pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - plant room equipment support: splitter frame	 7	MQ system	Concrete
General comments		Anchors	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Plant Room Equipment Support – Splitter Frame Options



Connector	
1x MQW-S1 connector	**369664**
4x MQN push button	**369623**

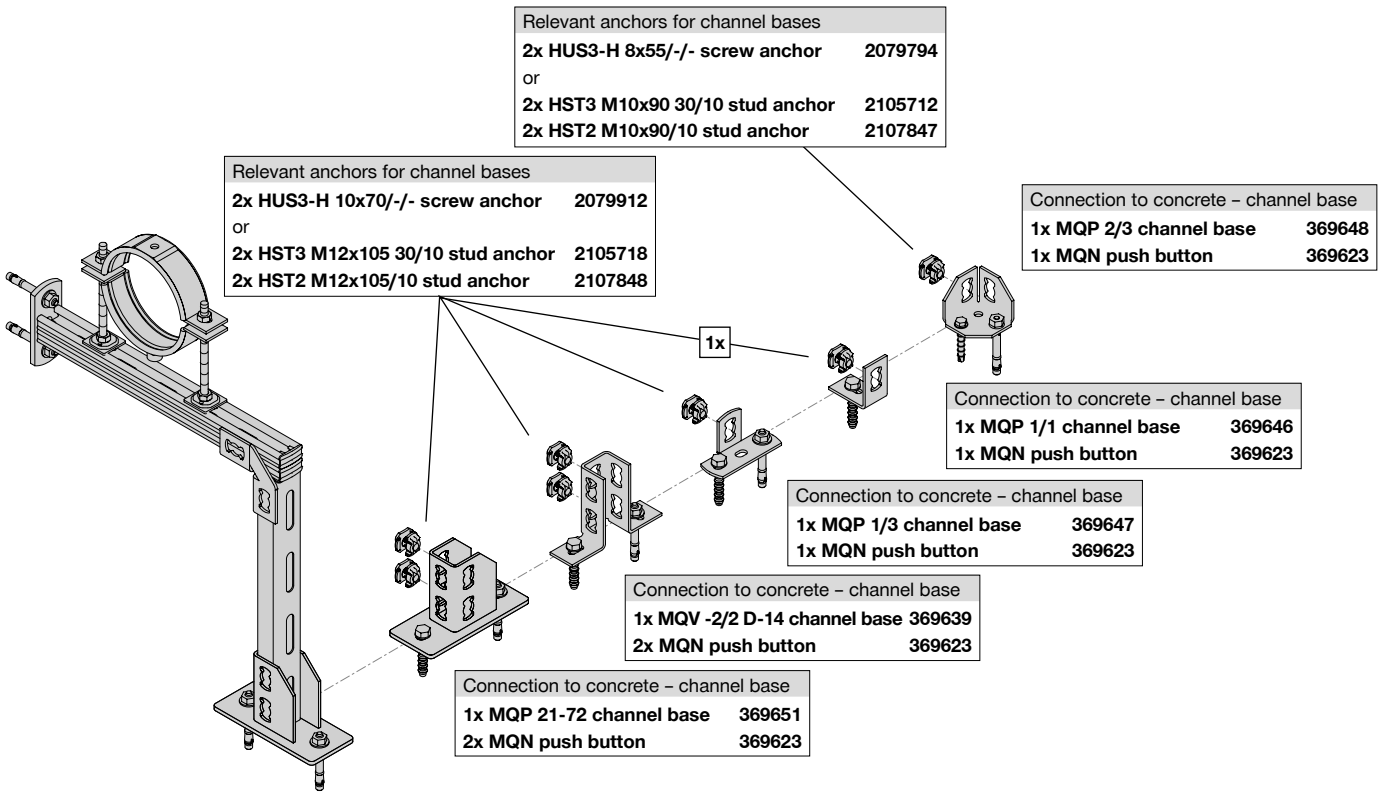
Connector	
1x MQW-S2 connector	**369665**
4x MQN push button	**369623**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**

Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

41 format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Plastic end caps	
1x MQZ-E41 for 41 channel	**369685**
2x MQZ-E21 for 21D channel	**370598**



Relevant anchors for channel bases	
2x HUS3-H 8x55/-/- screw anchor	**2079794**
or	
2x HST3 M10x90 30/10 stud anchor	**2105712**
2x HST2 M10x90/10 stud anchor	**2107847**

Relevant anchors for channel bases	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
2x HST2 M12x105/10 stud anchor	**2107848**

Connection to concrete – channel base	
1x MQP 2/3 channel base	**369648**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 1/1 channel base	**369646**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 1/3 channel base	**369647**
1x MQN push button	**369623**

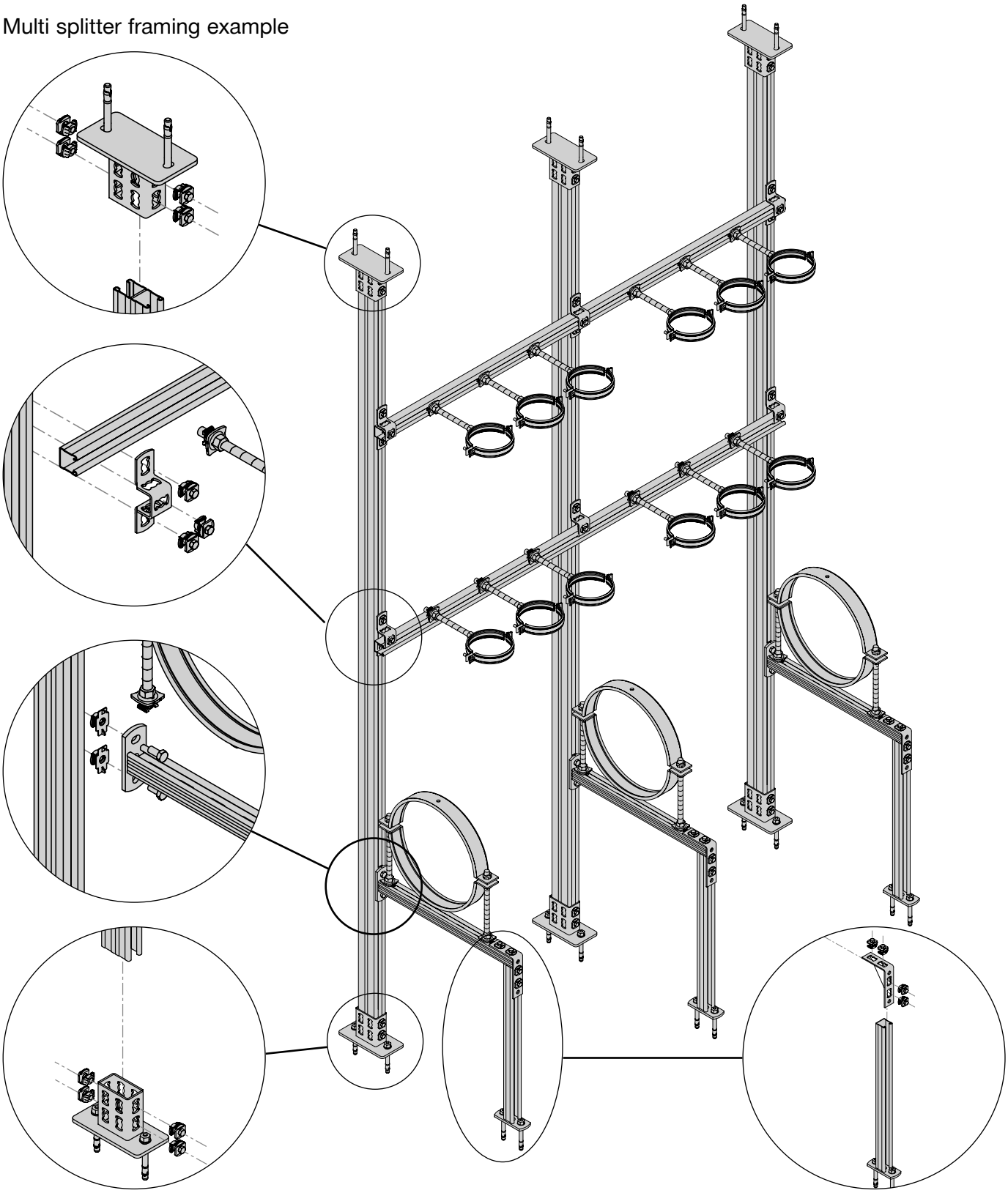
Connection to concrete – channel base	
1x MQV -2/2 D-14 channel base	**369639**
2x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating - plant room equipment support: splitter frame	7	MQ system	Concrete
General comments		Anchors	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Plant Room Equipment Support – Splitter Frame Options

Multi splitter framing example



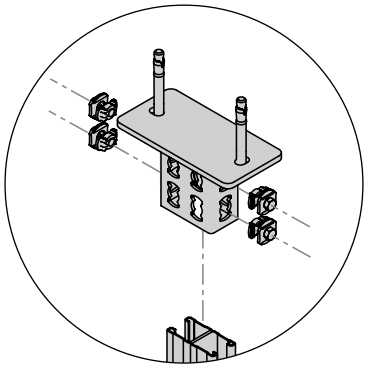
Application description	Application	Product lines	Base material
Heating - plant room equipment support: splitter frame	7	MQ system	Concrete

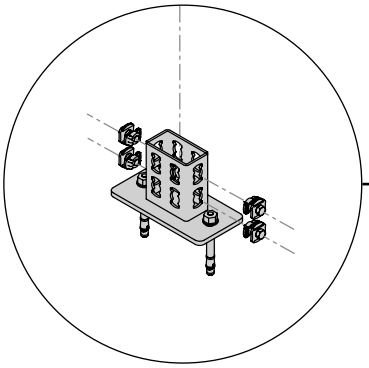
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

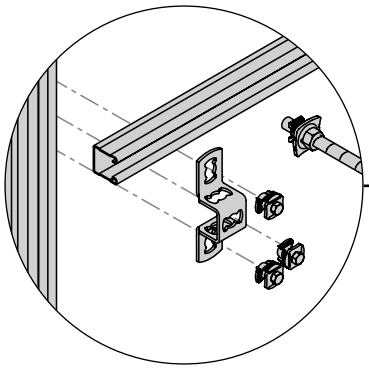
Plant Room Equipment Support – Splitter Frame Options

Multi splitter framing example



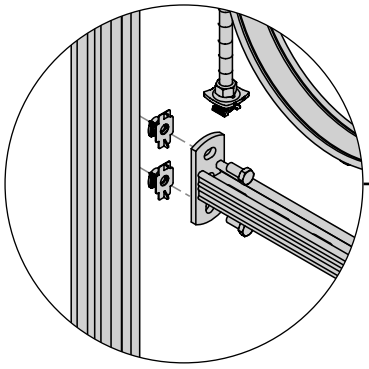


MQP 82 Channel base with associated channels	
1x MQP 82 channel base	**369652**
4x MQN push button	**369623**
41D mm format channels	
MQ-41D 3m	**369603**
MQ-41D 6m	**369604**
2x Anchors	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



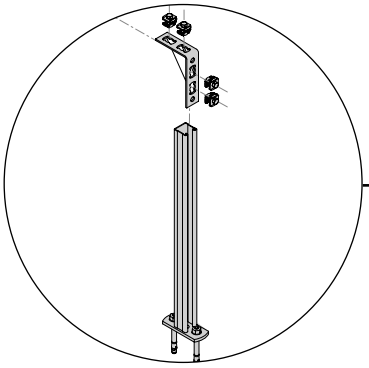
Cross connector	
1x MQB-41 cross connector	**369668**
3x MQN push button	**369623**

41 format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**



Connection of bracket to channel	
1x MQK bracket	
2x M12x25 screw	**216458**
2x MQM-M12 wing nut	**369623**

21D mm format brackets	
MQK-21D/300	**369617**
MQK-21D/450	**369618**
MQK-21D/600	**369619**
41 mm format brackets	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
72 mm format brackets	
MQK-72/450	**369615**
MQK-72/600	**369616**
41D mm format brackets	
MQK-41D/1000	**369620**



Node connection	
1x MQW-S1 connector	**369664**
4x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating - plant room equipment support: splitter frame	7	MQ system	Concrete

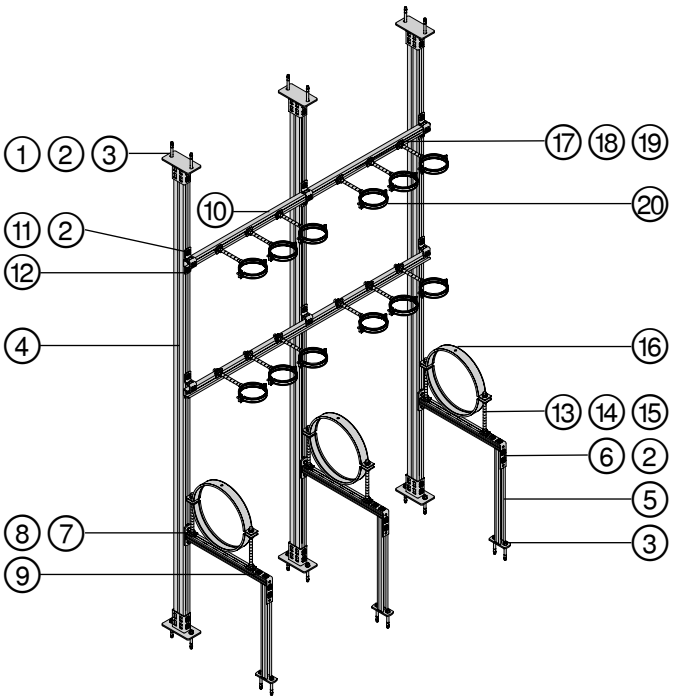
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: Splitter Frame

Type H-PR-SF5

- This example for splitter DN 350 (O.D. 372 mm)
- Outgoing pipes 6 x DN 80 (O.D. 88.9 mm)
- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369652**	**MQP 82 channel base**	6	-
②	**369623**	**MQN push button**	54	-
③	**2105718**	**HST3 M12x105 30/10 stud anchor**	18	-
④	**369603**	**MQ-41D 3 m channel**	3	Depends on span
⑤	**369611**	**MQK-41/600 bracket**	3	-
⑥	**369664**	**MQW-S1 connector**	3	-
⑦	**369623**	**MQM-M12 wing nut**	6	-
⑧	**216458**	**M12x25 screw**	6	-
⑨	**369619**	**MQK-21D/600 bracket**	3	-
⑩	**369591**	**MQ-41 3 m channel**	2	Depends on width of the frame
⑪	**369668**	**MQB-41 cross connector**	6	-
⑫	**369685**	**MQZ-E41 plastic end cap**	4	-
⑬	**369632**	**MQA-M16 B saddle nut**	6	-
⑭	**216422**	**AM16x1000 threaded rod**	6	Depends on size
⑮	**216468**	**M16 hexagon nut**	18 (12)	-
⑯	**372245**	**MP-MXI 368 M16 pipe ring**	3	-
⑰	**369630**	**MQA-M10 saddle nut**	12	-
⑱	**216390**	**AM10x40 threaded bolt**	12	-
⑲	**216466**	**M10 hexagon nut**	12	-
⑳	**335692**	**MPN-RC 3" B pipe ring**	12	-

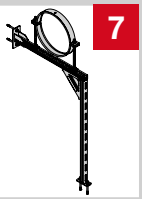
Application description

Heating - plant room equipment support: splitter frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

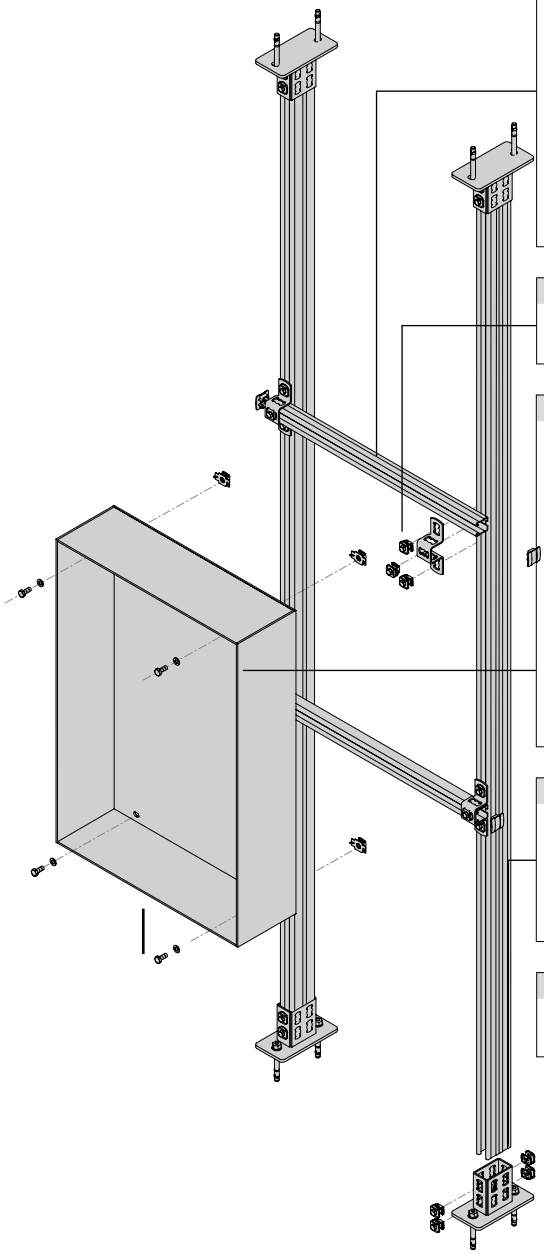
Application



Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Equipment Support – Switch Box Frame Options

Switch box frame, floor to ceiling



41 format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Cross connector for 1 fixing point	
1x MQB-41 cross connector	**369668**
3x MQN push button	**369623**

Connection of the switch box to channel	
M8	
4x M8x25 hex. screw	**216448**
4x A8,4/16 washer	**282850**
4x MQM-M8 wing nut	**369698**
M10	
4x M10x25 hex. screw	**216454**
4x A10,5/20 washer	**282851**
4x MQM-M10 wing nut	**369626**
M12	
4x M12x25 hex. screw	**216458**
4x A13/24 washer	**282852**
4x MQM-M12 wing nut	**369627**

MQP 82 channel base with associated channels	
1x MQP-82 channel base	**369652**
4x MQN push button	**369623**
41D format channels	
MQ-41D 3 m	**369603**
MQ-41D 6 m	**369604**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**

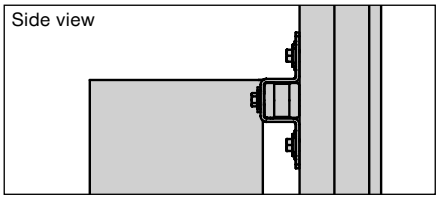
Connection to concrete – channel base	
1x MQV -2/2 D-14 channel base	**369639**
2x MQN push button	**369623**

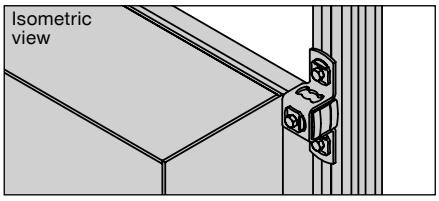
Connection to concrete – channel	
1x MQP 1/3 channel base	**369647**
1x MQN push button	**369623**

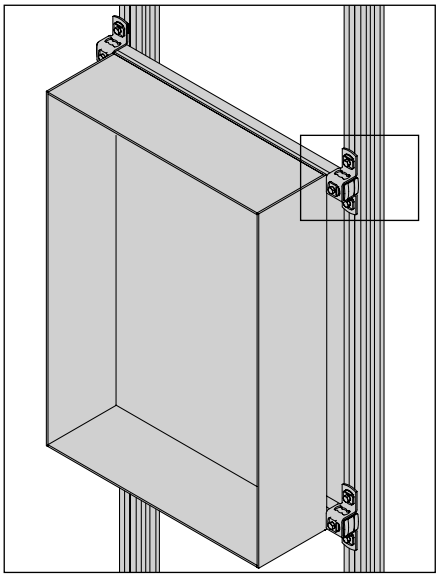
Relevant anchors for channel bases	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
For MQP 1/1 only 1 pc of anchor	

Connection to concrete – channel base	
1x MQP 1/1 channel base	**369646**
1x MQN push button	**369623**

For cases where there is enough space







Application description	Application	Product lines	Base material
Heating - plant room equipment support: switch box frame	8	MQ system	Concrete
		Anchors	

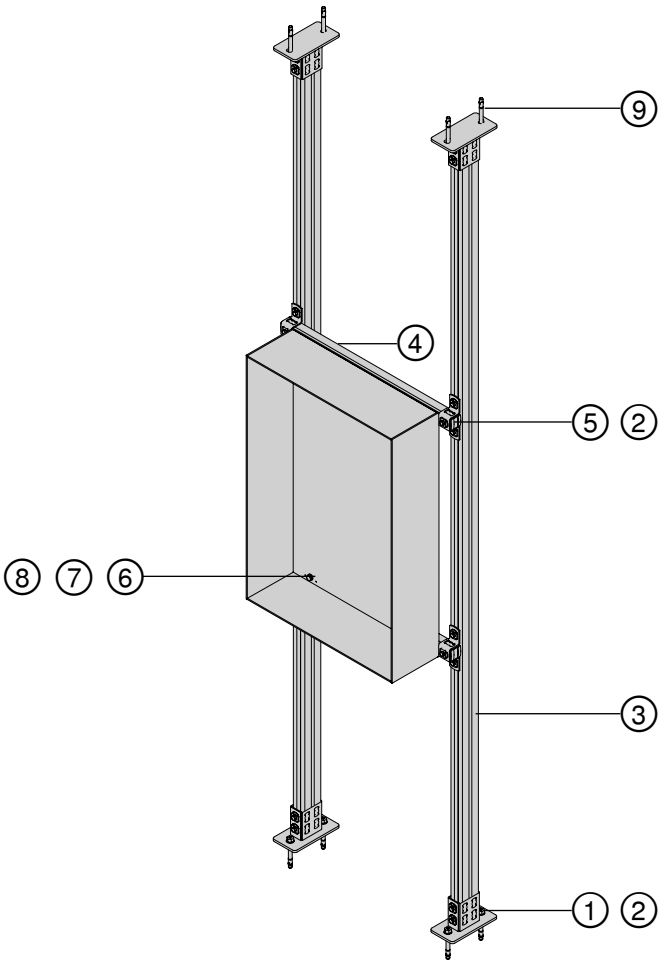
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: Switch Box Frame

Type H-PR-SB1

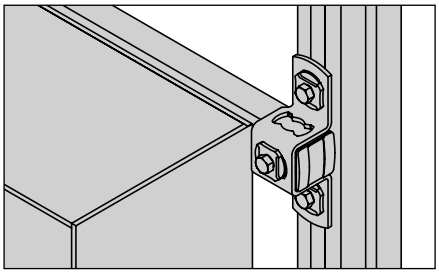
- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369652**	**MQP-82 channel base**	4	-
②	**369623**	**MQN push button**	28	-
③	**369603**	**MQ-41D 3 m channel**	2	Depends on span
④	**369591**	**MQ-41 3 m channel**	2	Depends on the with of the box
⑤	**369668**	**MQB-41 cross connector**	4	-
⑥	**369627**	**A13/24 washer**	4	-
⑦	**282852**	**M10x20 hexagon screw**	4	-
⑧	**216458**	**M12x25 hex. screw**	4	-
⑨	**2105718**	**HST3 M12x105 30/10 anchor**	8	-

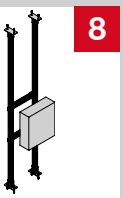
Application description

Heating – plant room equipment support: switch box frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

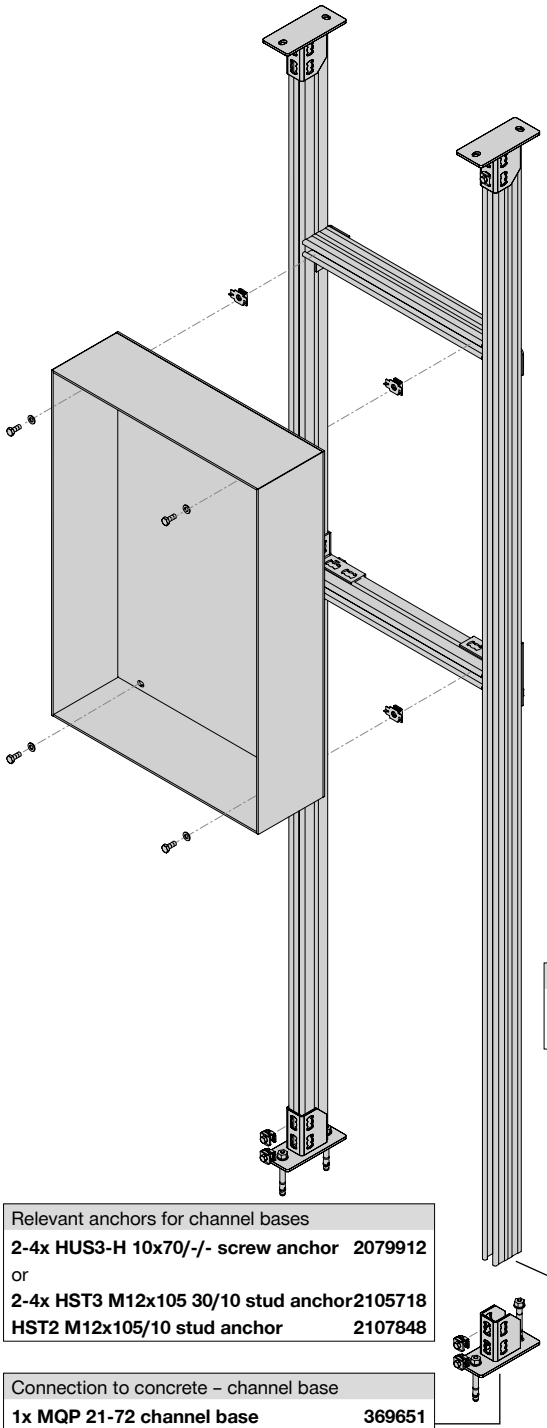
Application



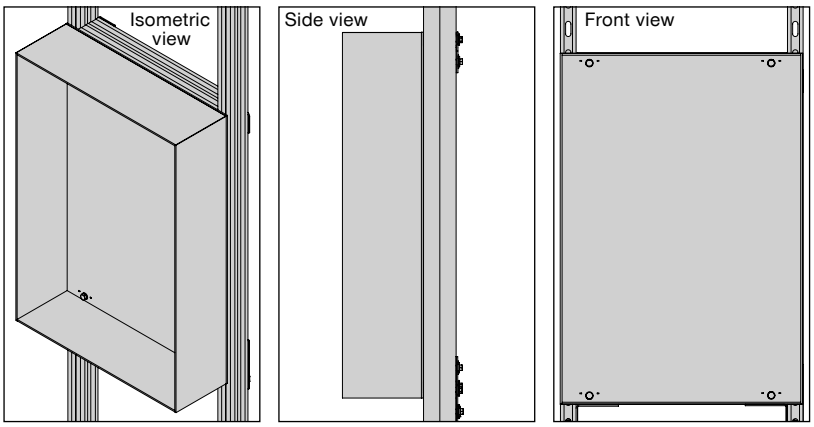
Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Equipment Support – Switch Box Frame Options

Switch box frame, floor to ceiling



Space-saving solution



Connector	
1x MQW - P2 connector	**369661**
2x MQN push button	**369623**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**

Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

Connector	
1x MQV-3/2 D	**369640**
4x MQN push button	**369623**

Connection to concrete – channel base	
2x MQP 1/1 channel base	**369646**
2x MQN push button	**369623**

Connection to concrete – channel base	
2x MQP 1/3 channel base	**369647**
2x MQN push button	**369623**

Connection to concrete – channel base	
1x MQV -2/2 D-14 channel base	**369639**
2x MQN push button	**369623**

Relevant anchors for channel bases	
2-4x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2-4x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Connection to concrete – channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**

MQP-82 channel base with associated channels	
1x MQP 82 channel base	**369652**
4x MQN push button	**369623**
41D format channels	
MQ-41D 3 m	**369603**
MQ-41D 6 m	**369604**

Application description	Application	Product lines	Base material
Heating - plant room equipment support: switch box frame	8	MQ system	Concrete
		Anchors	

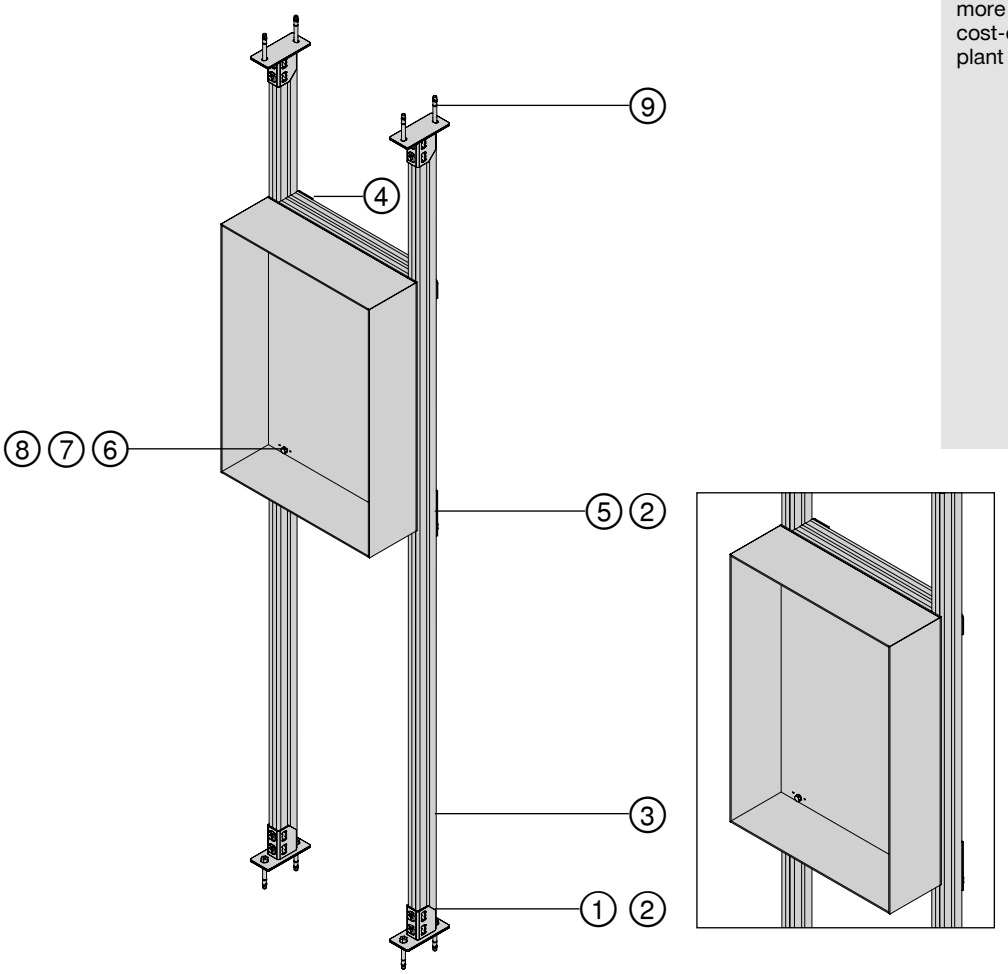
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: Switch Box Frame

Type H-PR-SB2

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369652**	**MQP 21-72 channel base**	4	-
②	**369623**	**MQN push button**	16	-
③	**369603**	**MQ-41D 3 m channel**	2	Depends on span
④	**369603**	**MQ-41D 3 m channel**	2	Depends on the with of the box
⑤	**369658**	**MQW-4 connector**	4	-
⑥	**369627**	**MQM-M12 wing nut**	4	-
⑦	**282852**	**A13/24 washer**	4	-
⑧	**216458**	**M12x25 hex. screw**	4	-
⑨	**2105718**	**HST3 M12x105 30/10 anchor**	8	-

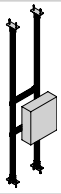
Application description

Heating – plant room equipment support: switch box frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

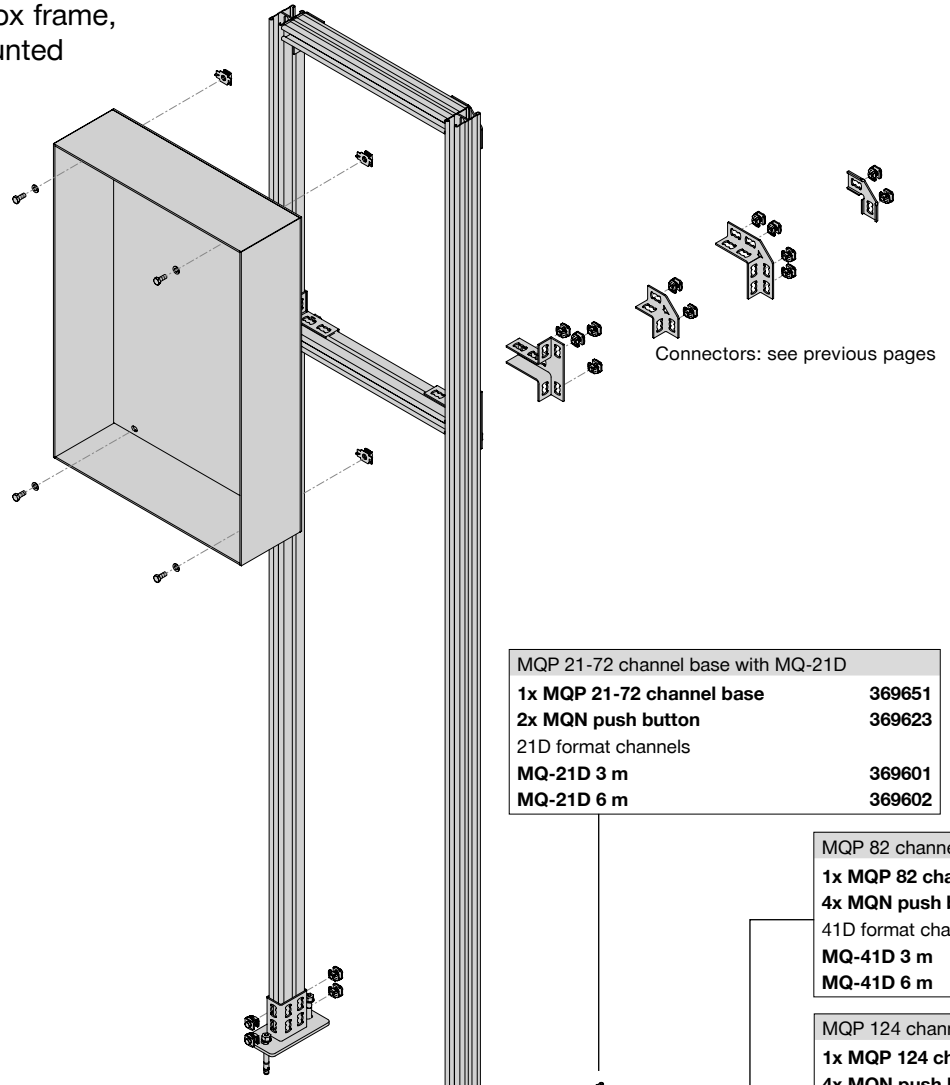


8

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Equipment Support – Switch Box Frame Options

Switch box frame, floor-mounted



Connectors: see previous pages

MQP 21-72 channel base with MQ-21D	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
21D format channels	
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

MQP 82 channel base with MQ-41D	
1x MQP 82 channel base	**369652**
4x MQN push button	**369623**
41D format channels	
MQ-41D 3 m	**369603**
MQ-41D 6 m	**369604**

MQP 124 channel base with associated channels	
1x MQP 124 channel base	**369653**
4x MQN push button	**369623**
52-72D and 124X D format channels	
MQ-52-72 D 3 m	**373799**
MQ-52-72 D 6 m	**369605**
MQ-124X D 6 m	**369606**

Relevant anchors for channel bases	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
2x HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - plant room equipment support: switch box frame	8	MQ system	Concrete
		Anchors	

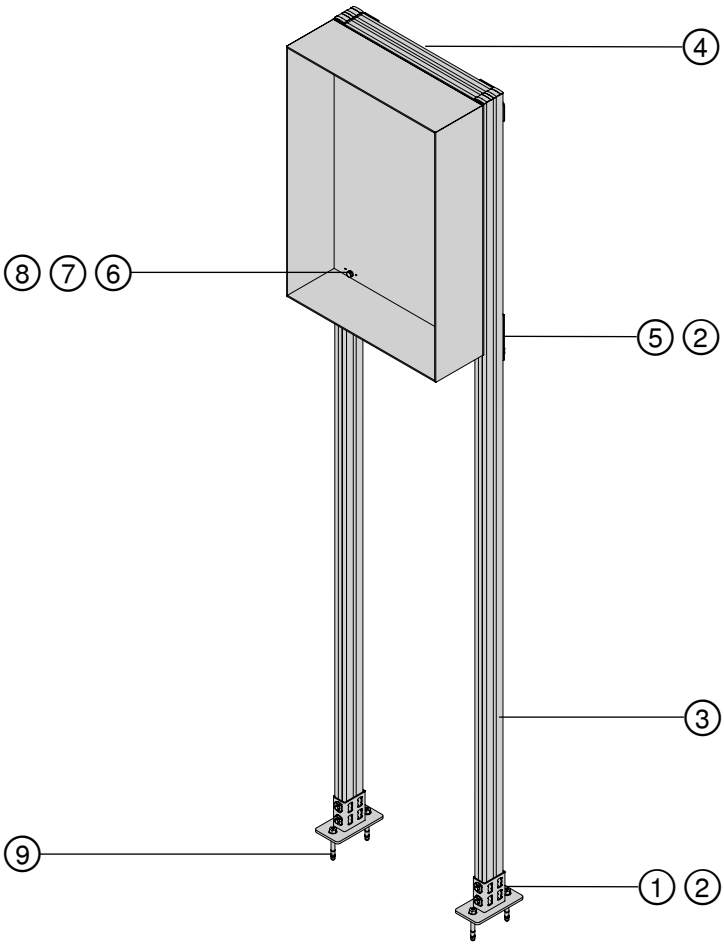
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: Switch Box Frame

Type H-PR-SB3

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369652**	**MQP-82 channel base**	2	-
②	**369623**	**MQN push button**	16	-
③	**369603**	**MQ-41D 3 m channel**	2	Depends on span
④	**369603**	**MQ-41D 3 m channel**	2	Depends on the with of the box
⑤	**369658**	**MQW-4 connector**	4	-
⑥	**369627**	**MQM-M12 wing nut**	4	-
⑦	**282852**	**A13/24 washer**	4	-
⑧	**216458**	**M12x25 hex. screw**	4	-
⑨	**369685**	**MQZ-E41 plastic end cap**	4	-
⑩	**2105718**	**HST3 M12x105 30/10 anchor**	4	-

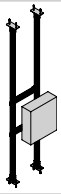
Application description

Heating – plant room equipment support: switch box frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



8

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

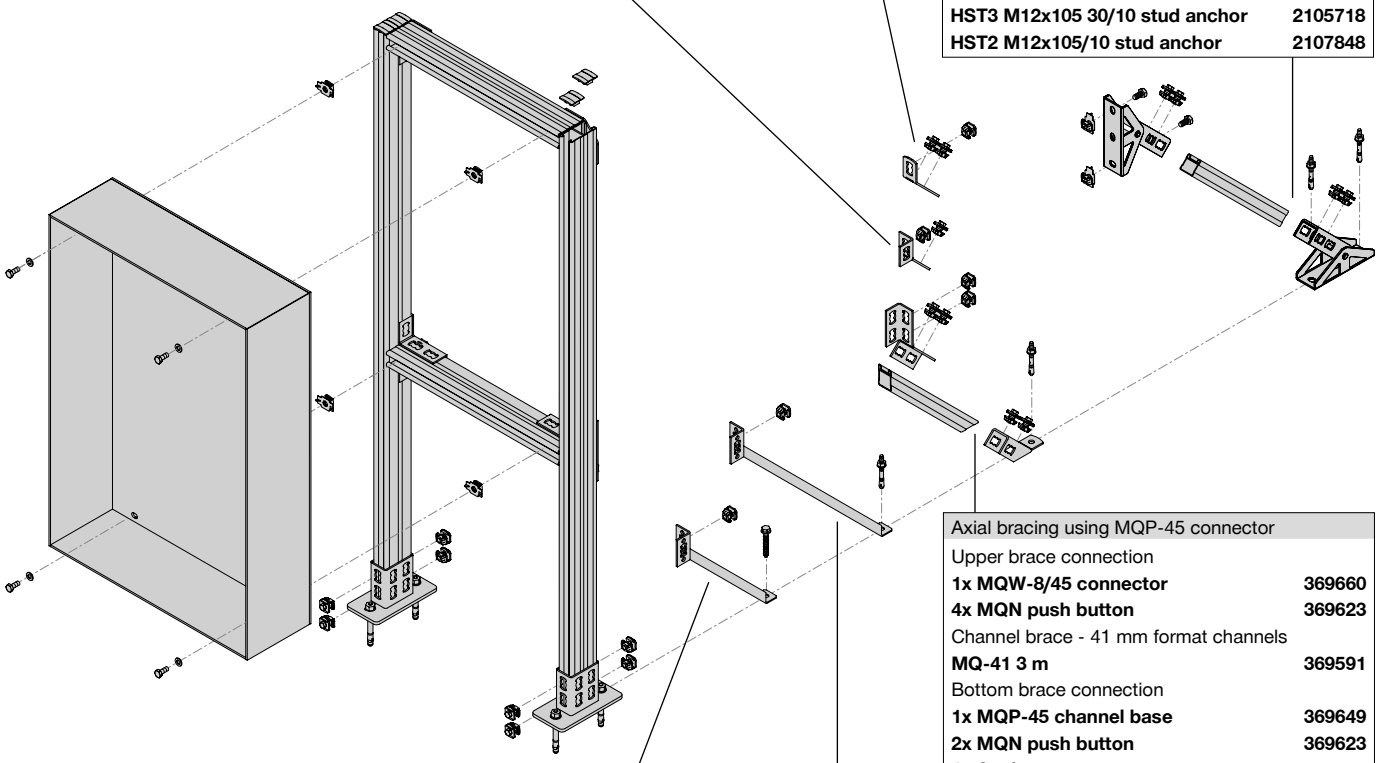
Plant Room Equipment Support – Switch Box Frame: Stiffening Options

Switch box frame, floor-mounted

Upper brace connector	
Upper brace connection alternative	
1x MQW-3/45 connector	**369657**
3x MQN push button	**369623**

Upper brace connector	
Upper brace connection alternative	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Axial bracing using MQP-G pivot connector	
Upper brace connection	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x M12x25 hex. screw	**216458**
2x MQM-M12 wing nut	**369627**
Channel brace - 41 mm format channels	
MQ-41 3 m	**369591**
Bottom brace connection	
1x MQP-G pivot connector	**369654**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**



Axial bracing using MQP-45 connector	
Upper brace connection	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**
Channel brace - 41 mm format channels	
MQ-41 3 m	**369591**
Bottom brace connection	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Short pre-fab. brace	
Pre-fab brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Long pre-fab. brace	
Pre-fab brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating - plant room equipment support: switch box frame	8	MQ system	Concrete
		Anchors	

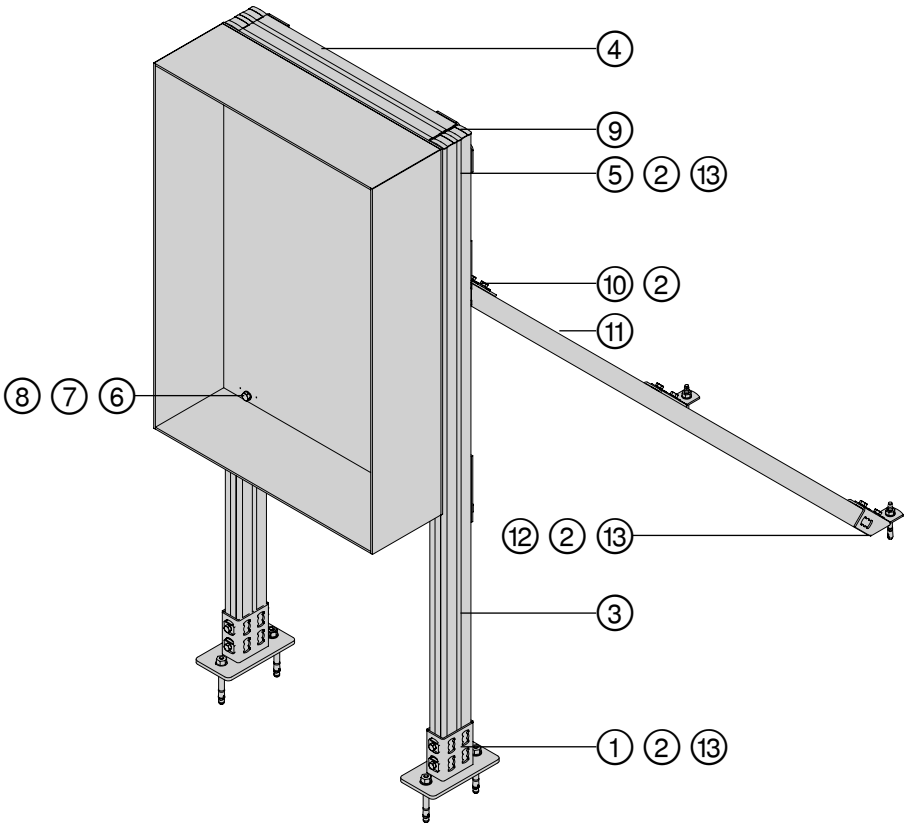
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: Switch Box Frame

Type H-PR-SB4

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369652**	**MQP-82 channel base**	2	-
②	**369623**	**MQN push button**	28	-
③	**369603**	**MQ-41D 3m channel**	2	Depends on height
④	**369603**	**MQ-41D 3m channel**	2	Depends on the with of the box
⑤	**369658**	**MQW-4 connector**	4	-
⑥	**369627**	**MQM-M12 wing nut**	4	-
⑦	**282852**	**A13/24 washer**	4	-
⑧	**216458**	**M12x25 hex. screw**	4	-
⑨	**369685**	**MQZ-E41 plastic end cap**	4	-
⑩	**369660**	**MQW-8/45 connector**	2	-
⑪	**369591**	**MQ-41 3m channel**	2	Depends on the length of the brace
⑫	**369649**	**MQP-45 channel base**	2	-
⑬	**2105718**	**HST3 M12x105 30/10 anchor**	6	-

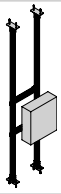
Application description

Heating – plant room equipment support: switch box frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

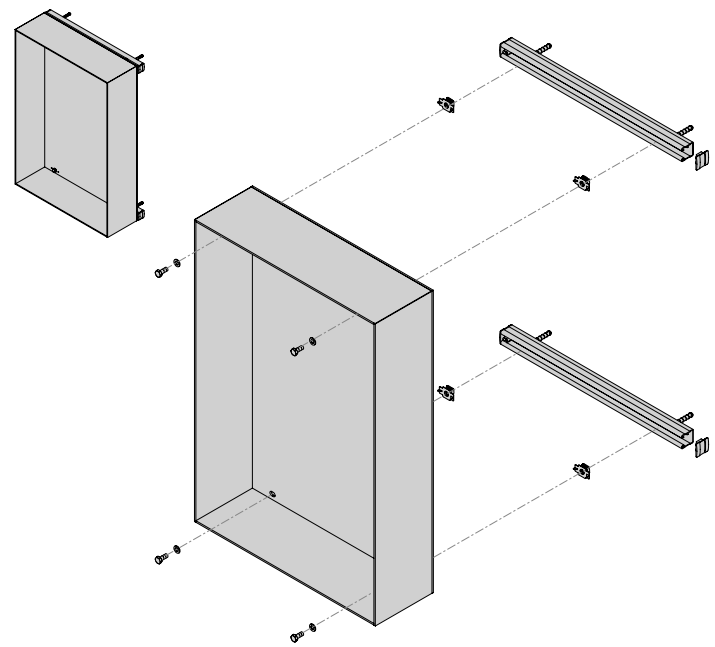


8

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

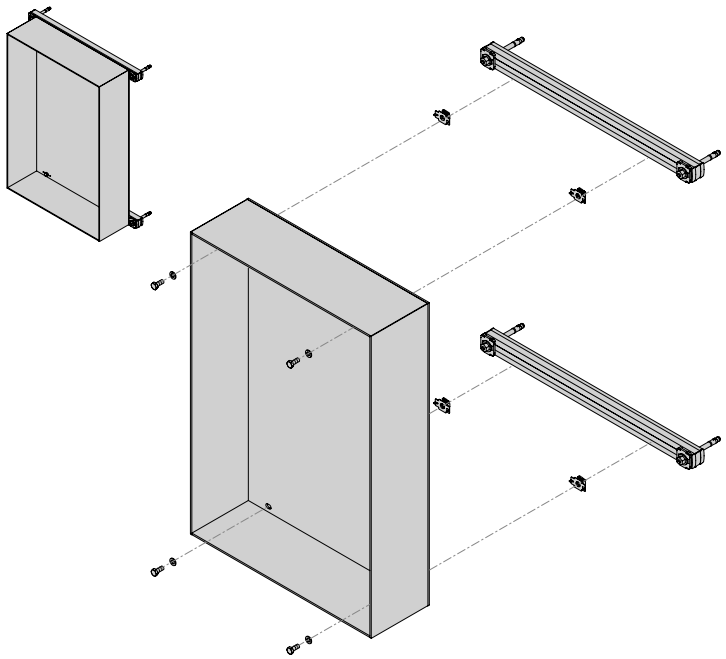
Plant Room Equipment Support – Switch Box – Wall Mounted

Switch box on wall, with lateral adjustment on concealed channel

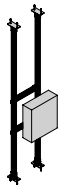


Switch box on wall rail – concealed channel	
2x Channel - 21 mm format channels	
MQ-21 2 m	**304558**
MQ-21 3 m	**369584**
MQ-21 6 m	**369585**
2x Channel -41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
Plastic end cap	
4x MQZ-E21 end cap for 21 channel	**370598**
4x MQZ-E41 end cap for 41 channel	**369685**
Anchor	
4x HUS3-H 10x70/-/- screw anchor	**2079912**
Switch box fastening	
M8	
4x M8x20 hex. screw	**216447**
4x A8,4/16 washer	**282850**
4x MQM-M8 wing nut	**369698**
M10	
4x M10x20 hex. screw	**216453**
4x A10,5/20 washer	**282851**
4x MQM-M10 wing nut	**369626**
M12	
4x M12x20 hex. screw	**216457**
4x A13/24 washer	**282852**
4x MQM-M12 wing nut	**369627**

Switch box on wall, with lateral adjustment on projecting channel



Switch box on wall rail – projecting channel	
2x Channel - 21 mm format channels	
MQ-21 2 m	**304558**
MQ-21 3 m	**369584**
MQ-21 6 m	**369585**
2x Channel -41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
Plastic end cap	
4x MQZ-E21 end cap for 21 channel	**370598**
4x MQZ-E41 end cap for 41 channel	**369685**
Connection to the wall	
4x MQZ-L13 square washer	**369680**
4x HST3 M12x145 70/50 stud anchor	**2105851**
Switch box fastening	
See above	

Application description	Application	Product lines	Base material
Heating - plant room equipment support: switch box wall mounted	8 	MQ system	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: Switch Box Wall Mounted

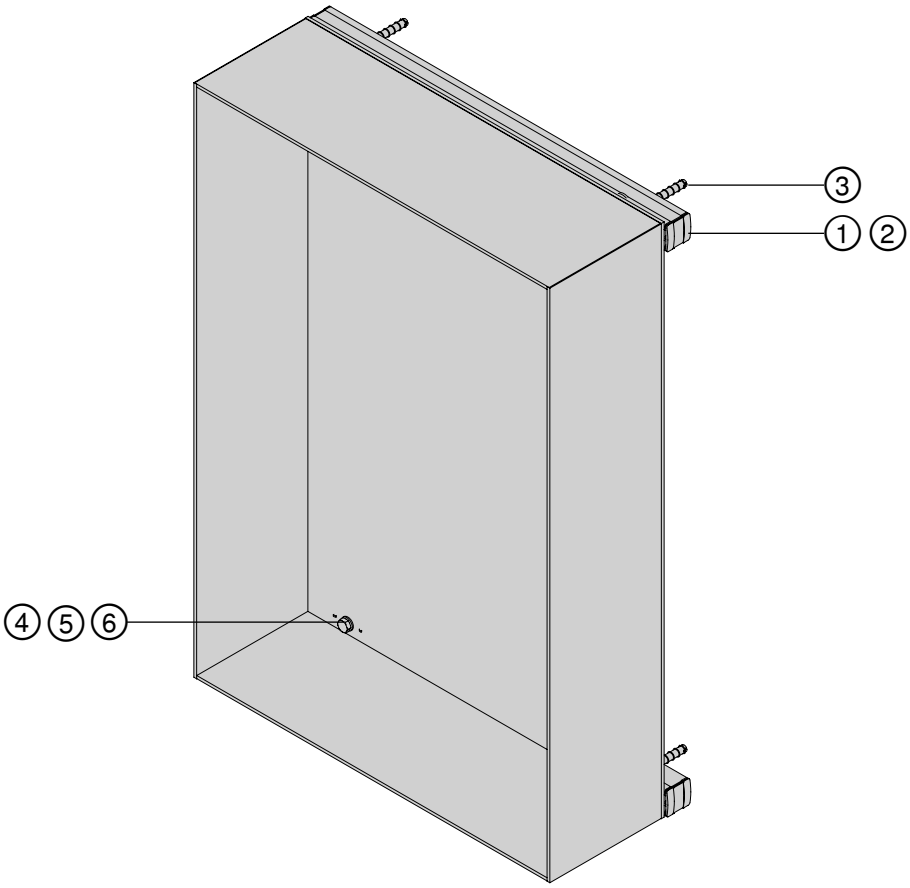
Type H-PR-SB5

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually

Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369591**	**MQ-41 3 m channel**	2	Depends on the width of the box
②	**370598**	**MQZ-E41 plastic end cap**	4	-
③	**2079912**	**HUS3-H 10x70/-/- screw anchor**	4	-
④	**369627**	**MQM-M12 wing nut**	4	-
⑤	**282852**	**A13/24 washer**	4	-
⑥	**216458**	**M12x25 hex. screw**	4	-

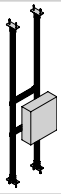
Application description

Heating – plant room equipment support: switch box frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

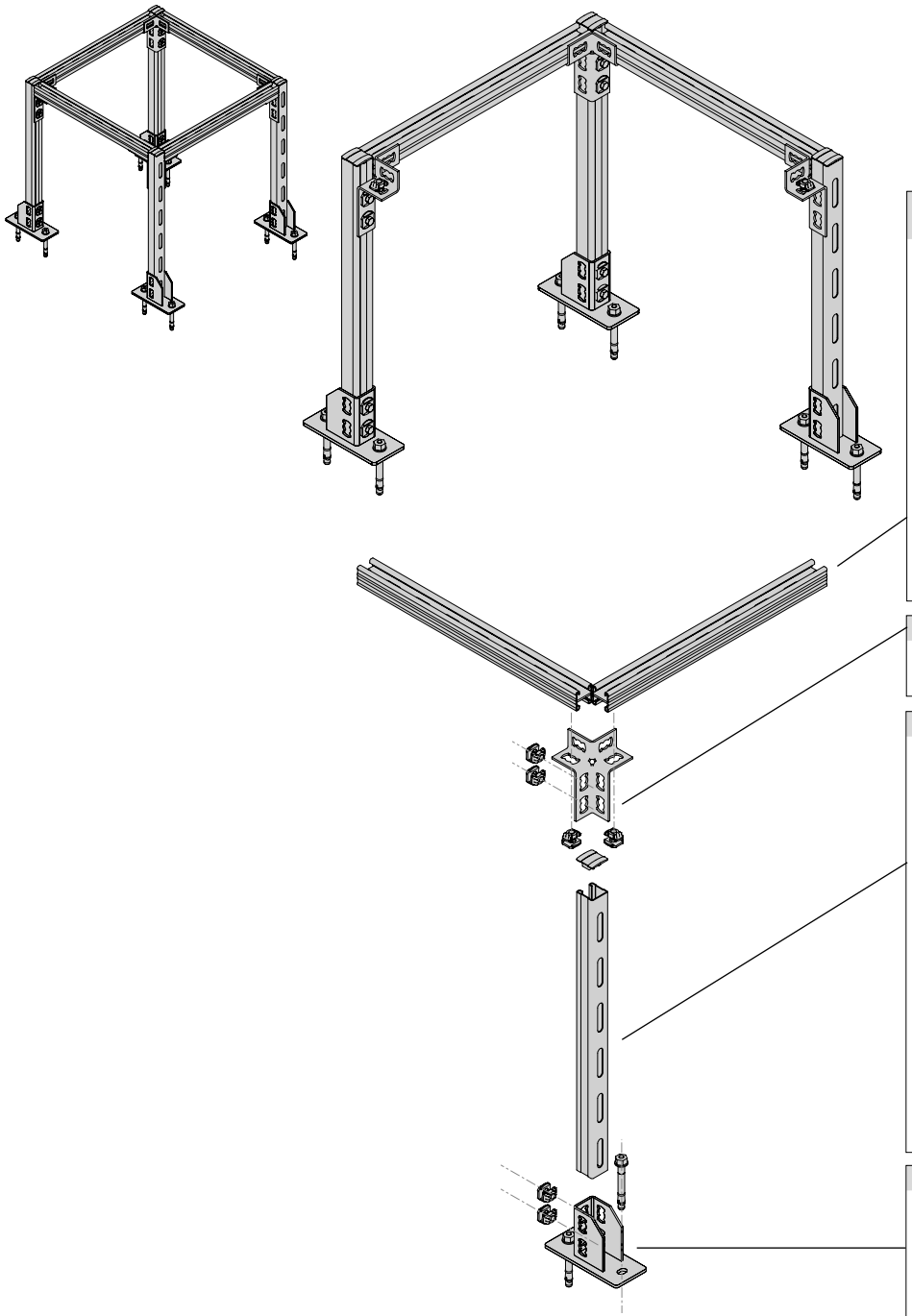
Application



Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Frame: Options

Simple 3D frame, e.g. for small boiler or heater



Channels most suitable for upper channels	
21D format channels	
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Channel - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**

Node for 3 channels	
1x MQV-3/3 D 3D connector	**369641**
4x MQN push button	**369623**

Channels suitable for vertical upright	
Channel - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
Plastic end cap	
1x MQZ-E41 end cap	**369685**
21D format channels	
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Plastic end cap	
2x MQZ-E21	**370598**

MQP 21-72 channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete
		Anchors	

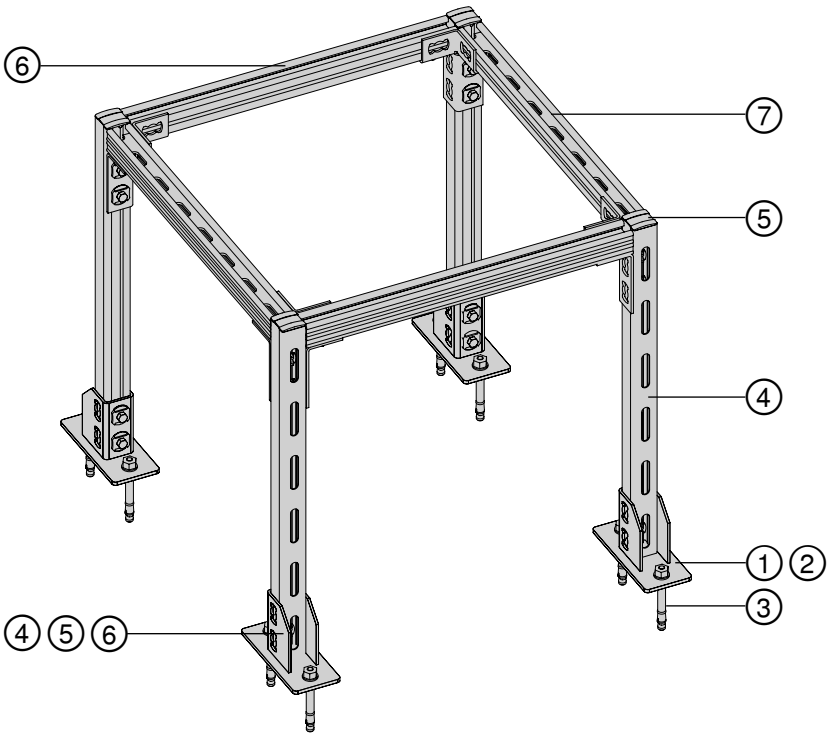
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D1

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	4	-
②	**369623**	**MQN push button**	24	-
③	**2105718**	**HST3 M12x105 30/10 stud anchor**	8	-
④	**369591**	**MQ-41 3 m channel**	4	Depends on the height of the box
⑤	**369685**	**MQZ-E41 end cap**	4	-
⑥	**369601**	**MQ-21D 3 m channel**	2	Depends on width of the frame
⑦	**369601**	**MQ-21D 3 m channel**	2	Depends on depth of the frame
⑧	**369641**	**MQV-3/3 D 3D connector**	4	-

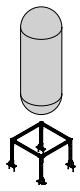
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

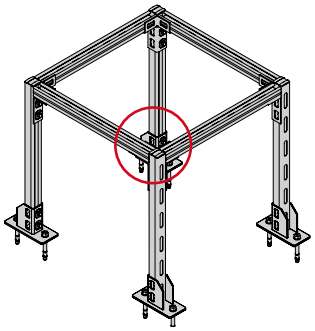


9

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Frame: Node Options

Simple 3D frame, e.g. for small boiler or heater



MQ-124X D channel for upper channel	
MQ-124X D 6 m	**369606**

MQ-52-72 D channel for upper channel	
MQ-52-72 D 3 m	**373799**
MQ-52-72 D 6 m	**369605**

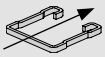
MQ-41D channels for upper channel	
MQ-41D 3 m	**369603**
MQ-41D 6 m	**369604**

MQ-21D channels for upper channel	
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

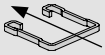
MQ-72 channels for upper channel	
MQ-72 3 m	**373797**
MQ-72 6 m	**369599**
MQ-72 6 m U	**370593**

MQ-52 channels for upper channel	
MQ-52 3 m	**373795**
MQ-52 6 m	**369598**

Note



The channel may be rotated within the connector.



Channels suitable for vertical upright and upper channel	
Channel - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**

Node for 3 channels	
1x MQV-3/3 D 3D connector	**369641**
4x MQN push button	**369623**

Channels most suitable for vertical upright	
21D format channels	
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**

Brackets MQK-41/21D for vertical upright with 2hole base	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**

Brackets MQK-41 for vertical upright with 4 hole base	
MQK-41/600/4	**369613**
MQK-41/1000/4	**369614**

For base plates, see previous pages

Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

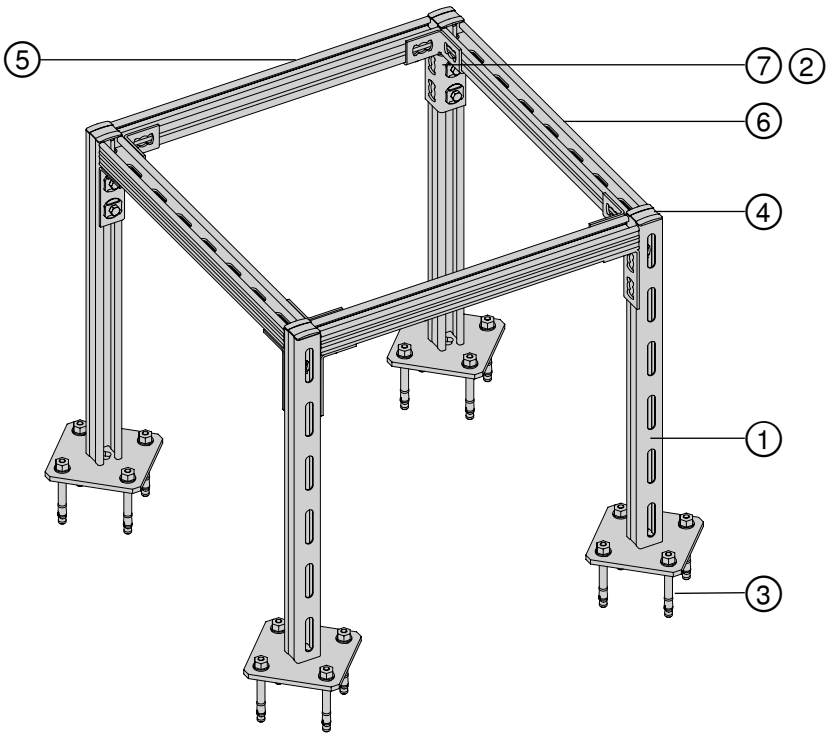
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D2

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369613**	**MQK-41/600/4 bracket**	4	-
②	**369623**	**MQN push button**	16	-
③	**2105718**	**HST3 M12x105 30/10 stud anchor**	16	-
④	**369685**	**MQZ-E41 end cap**	4	-
⑤	**369601**	**MQ-21D 3 m channel**	2	Depends on width of the frame
⑥	**369601**	**MQ-21D 3 m channel**	2	Depends on depth of the frame
⑦	**369641**	**MQV-3/3 D 3D connector**	4	-

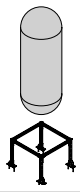
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

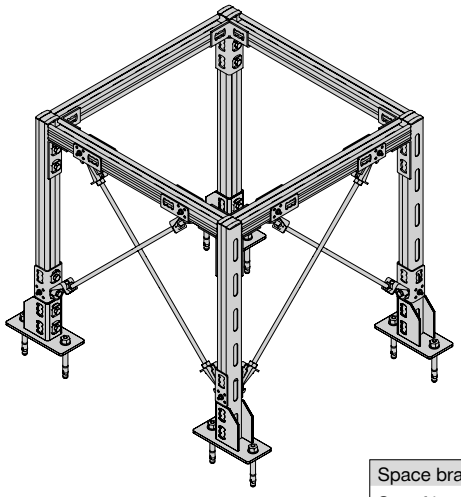


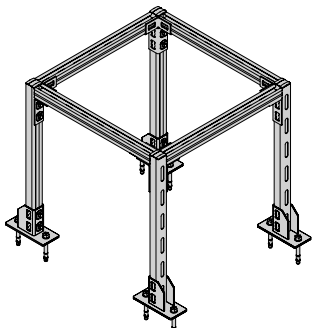
9

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

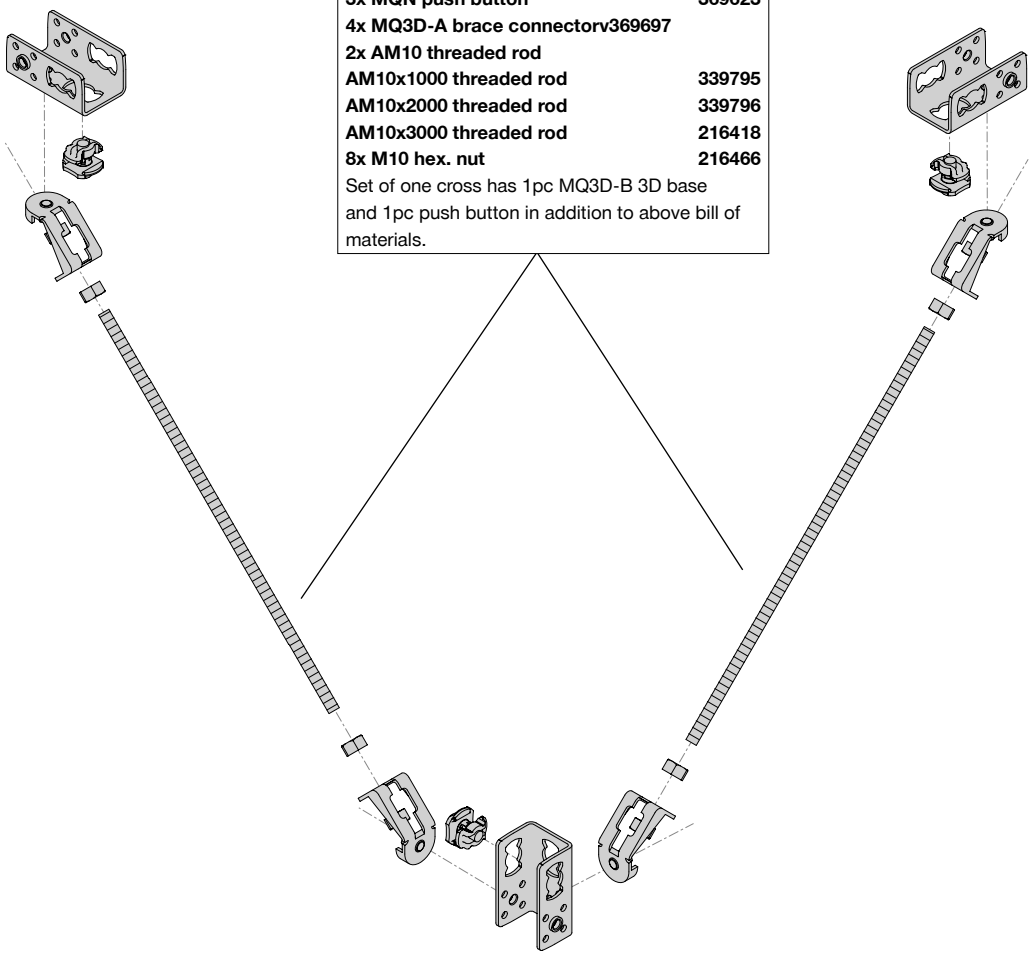
Plant Room Framing – Simple 3D Frame: Space Bracing Options

Space bracing with MQ-3D elements using threaded rods





Space bracing set for one corner	
Set of braces (2 braces)	
3x MQ3D-B 3D base	**369694**
3x MQN push button	**369623**
4x MQ3D-A brace connectorv	**369697**
2x AM10 threaded rod	
AM10x1000 threaded rod	**339795**
AM10x2000 threaded rod	**339796**
AM10x3000 threaded rod	**216418**
8x M10 hex. nut	**216466**
Set of one cross has 1pc MQ3D-B 3D base and 1pc push button in addition to above bill of materials.	



Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

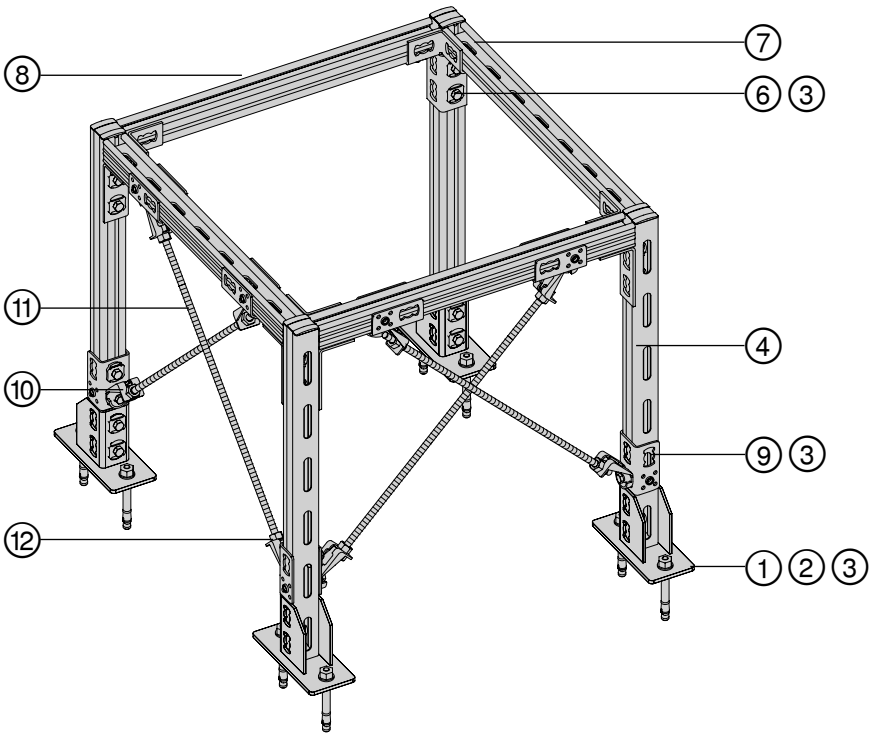
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D3

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually

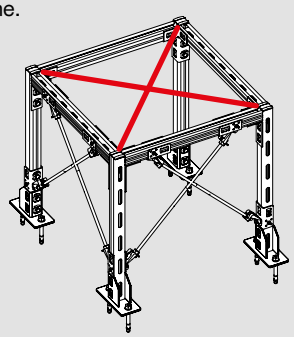


Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Prerequisite for space bracing shown: The equipment mounted on the 3D frame ensures rigidity of the upper horizontal plane.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	4	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	8	-
③	**369623**	**MQN push button**	31	
④	**369591**	**MQ-41 3 m channel**	4	Depends on height of the frame
⑤	**369685**	**MQZ-E41 end cap**	4	-
⑥	**369641**	**MQV-3/3 D 3D connector**	4	-
⑦	**369601**	**MQ-21D 3 m channel**	2	Depends on width of the frame
⑧	**369601**	**MQ-21D 3 m channel**	2	Depends on the depth of the frame
⑨	**369694**	**MQ3D-B 3D base**	7	-
⑩	**369697**	**MQ3D-A brace connector**	8	
⑪	**339795**	**AM10x1000 threaded rod**	4	Depends on the size of the frame
⑫	**216466**	**M10 hex. nut**	16	-

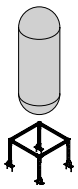
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

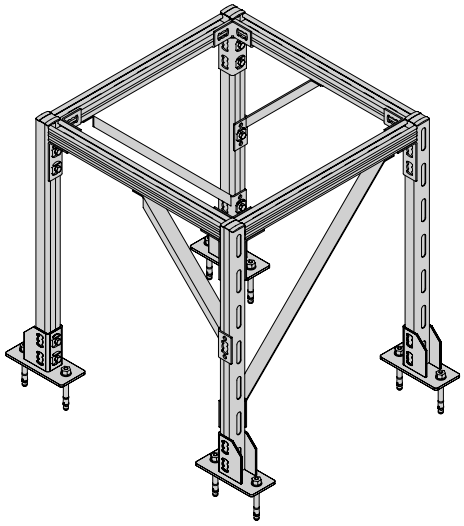


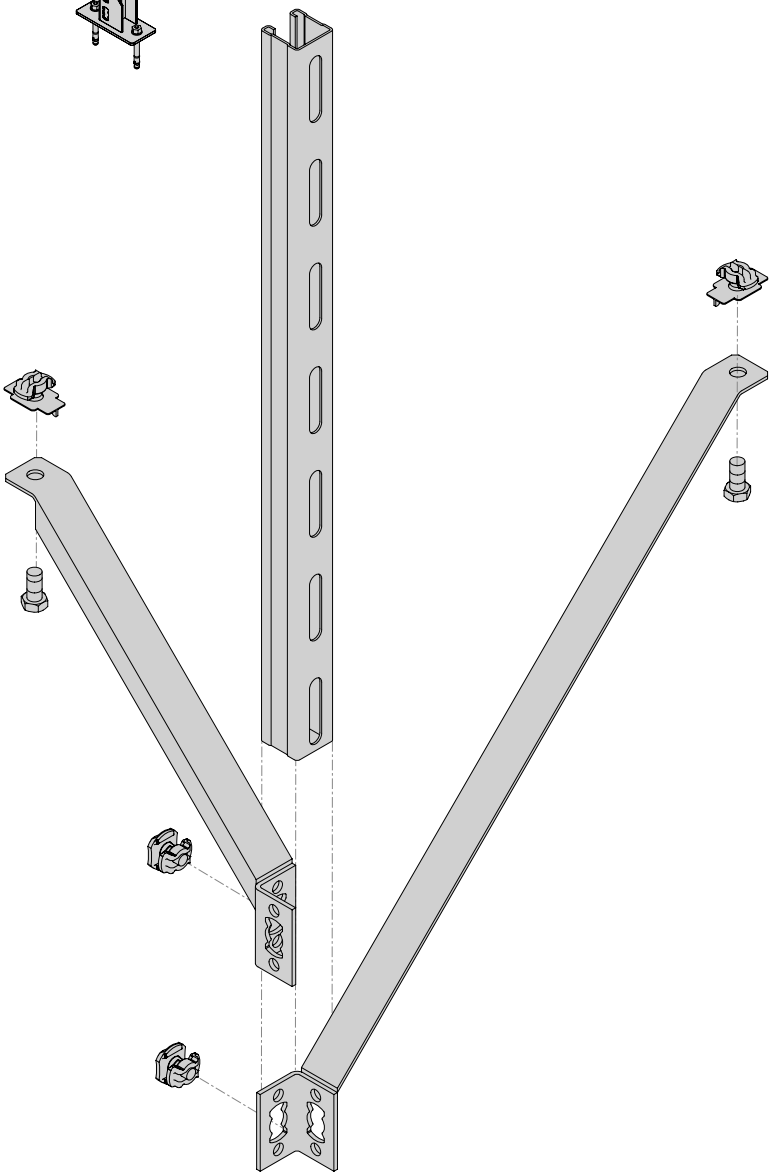
9

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Frame: Space Bracing Options

Space bracing using pre-fab. braces





Space bracing set for one corner	
Set of space braces (2 braces)	
1x MQK-SK pre-fab. brace	**369622**
1x MQK-SL pre-fab. brace	**369621**
2x MQN push buttonv369623	
2x M12x22 hex. screw	**216457**
2x MQM-M12 wing nut	**369627**

Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

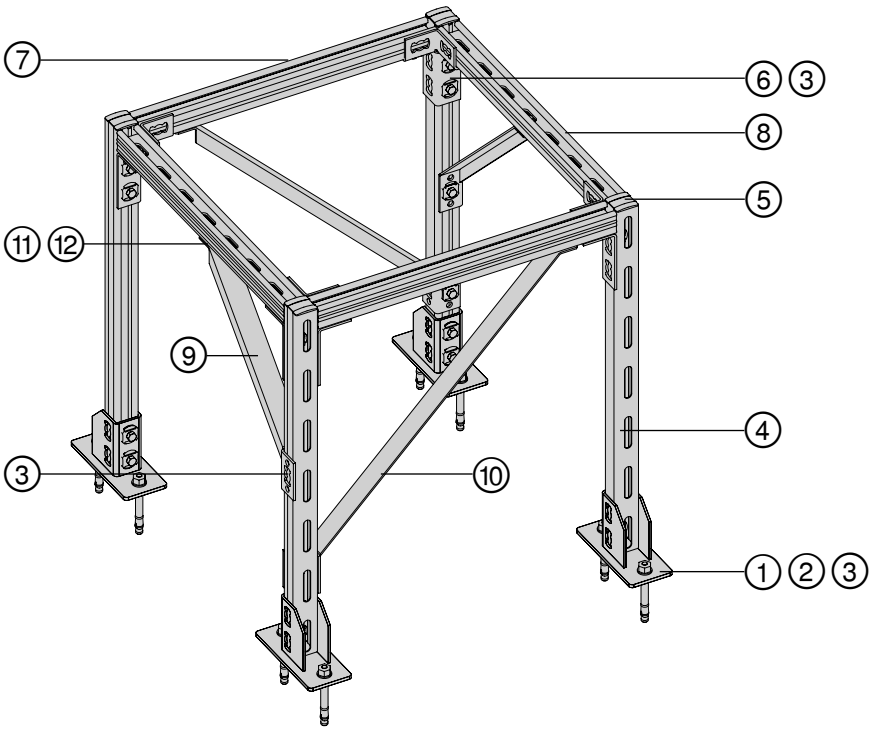
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D4

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually

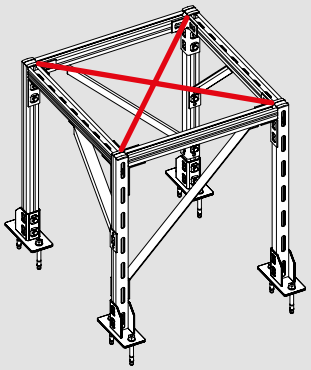


Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Prerequisite for space bracing shown: The equipment mounted on the 3D frame ensures rigidity of the upper horizontal plane.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	4	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	8	-
③	**369623**	**MQN push button**	28	
④	**369591**	**MQ-41 3 m channel**	4	Depends on height of the frame
⑤	**369685**	**MQZ-E41 end cap**	4	-
⑥	**369641**	**MQV-3/3 D 3D connector**	4	-
⑦	**369601**	**MQ-21D 3 m channel**	2	Depends on width of the frame
⑧	**369601**	**MQ-21D 3 m channel**	2	Depends on the depth of the frame
⑨	**369622**	**MQK-SK pre-fab. brace short**	2	-
⑩	**369621**	**MQK-SL pre-fab. brace long**	2	-
⑪	**369627**	**MQM-M12 wing nut**	4	-
⑫	**216457**	**M12x22 hex. screw**	4	-

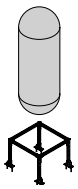
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

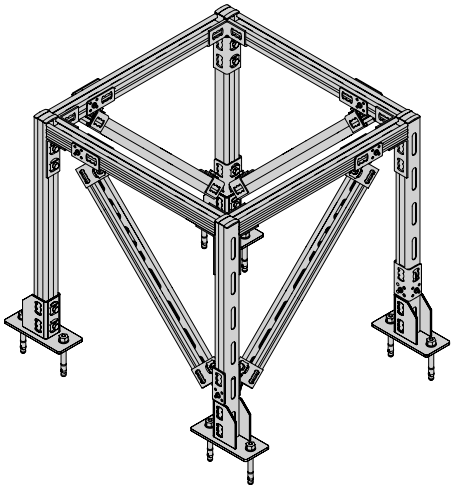


9

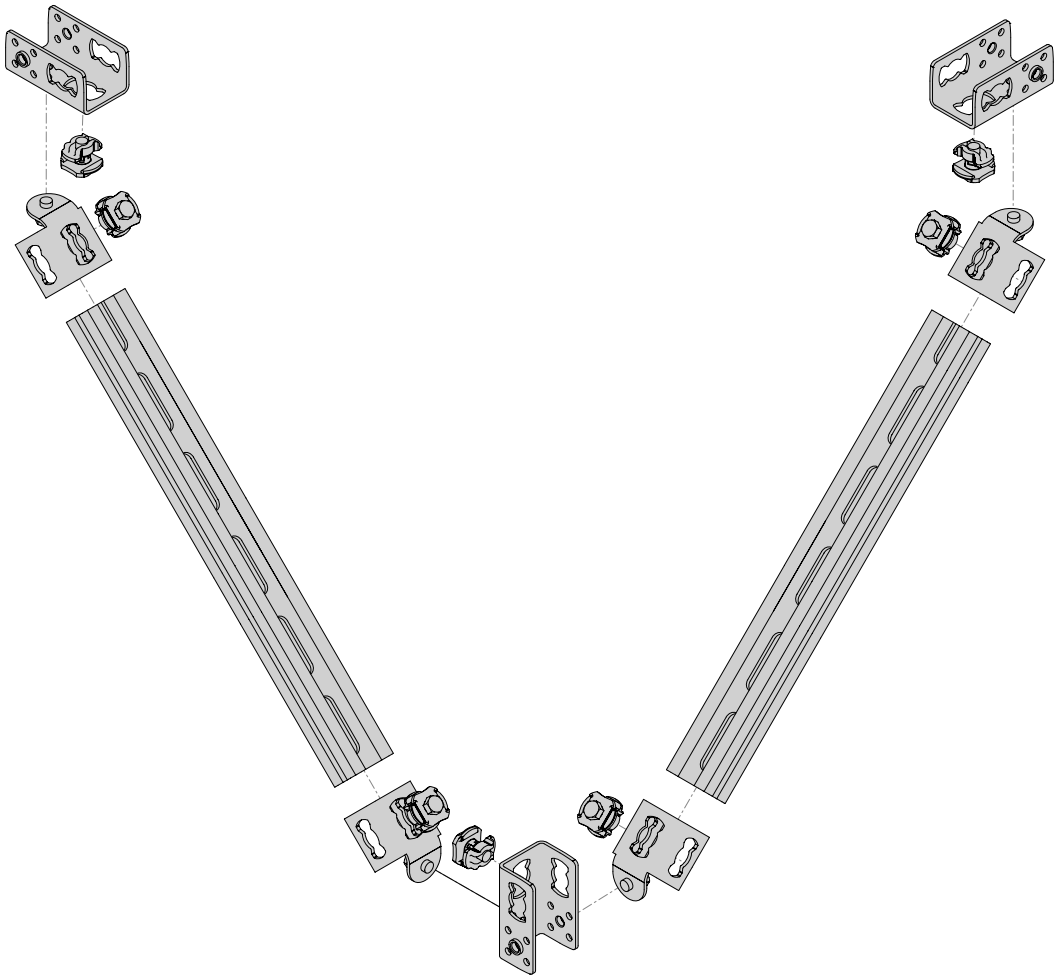
Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Frame: Space Bracing Options

Space bracing using MQ3D elements and channels



Space bracing set for one corner	
Set of axial braces (2 braces)	
3x MQ3D-B 3D base	**369694**
7x MQN push button	**369623**
4x MQ3D-W45 channel brace connector	**369696**
Channels format 41 mm which could be used for brace	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 mv	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**



Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

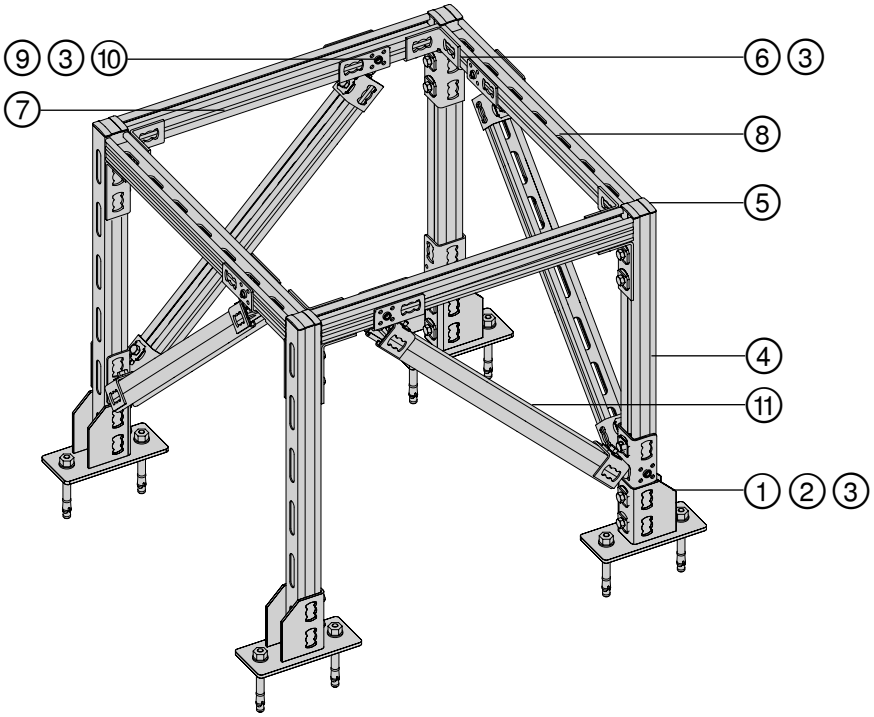
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D5

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually

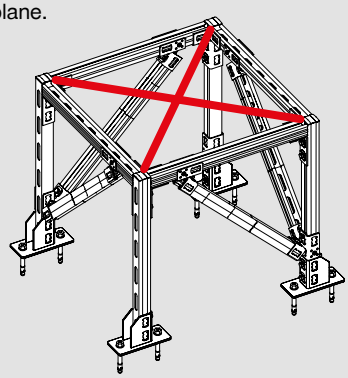


Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Prerequisite for space bracing shown: The equipment mounted on the 3D frame ensures rigidity of the upper horizontal plane.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	4	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	8	-
③	**369623**	**MQN push button**	28	-
④	**369591**	**MQ-41 3 m channel**	4	Depends on height of the frame
⑤	**369685**	**MQZ-E41 end cap**	4	-
⑥	**369641**	**MQV-3/3 D 3D connector**	4	-
⑦	**369601**	**MQ-21D 3 m channel**	2	Depends on width of the frame
⑧	**369601**	**MQ-21D 3 m channel**	2	Depends on the depth of the frame
⑨	**369694**	**MQ3D-B 3D base**	6	-
⑩	**369696**	**MQ3D-W45 channel brace**	8	-
⑪	**369591**	**MQ-41 3 m channel**	4	Depends on size of the frame

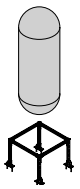
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

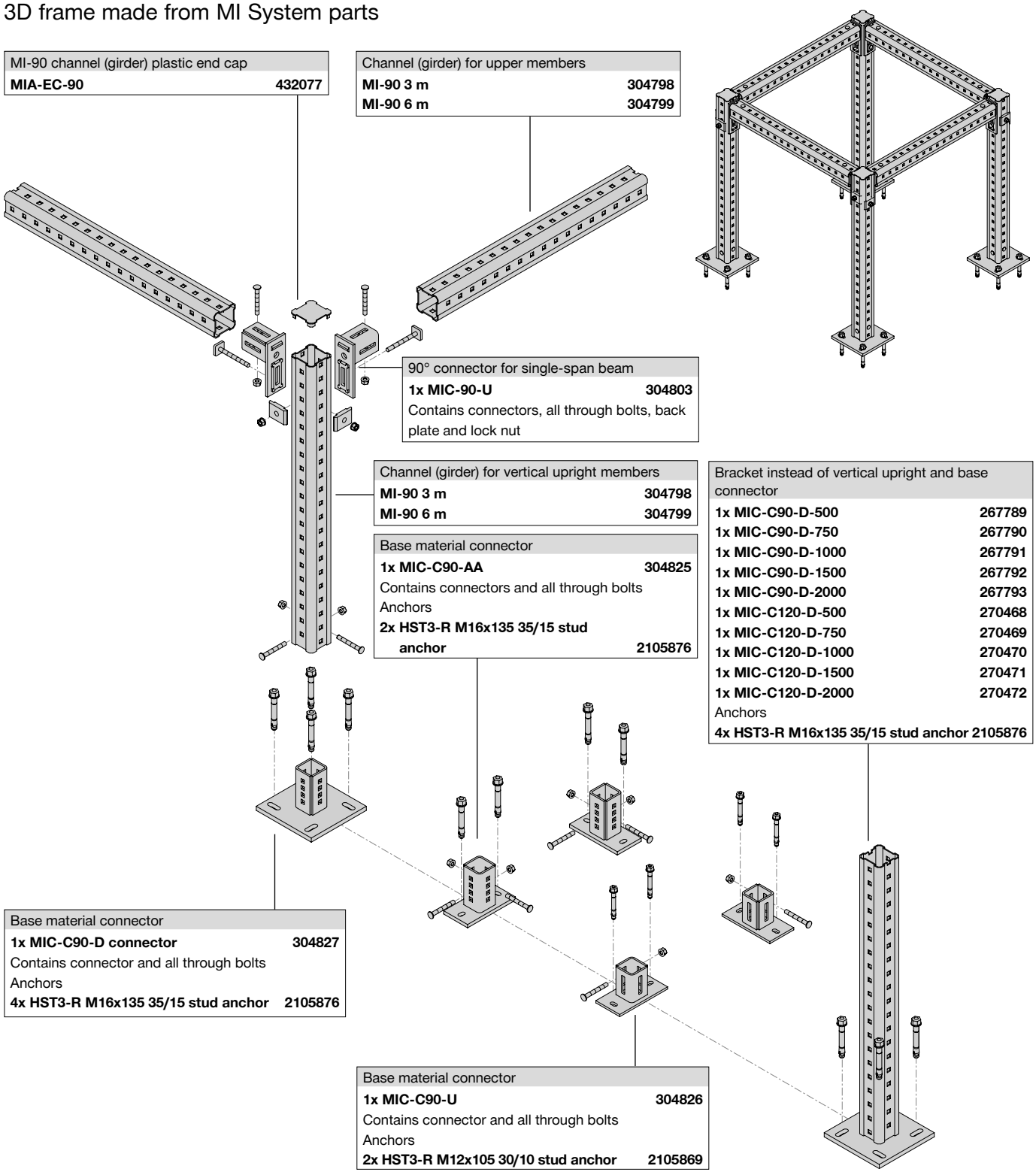


9

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Heavy-load MI System Frame: Options

3D frame made from MI System parts



MI-90 channel (girder) plastic end cap	
MIA-EC-90	**432077**

Channel (girder) for upper members	
MI-90 3 m	**304798**
MI-90 6 m	**304799**

90° connector for single-span beam	
1x MIC-90-U	**304803**
Contains connectors, all through bolts, back plate and lock nut	

Channel (girder) for vertical upright members	
MI-90 3 m	**304798**
MI-90 6 m	**304799**

Base material connector	
1x MIC-C90-AA	**304825**
Contains connectors and all through bolts	
Anchors	
2x HST3-R M16x135 35/15 stud anchor	**2105876**

Bracket instead of vertical upright and base connector	
1x MIC-C90-D-500	**267789**
1x MIC-C90-D-750	**267790**
1x MIC-C90-D-1000	**267791**
1x MIC-C90-D-1500	**267792**
1x MIC-C90-D-2000	**267793**
1x MIC-C120-D-500	**270468**
1x MIC-C120-D-750	**270469**
1x MIC-C120-D-1000	**270470**
1x MIC-C120-D-1500	**270471**
1x MIC-C120-D-2000	**270472**
Anchors	
4x HST3-R M16x135 35/15 stud anchor	**2105876**

Base material connector	
1x MIC-C90-D connector	**304827**
Contains connector and all through bolts	
Anchors	
4x HST3-R M16x135 35/15 stud anchor	**2105876**

Base material connector	
1x MIC-C90-U	**304826**
Contains connector and all through bolts	
Anchors	
2x HST3-R M12x105 30/10 stud anchor	**2105869**

Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete
		Anchors	

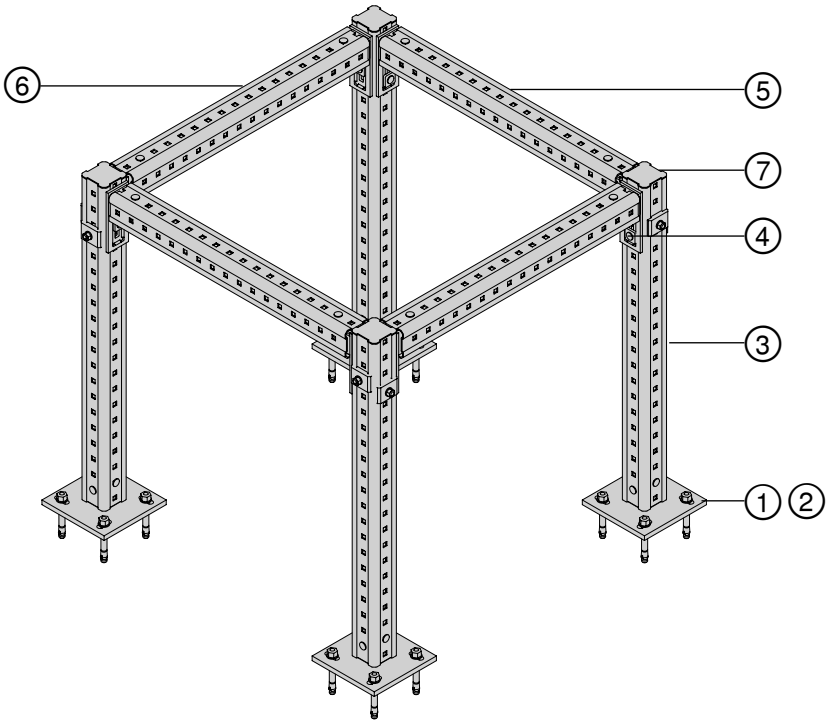
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D6

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**304827**	**MIC-C90-D connector**	4	-
②	**2105876**	**HST3-R M16x135 35/15 stud anchor**	16	-
③	**304798**	**MI-90 3 m girder**	4	Depends on height of the frame
④	**304803**	**MIC-90-U connector**	8	-
⑤	**304798**	**MI-90 3 m girder**	2	Depends on width of the frame
⑥	**304798**	**MI-90 3 m girder**	2	Depends on depth of the frame
⑦	**432077**	**MIA-EC-90 plastic end cap**	4	-

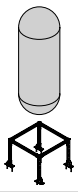
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

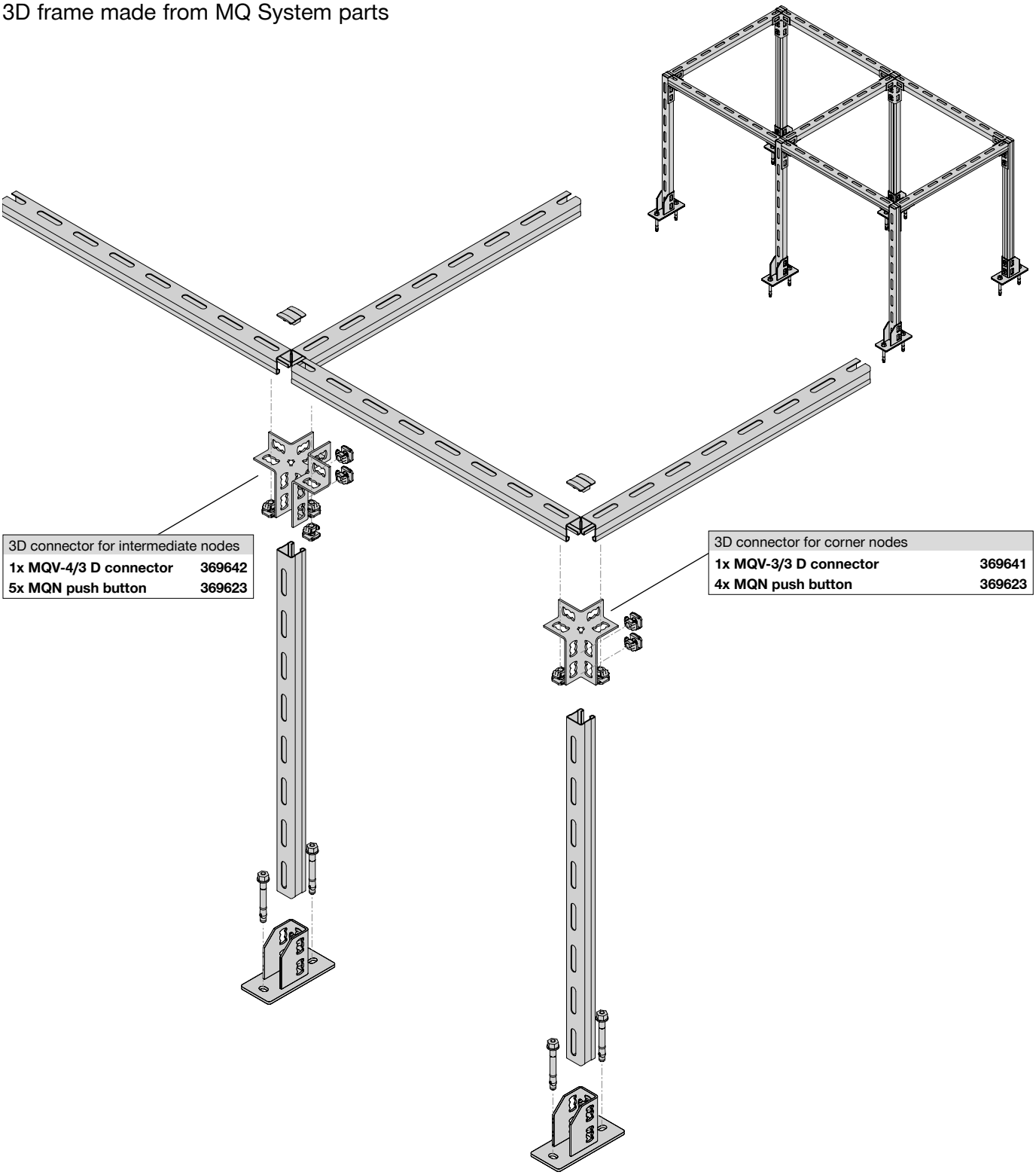


9

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Multi-sectional 3D Frame: Options

3D frame made from MQ System parts



3D connector for intermediate nodes	
1x MQV-4/3 D connector	**369642**
5x MQN push button	**369623**

3D connector for corner nodes	
1x MQV-3/3 D connector	**369641**
4x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

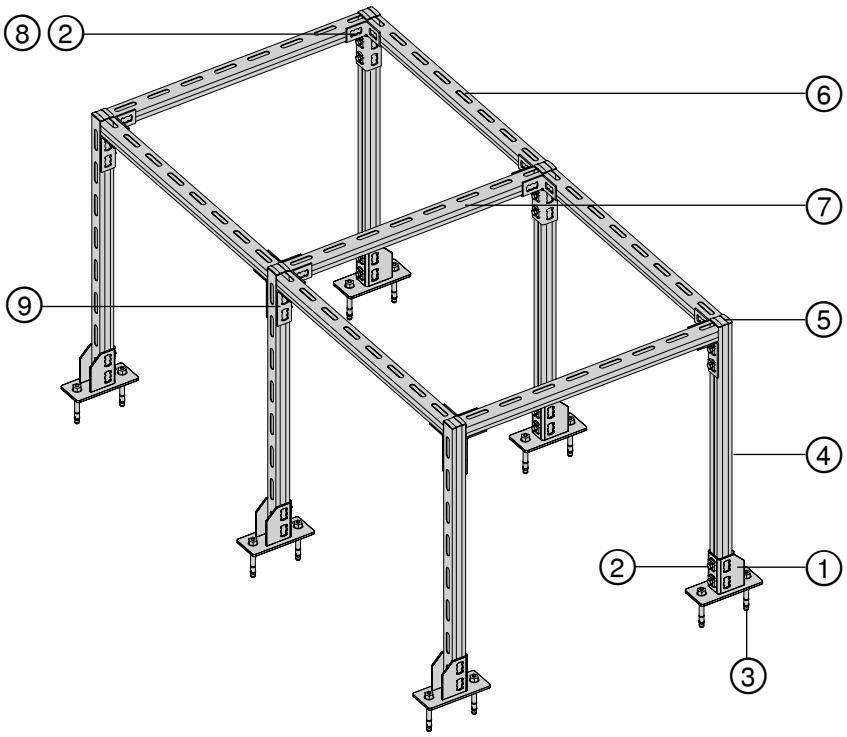
Type H-PR-3D7

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually

Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel baser**	6	-
②	**369623**	**MQN push button**	38	-
③	**2105718**	**HST3 M12x105 30/10 stud anchor**	12	-
④	**369591**	**MQ-41 3 m channel**	6	Depends on the height of the box
⑤	**369685**	**MQZ-E41 end cap**	6	-
⑥	**369591**	**MQ-41 3 m channel**	4	Depends on width of the frame
⑦	**369591**	**MQ-41 3 m channel**	3	Depends on depth of the frame
⑧	**369641**	**MQV-3/3 D 3D connector**	4	-
⑨	**369642**	**MQV-4/3 D connector**	2	

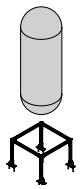
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

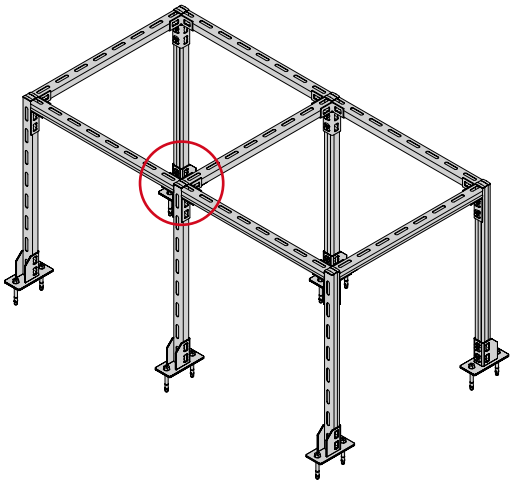


9

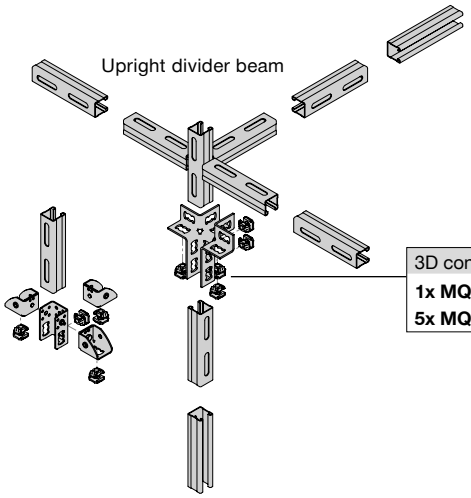
Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Frame: Intermediate Node Options

3D frame made from MQ System parts

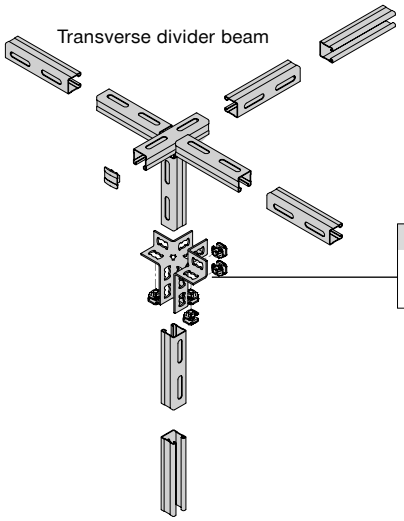


Upright divider beam



3D connector for intermediate nodes	
1x MQV-4/3 D connector	**369642**
5x MQN push button	**369623**

Transverse divider beam

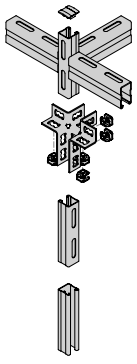


3D connector for intermediate nodes	
1x MQV-4/3 D connector	**369642**
5x MQN push button	**369623**

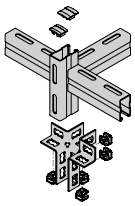
3D system substitution of connector for intermediate nodes	
1x MQ3D-B	**369694**
3x MQ3D-W90	**369695**
4x MQN push button	**369623**
Upper frame channels can be rotated 360° (assembly in 4 positions possible).	

For various sizes of channels

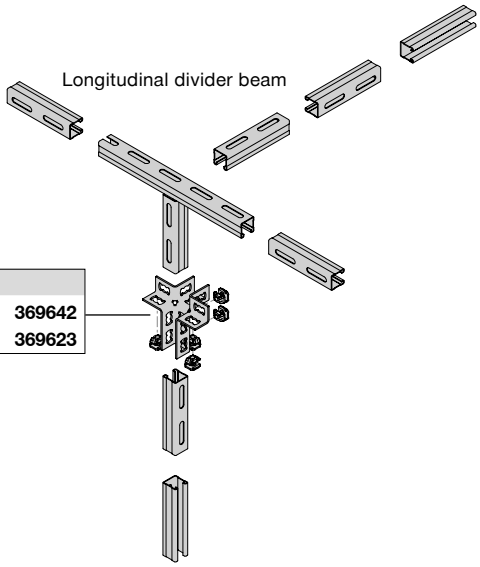
e.g. upper channel made of MQ-72



e.g. upper channel and vertical upright made of MQ-72



Longitudinal divider beam



3D connector for intermediate nodes	
1x MQV-4/3 D connector	**369642**
5x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

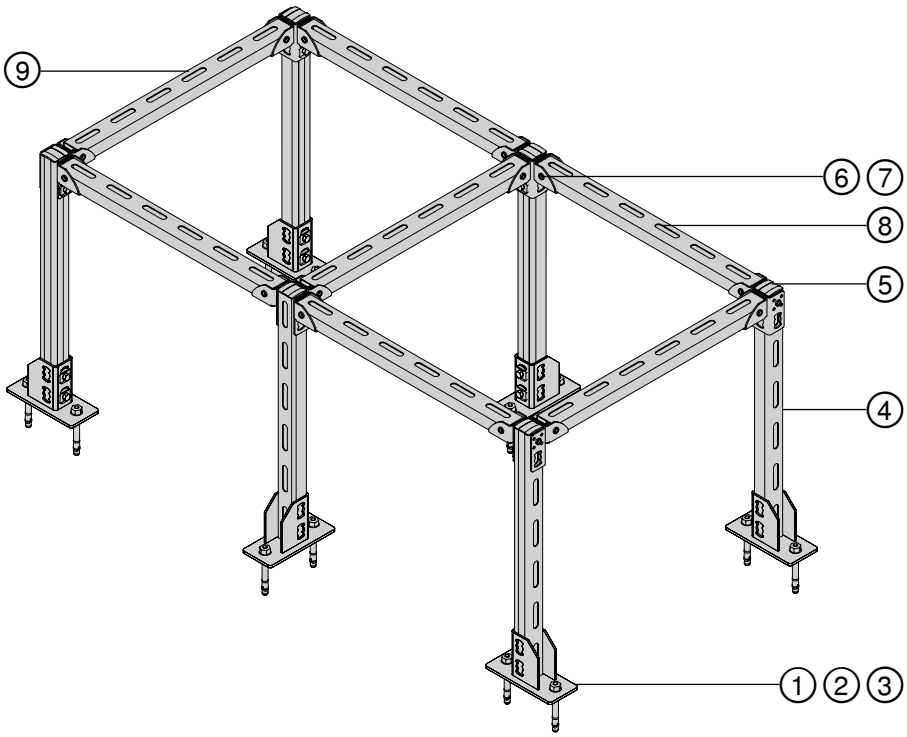
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D8

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	6	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	12	-
③	**369623**	**MQN push button**	32	-
④	**369591**	**MQ-41 3 m channel**	6	Depends on height of the frame
⑤	**369685**	**MQZ-E41 end cap**	6	-
⑥	**369694**	**MQ3D-B 3D base**	6	-
⑦	**369695**	**MQ3D-W90 connector**	14	-
⑧	**369591**	**MQ-41 3 m channel**	4	Depends on the width of the frame
⑨	**369591**	**MQ-41 3 m channel**	3	Depends on the depth of the frame

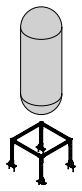
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

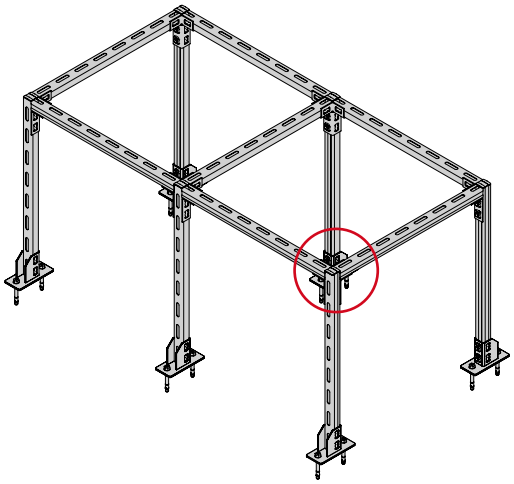


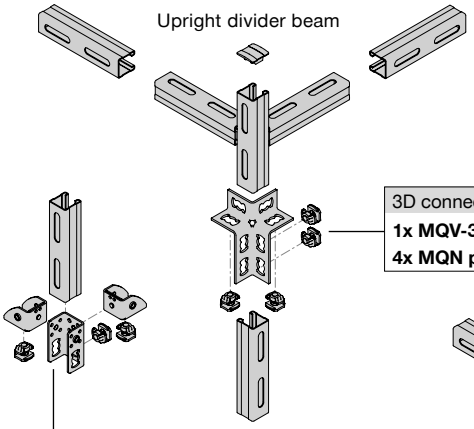
9

Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Simple 3D Frame: Corner Node Options

3D frame made from MQ System parts

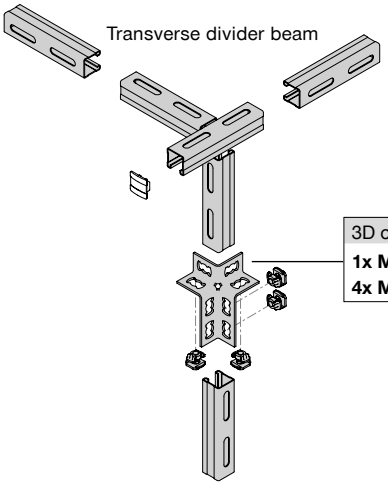




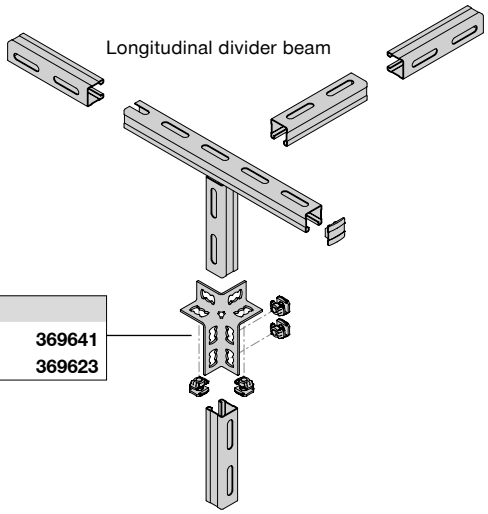
3D connector for corner nodes	
1x MQV-3/3 D	**369641**
4x MQN push button	**369623**

3D System substitution of connector for corner nodes	
1x MQ3D-B	**369694**
2x MQ3D-W90	**369695**
3x MQN push button	**369623**

Upper frame channels can be rotated 360° (assembly in 4 positions possible).



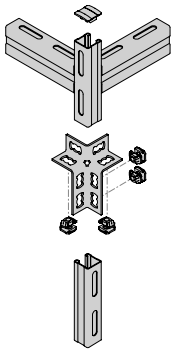
3D connector for corner nodes	
1x MQV-3/3 D	**369641**
4x MQN push button	**369623**



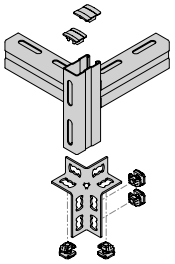
3D connector for corner nodes	
1x MQV-3/3 D	**369641**
4x MQN push button	**369623**

For various sizes of the channels

e.g. upper channel made of MQ-72



e.g. upper channel and vertical upright made of MQ-72



Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

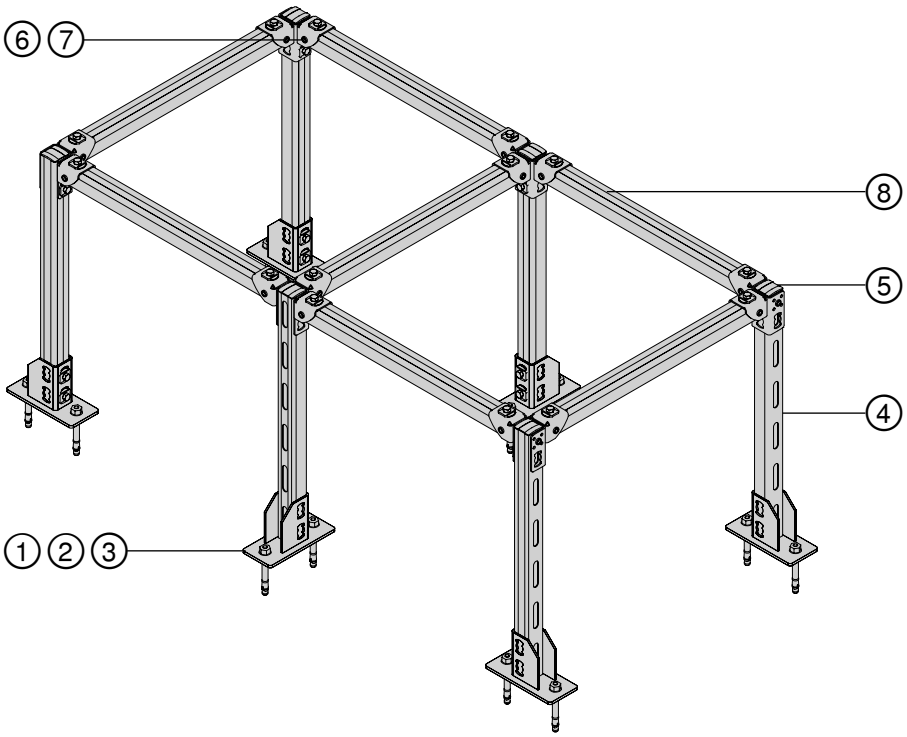
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D9

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	6	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	12	-
③	**369623**	**MQN push button**	32	-
④	**369591**	**MQ-41 3 m channel**	6	Depends on height of the frame
⑤	**369685**	**MQZ-E41 end cap**	6	-
⑥	**369694**	**MQ3D-B 3D base**	6	-
⑦	**369695**	**MQ3D-W90 connector**	14	-
⑧	**369591**	**MQ-41 3 m channel**	4	Depends on the width of the frame
⑨	**369591**	**MQ-41 3 m channel**	3	Depends on the depth of the frame

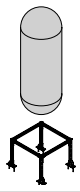
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application

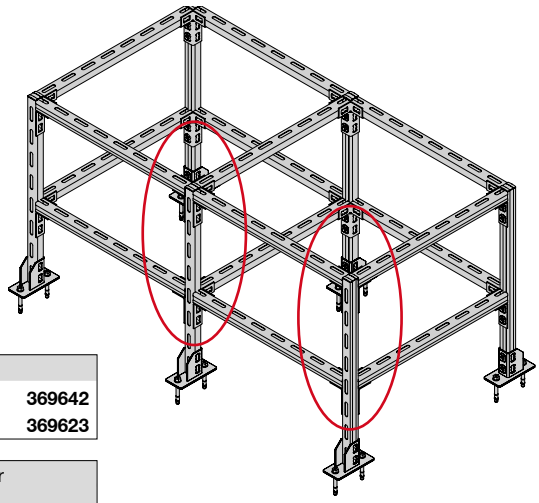


9

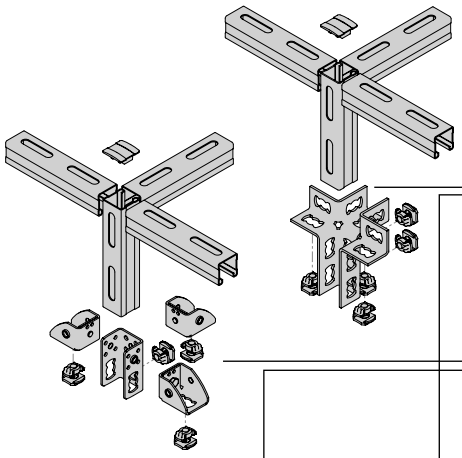
Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Plant Room Framing – Multi-sectional 3D Frame: Corner Node Options

3D frame made from MQ System parts

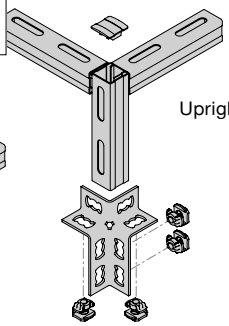


Upright divider beam

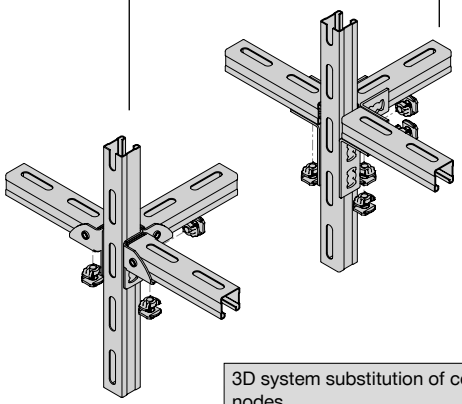


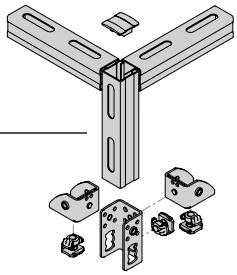
3D connector for intermediate nodes	
1x MQV-4/3 D connector	**369642**
5x MQN push button	**369623**

3D system substitution of connector for intermediate nodes	
1x MQ3D-B	**369694**
3x MQ3D-W90	**369695**
4x MQN push button	**369623**
Upper frame channels can be rotated 360° (assembly in 4 positions possible).	



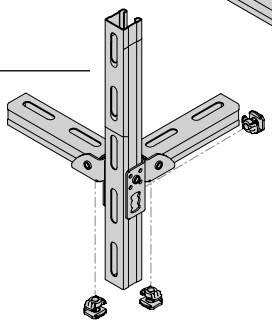
Upright divider beam

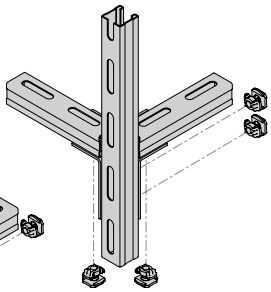




3D connector for corner nodes	
1x MQV-3/3 D	**369641**
4x MQN push button	**369623**

3D system substitution of connector for corner nodes	
1x MQ3D-B	**369694**
2x MQ3D-W90	**369695**
3x MQN push button	**369623**
Upper frame channels can be rotated 360° (assembly in 4 positions possible).	





Application description	Application	Product lines	Base material
Heating – plant room framing: 3D frame	9	MQ system	Concrete

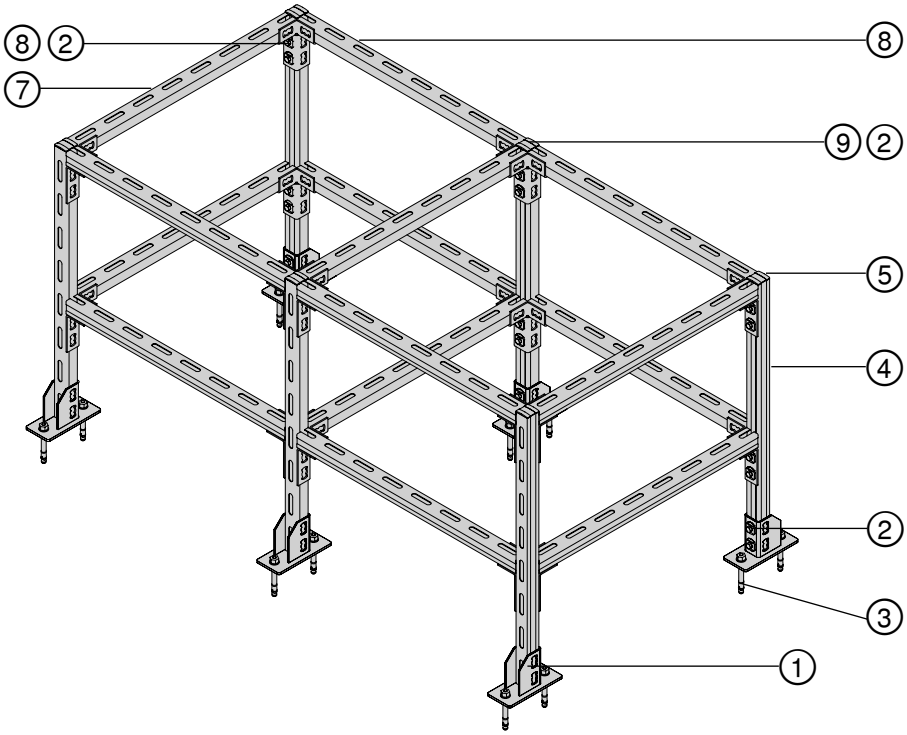
General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Heating Applications – Plant Room Equipment Support: 3D Frame

Type H-PR-3D10

- No particular loading capacity limits for this case since every case must be modeled, calculated and verified individually



Additional capacity limits

Every case must be modeled, calculated and verified individually.

Strength, rigidity and convenience are more important than finding the most cost-efficient solution when installing plant room equipment.

Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369651**	**MQP 21-72 channel base**	6	-
②	**369623**	**MQN push button**	64	-
③	**2105718**	**HST3 M12x105 30/10 stud anchor**	12	-
④	**369591**	**MQ-41 3 m channel**	6	Depends on the height of the box
⑤	**369685**	**MQZ-E41 end cap**	6	-
⑥	**369591**	**MQ-41 3 m channel**	8	Depends on width of the frame
⑦	**369591**	**MQ-41 3 m channel**	6	Depends on depth of the frame
⑧	**369641**	**MQV-3/3 D 3D connector**	8	-
⑨	**369642**	**MQV-4/3 D connector**	4	

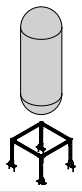
Application description

Heating – plant room equipment support: 3D frame

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



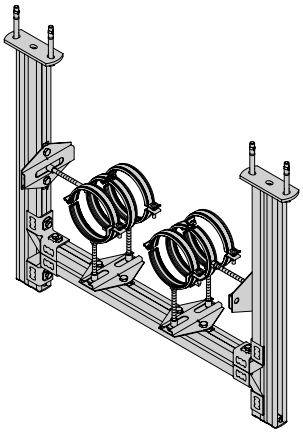
9

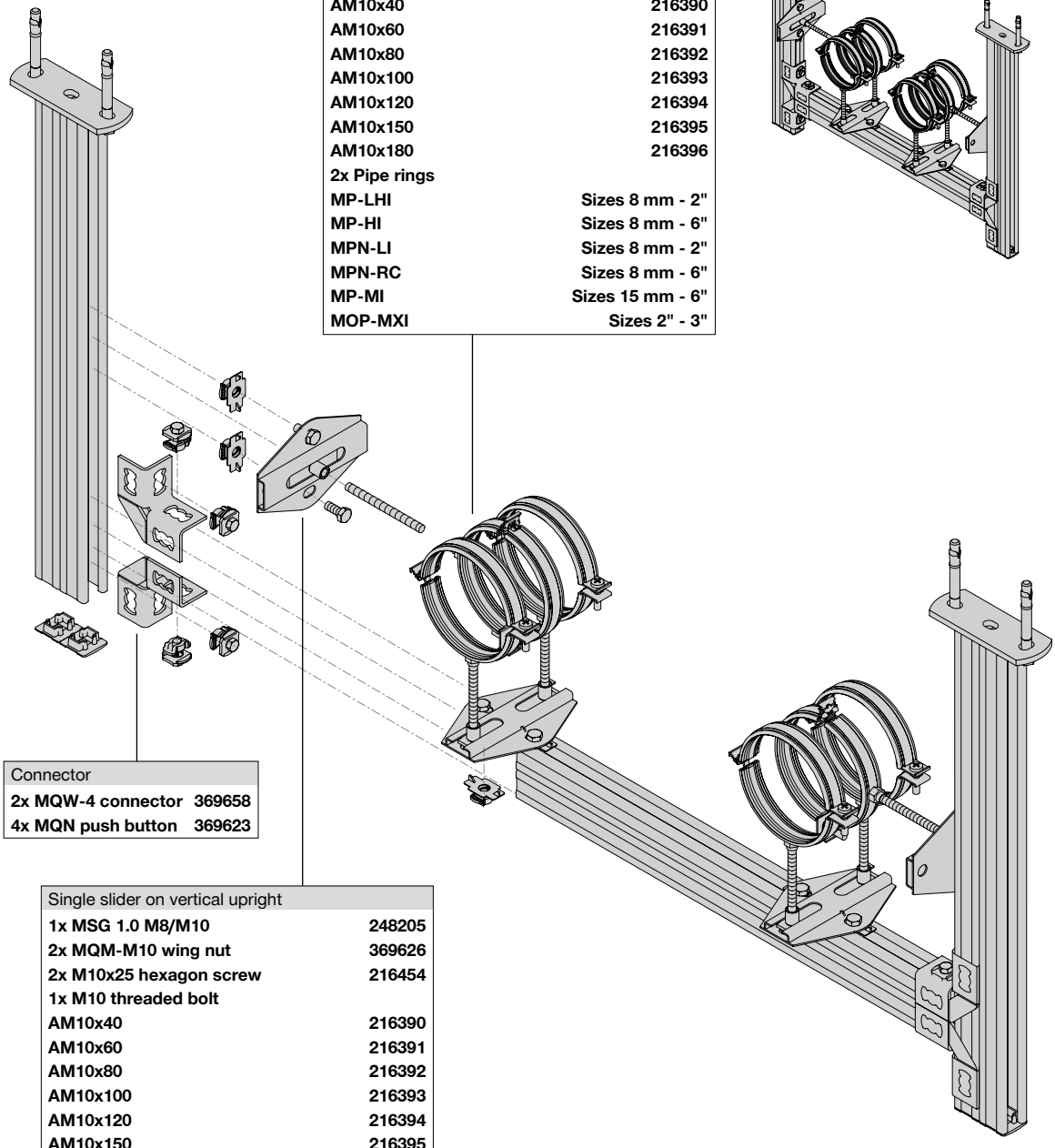
Base material	Concrete
Product line	MQ System
Capacity limit	Individual

Axial Guides On Concrete – Options

For frames requiring no axial or lateral bracing

Double slider on channel	
1x MSG 1.75 M8/M10 slider	**248209**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
2x M 10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**
2x Pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**
MP-MI	**Sizes 15 mm - 6"**
MOP-MXI	**Sizes 2" - 3"**





Connector	
2x MQW-4 connector	**369658**
4x MQN push button	**369623**

Single slider on vertical upright	
1x MSG 1.0 M8/M10	**248205**
2x MQM-M10 wing nut	**369626**
2x M10x25 hexagon screw	**216454**
1x M10 threaded bolt	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**
1x Pipe rings (See double slider)	

Application description	Application	Product lines	Base material
Heating – axial guides	10	MQ system	Concrete
General comments		Sliders / rollers	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

Axial Guides On Concrete – Options

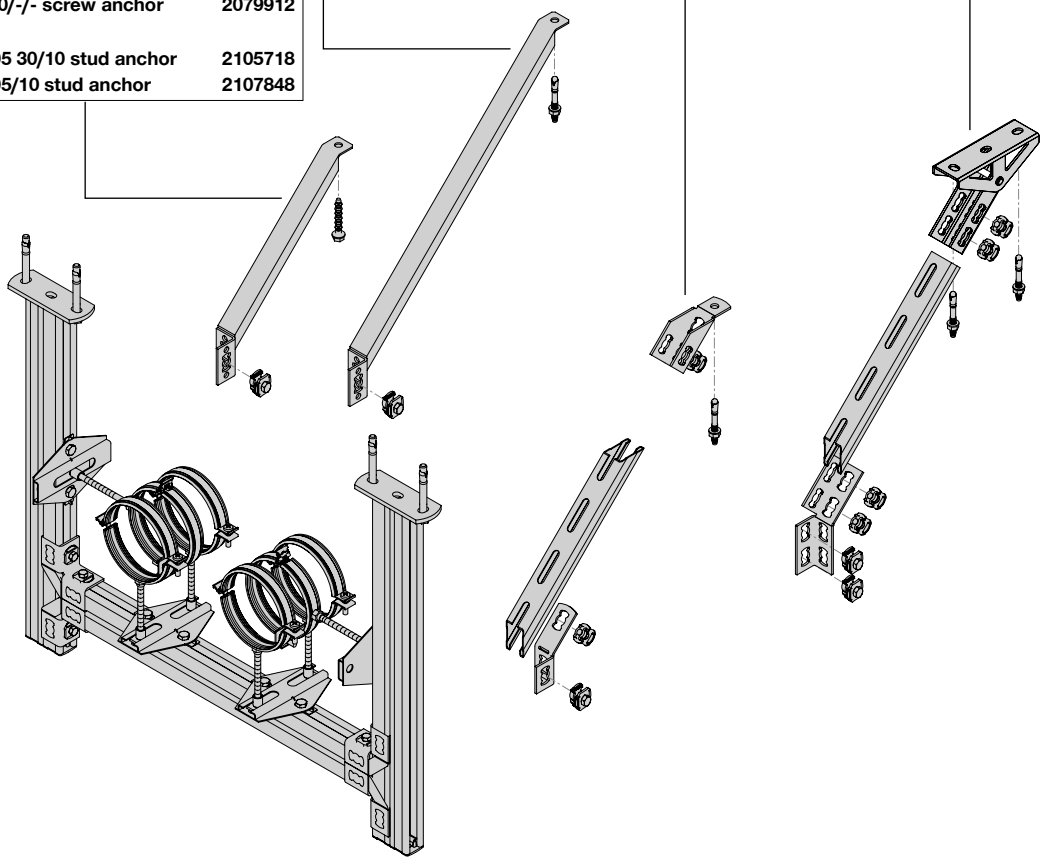
For cases where axial bracing is necessary

Axial bracing using long MQK brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing using short MQK brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Axial bracing using MQP-45 connector	
Upper brace connection	
1x MQP-45 channel base	**369649**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Channel brace - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Bottom brace connection	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Axial bracing using MQP-G connector	
Upper brace connection	
1x MQP-G pivot base	**369654**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Channel brace - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Bottom brace connection	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**



Application description	Application	Product lines	Base material
Heating – axial guides	10	MQ system	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Axial Guides On Concrete – Lateral Bracing Options

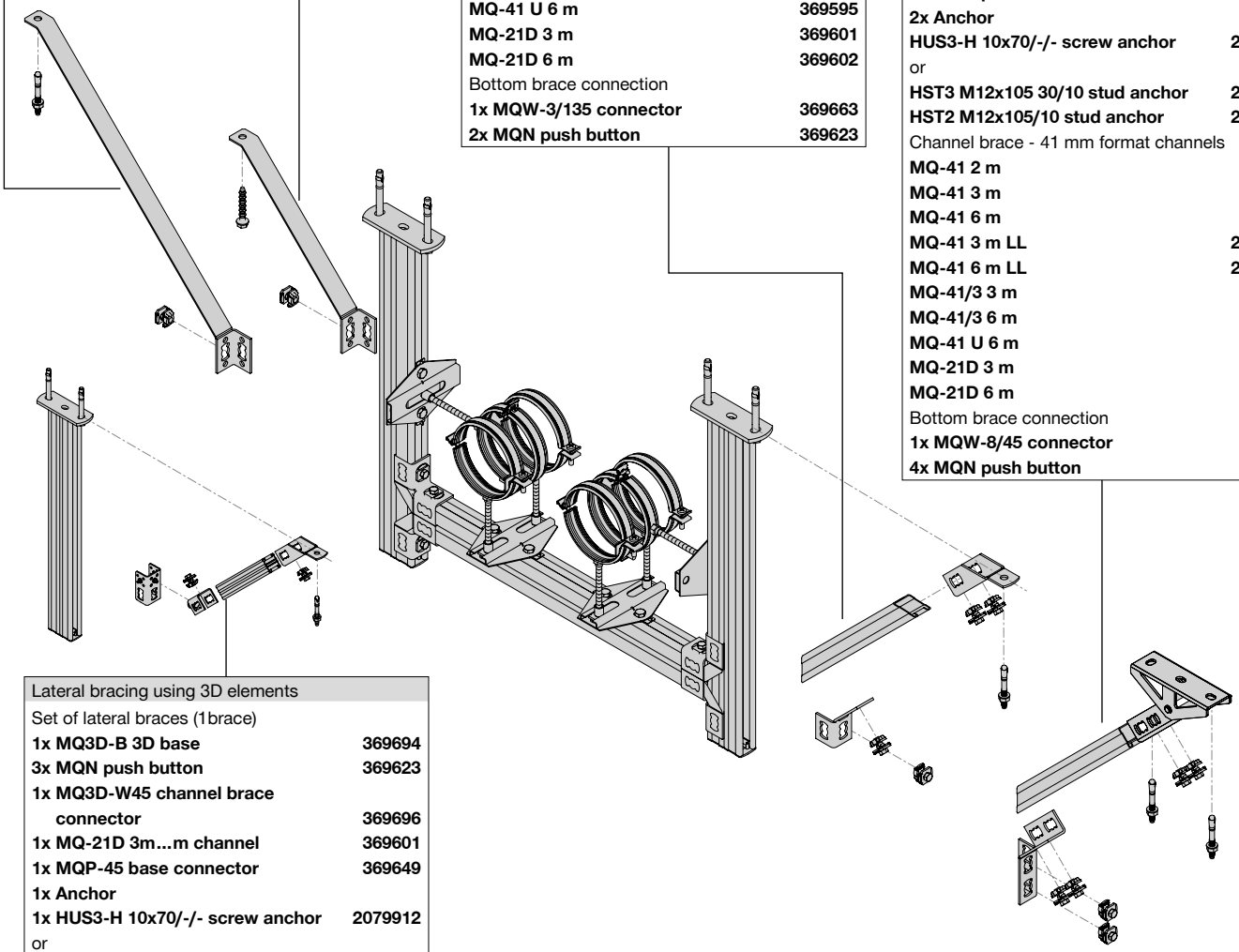
For cases where lateral bracing is necessary

Lateral bracing using long MQK brace	
1x MQK-SL pre-fab. brace	**369621**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Lateral bracing using short MQK brace	
1x MQK-SK pre-fab. brace	**369622**
1x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Lateral bracing using MQP-45 connector	
Upper brace connection	
1x MQP-45 channel base	**369649**
2x MQN push button	**369623**
1x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Channel brace - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Bottom brace connection	
1x MQW-3/135 connector	**369663**
2x MQN push button	**369623**

Lateral bracing using MQP-G connector	
Upper brace connection	
1x MQP-G pivot base	**369654**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**
Channel brace - 41 mm format channels	
MQ-41 2 m	**304559**
MQ-41 3 m	**369591**
MQ-41 6 m	**369592**
MQ-41 3 m LL	**2048100**
MQ-41 6 m LL	**2048101**
MQ-41/3 3 m	**369596**
MQ-41/3 6 m	**369597**
MQ-41 U 6 m	**369595**
MQ-21D 3 m	**369601**
MQ-21D 6 m	**369602**
Bottom brace connection	
1x MQW-8/45 connector	**369660**
4x MQN push button	**369623**



Lateral bracing using 3D elements	
Set of lateral braces (1brace)	
1x MQ3D-B 3D base	**369694**
3x MQN push button	**369623**
1x MQ3D-W45 channel brace connector	**369696**
1x MQ-21D 3m...m channel	**369601**
1x MQP-45 base connector	**369649**
1x Anchor	
1x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
1x HST3 M12x105 30/10 stud anchor	**2105718**
1x HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating – axial guides	10	MQ system	Concrete
		Anchors	

General comments

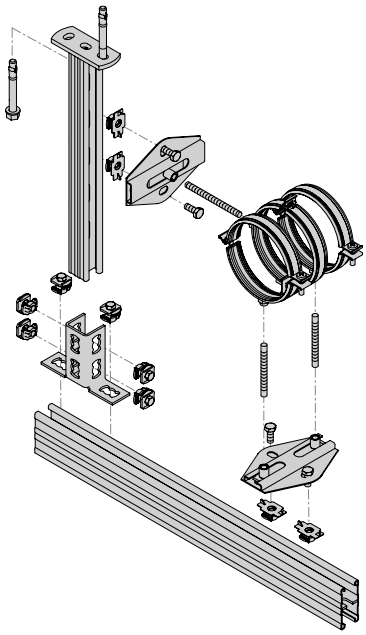
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Axial Guides On Concrete – Corridor Wall-to-wall Options

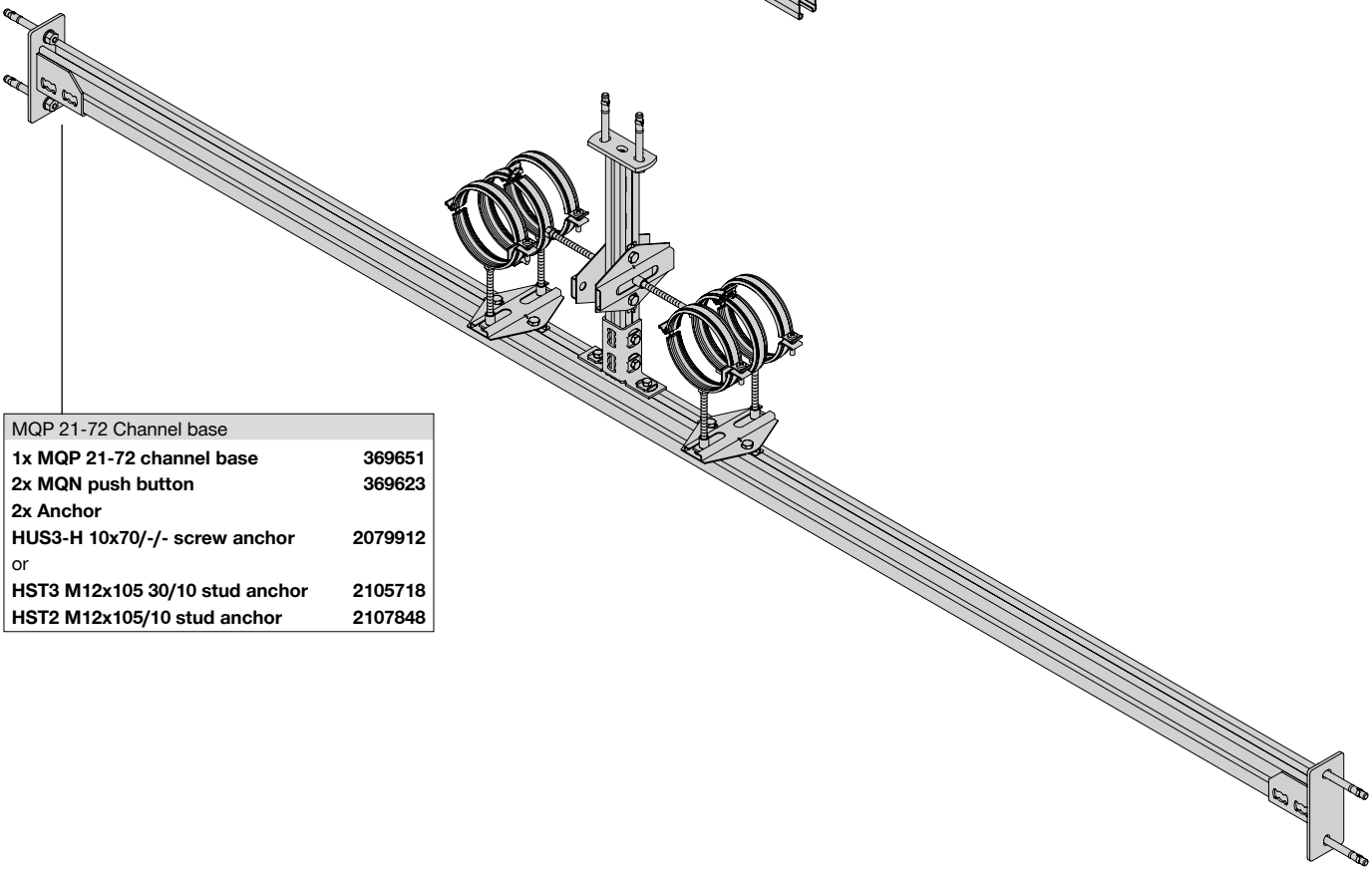
For cases where lateral bracing is necessary

Vertical upright anchored to ceiling supporting two axial guides	
1x Cantilever arm	
MQK-21D/300	**369617**
MQK-21D/450	**369618**
MQK-21D/600	**269619**
MQK-41D/1000	**269620**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Connector	
1x MQV-2/2 D connector	**369638**
6x MQN push button	**369623**



Set of axial guides - complete	
1x MSG 1.75 M8/M10 double slider	**248209**
1x MSG 1.0 M8/M10 single slider	**248205**
4x MQM-M10 wing nut	**369626**
4x M10x20 hexagon screw	**216453**
3x M10 threaded bolts	
AM10x40	**216390**
AM10x60	**216391**
AM10x80	**216392**
AM10x100	**216393**
AM10x120	**216394**
AM10x150	**216395**
AM10x180	**216396**
3x Pipe rings	
MP-LHI	**Sizes 8 mm - 2"**
MP-HI	**Sizes 8 mm - 6"**
MPN-LI	**Sizes 8 mm - 2"**
MPN-RC	**Sizes 8 mm - 6"**
MP-MI	**Sizes 15 mm - 6"**
MP-MXI	**Sizes 2" - 3"**



MQP 21-72 Channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
2x Anchor	
HUS3-H 10x70/-/- screw anchor	**2079912**
or	
HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

Application description	Application	Product lines	Base material
Heating – axial guides	10	MQ system	Concrete

General comments

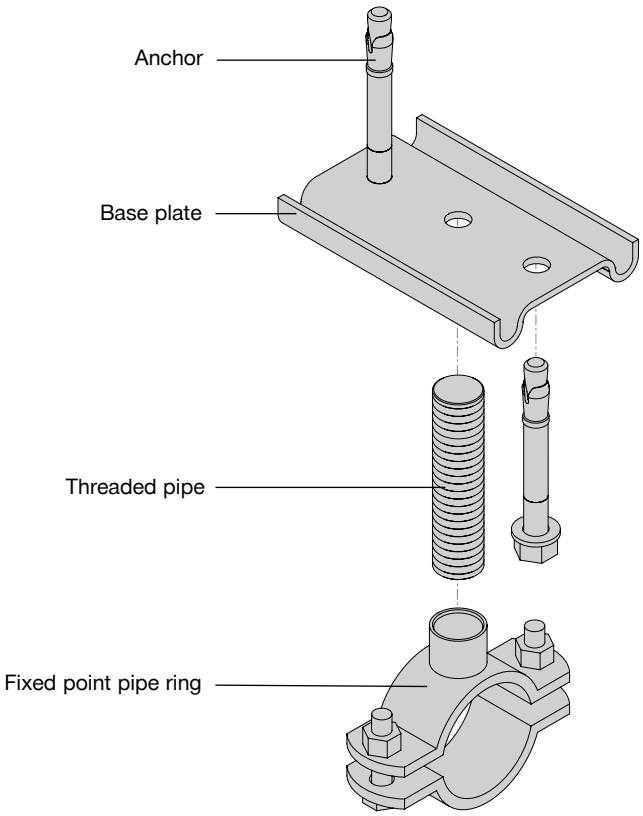
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Fixed Point On Concrete – MFP-L Fixed Point: Imperial Connection Options

MFP-L no sound insulation

MFP-L fixed point set with ½" connection	
1x MFP-L fixed point pipe ring	
MFP-L NW 15 ½"	**310307**
MFP-L NW 20 ½"	**310308**
MFP-L NW 25 ½"	**310309**
1x MFP-GP ½" base plate	**310318**
1x GR-GP ½" threaded pipe	**56428**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFP-L fixed point set with ¾" connection	
1x MFP-L Fixed point pipe ring	
MFP-L NW 32 ¾"	**310310**
MFP-L NW 40 ¾"	**310311**
MFP-L NW 50 ¾"	**310312**
MFP-L NW 68/72 ¾"	**310313**
MFP-L NW 65 ¾"	**310314**
MFP-L NW 80 ¾"	**310315**
MFP-L NW 4"¾"	**310316**
MFP-L NW 125 ¾"	**310317**
1x MFP-GP ¾" base plate	**310319**
1x GR-G ¾" threaded pipe	**56429**
2x HST3 M12x105 30/10 stud anchor	**2105718**

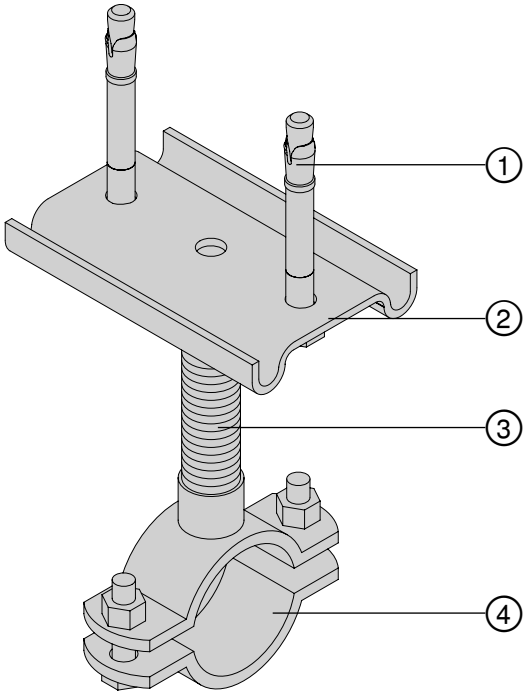


Application description	Application	Product lines	Base material
Heating – MFP-L fixed point: imperial size connection boss	11	Fixed point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

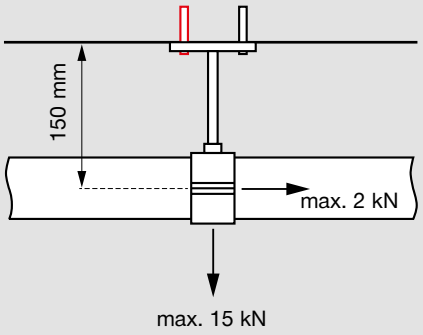
Heating Applications – MFP-L Fixed Point With Imperial Connection

Type H-FP2

- Limited to 1x DN 125 (O.D. 139.1 mm) steel pipe
- Max. axial load 2 kN at an axial distance of 150 mm
- Max. vertical load 15.0 KN
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**310319**	**MFP-GP ¾" base plate**	1	-
③	**56429**	**GR-G ¾" threaded pipe**	1	Depends on distance
④	**310317**	**MFP-L NW 125 ¾" fixed point pipe ring**	1	-

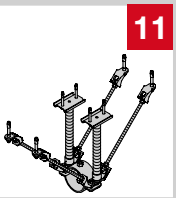
Application description

Heating – MFP-L fixed point: imperial connection boss

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP-L fixed points
Capacity limit	Max. 2 kN at 150 mm

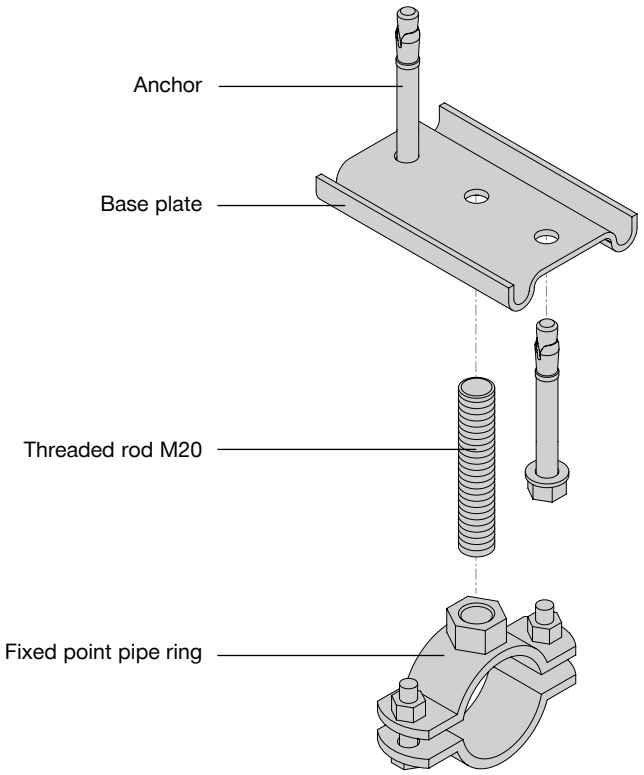
Fixed Point On Concrete – MFP-L Fixed Point: Metric Connection Options

MFP-L no sound insulation

MFP-L fixed point set with M20 connection	
1x MFP-L fixed point pipe ring	**See table below**
1x MFP-GP M20 base plate	**257001**
1x AM20x1000 threaded rod	**216425**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFP-L fixed point pipe rings

MFP-L fixed point pipe rings	
MFP-L NW15 M20	**313223**
MFP-L NW20 M20	**313224**
MFP-L NW25 M20	**313225**
MFP-L NW32 M20	**313226**
MFP-L NW40 M20	**313227**
MFP-L NW50 M20	**313228**
MFP-L NW68/72 M20	**313229**
MFP-L NW65 M20	**313230**
MFP-L NW80 M20	**313231**
MFP-L NW4" M20	**313232**
MFP-L NW125 M20	**313233**

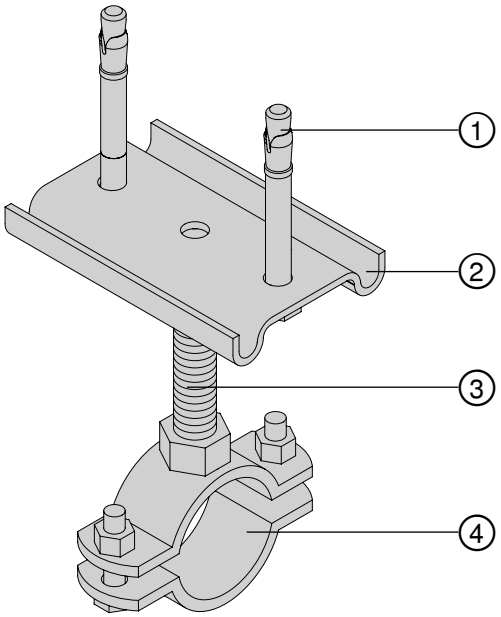


Application description	Application	Product lines	Base material
Heating – MFP-L fixed point: metric connection boss	11	Fixed point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

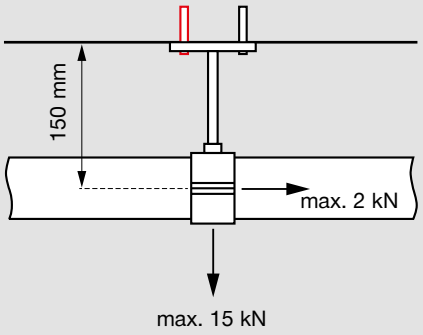
Heating Applications – MFP-L Fixed Point With Metric Connection

Type H-FP2

- Limited to 1x DN 125 (O.D. 139.1 mm) steel pipe
- Max. axial load 2 kN at an axial distance of 150 mm
- Max. vertical load KN
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**257001**	**MFP-GP M20 base plate**	1	-
③	**216425**	**AM20x1000 threaded rod**	1	Depends on distance
④	**313233**	**MFP-L NW125 M20 fixed point pipe ring**	1	-

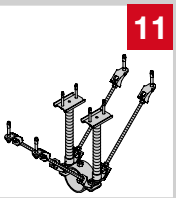
Application description

Heating – MFP-L fixed point: metric connection boss

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP-L fixed points
Capacity limit	Max. 2 kN at 150 mm

Fixed Point On Concrete – MFP-1a Fixed Point: Options

MFP-1a – no sound insulation

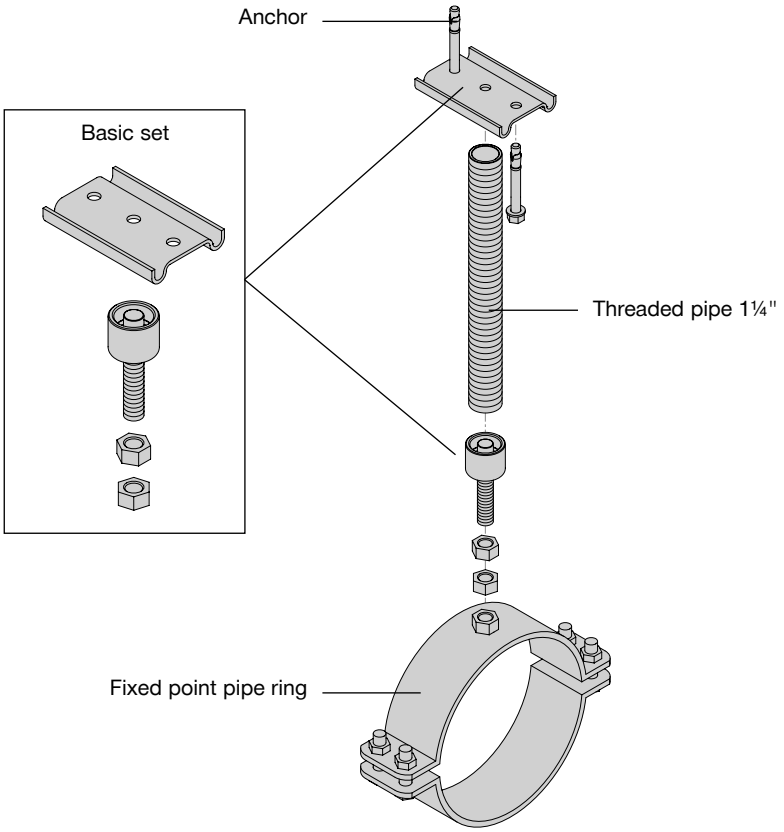
MFP-1a fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BP 20 basic set	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFPI-1a sound-insulated

MFP-1a fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BPI 20 basic set	**254 460**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFP-NW fixed point pipe rings

MFP-NW fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

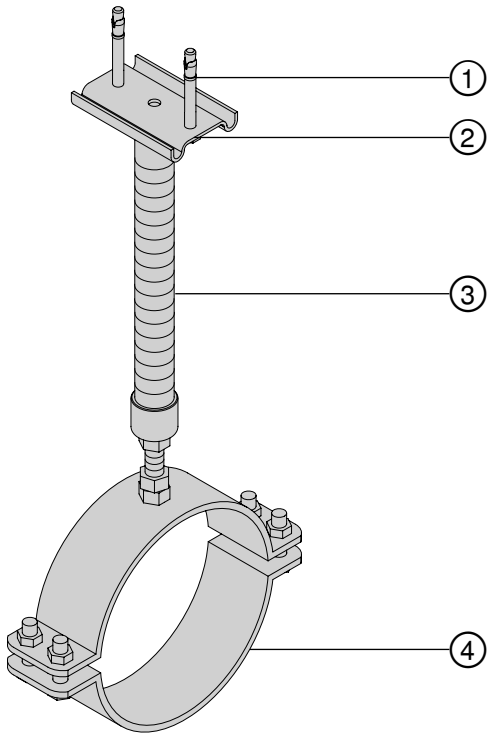


Application description	Application	Product lines	Base material
Heating – MFP-1a fixed point: metric connection boss	11	Fixed point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

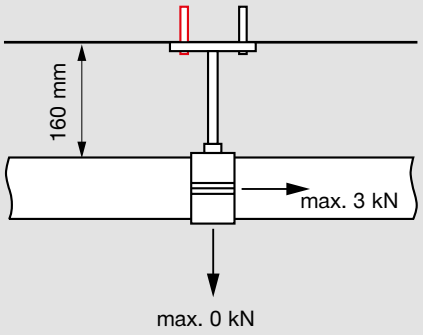
Heating Applications – MFP 1a Fixed Point

Type H-FP3

- Limited to 1x DN 250 (O.D. 273.0 mm) steel pipe
- Max. axial load 3 kN at a distance of 160 mm to pipe surface
- Max. vertical load 0.0 KN
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**247827**	**MFP-BP 20 basic set**	1	-
③	**248532**	**GR-G 1 ¼" threaded pipe**	1	Depends on distance
④	**243542**	**MFP NW250 fixed point pipe ring**	1	-

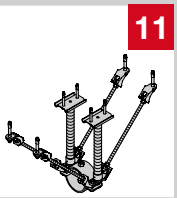
Application description

Heating – MFP-1a fixed point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max. 3 kN at 160 mm

Fixed Point On Concrete – MFP-1 Fixed Point Options

MFP-1 – no sound insulation

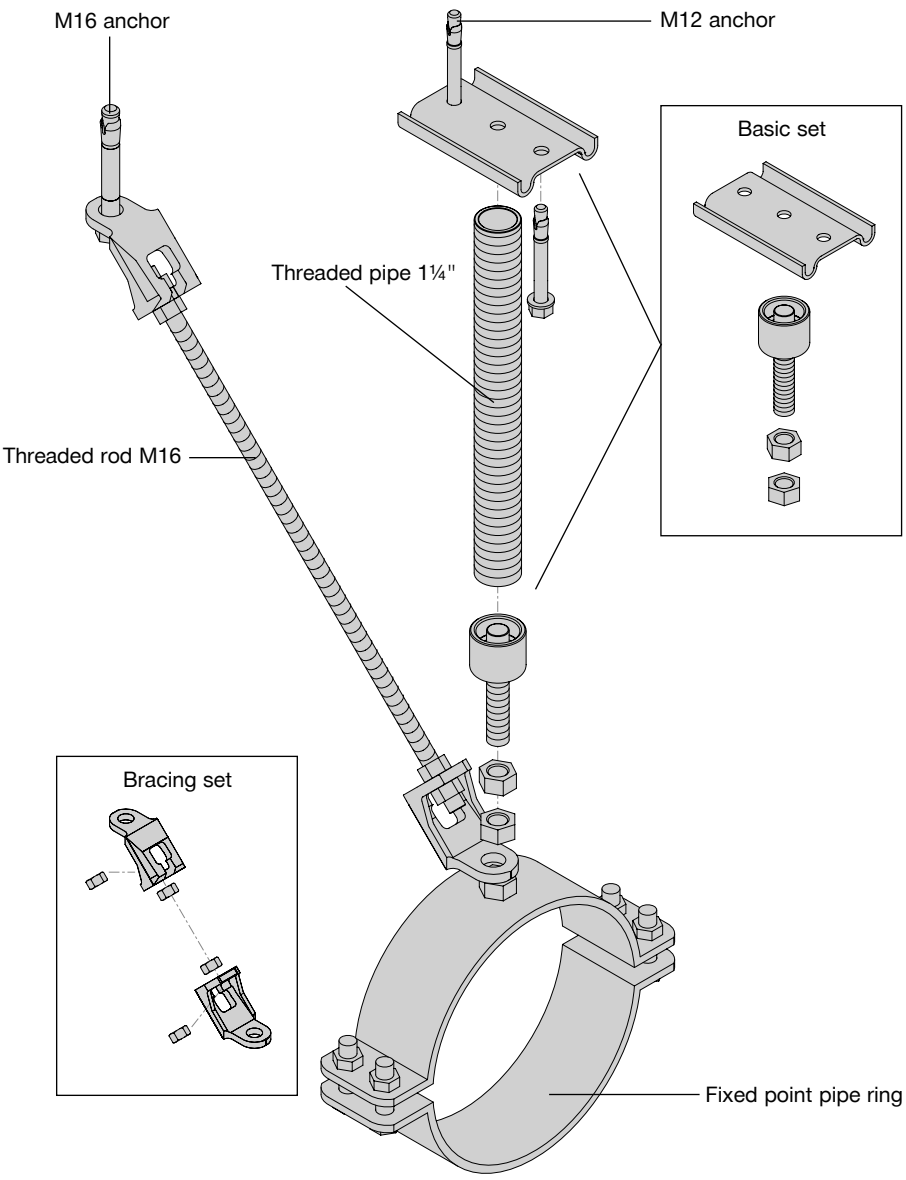
MFP-1 fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BP 20 basic set *	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-AP1 bracing set *	**247829**
1x AM16x1000 threaded rod	**216422**
1x HST3 M16x135 35/15	**2105858**
*** MFP-BP 20 + MFP-AP1**	**2083241**

MFPI-1 sound-insulated

MFP-1 fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BPI 20 basic set *	**254460**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-API1 bracing set *	**254461**
1x AM16x1000 threaded rod	**216422**
1x HST3 M16x135 35/15	**2105858**
*** MFP-BPI 20 + MFP-API1**	**2083244**

MFP-NW fixed point pipe rings

MFP-NW fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

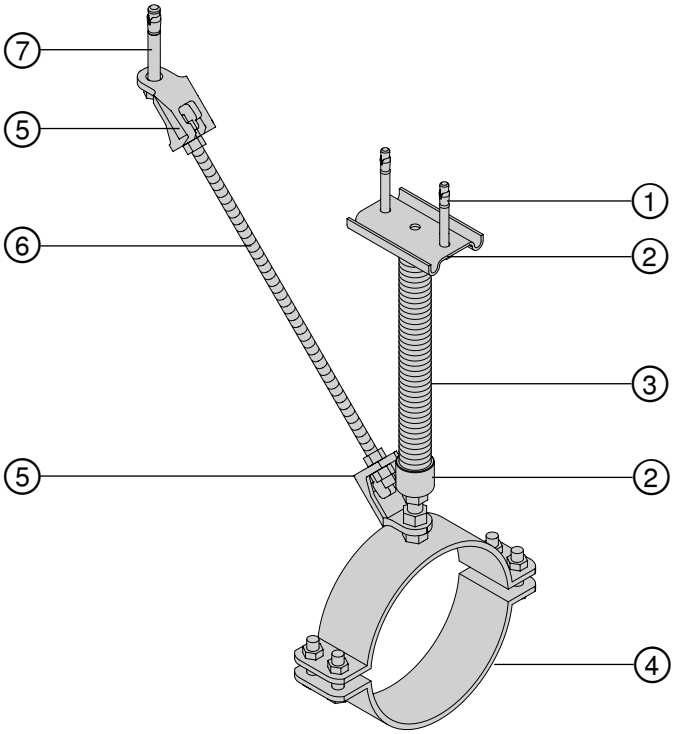


Application description	Application	Product lines	Base material
Heating – MFP-1 fixed point: metric connection boss	11	Fixed point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

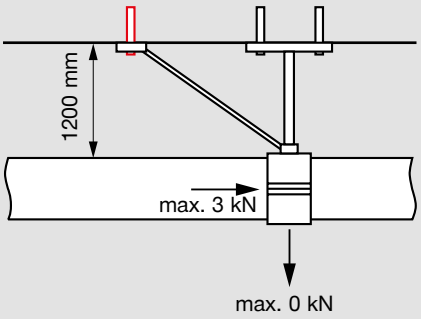
Heating Applications – MFP-1 Fixed Point

Type H-FP4

- Limited to 1x DN 250 (O.D. 273.0 mm) steel pipe
- Max. axial load 3 kN at a distance of 1200 mm to pipe surface
- Max. vertical load 0.0 KN
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**247827**	**MFP-BP 20 basic set**	1	-
③	**248532**	**GR-G 1¼" threaded pipe**	1	Depends on distance
④	**243542**	**MFP NW250 fixed point pipe ring**	1	-
⑤	**247829**	**MFP-AP1 bracing set**	1	-
⑥	**216422**	**AM16x1000 threaded rod**	1	Depends on distance
⑦	**2105858**	**HST3 M16x135 35/15 stud anchor**	1	-

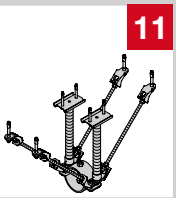
Application description

Heating – MFP-1 fixed point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max. 3 kN at 1200 mm

Fixed Point On Concrete – MFP-2 Fixed Point Options

MFP-2 – no sound insulation

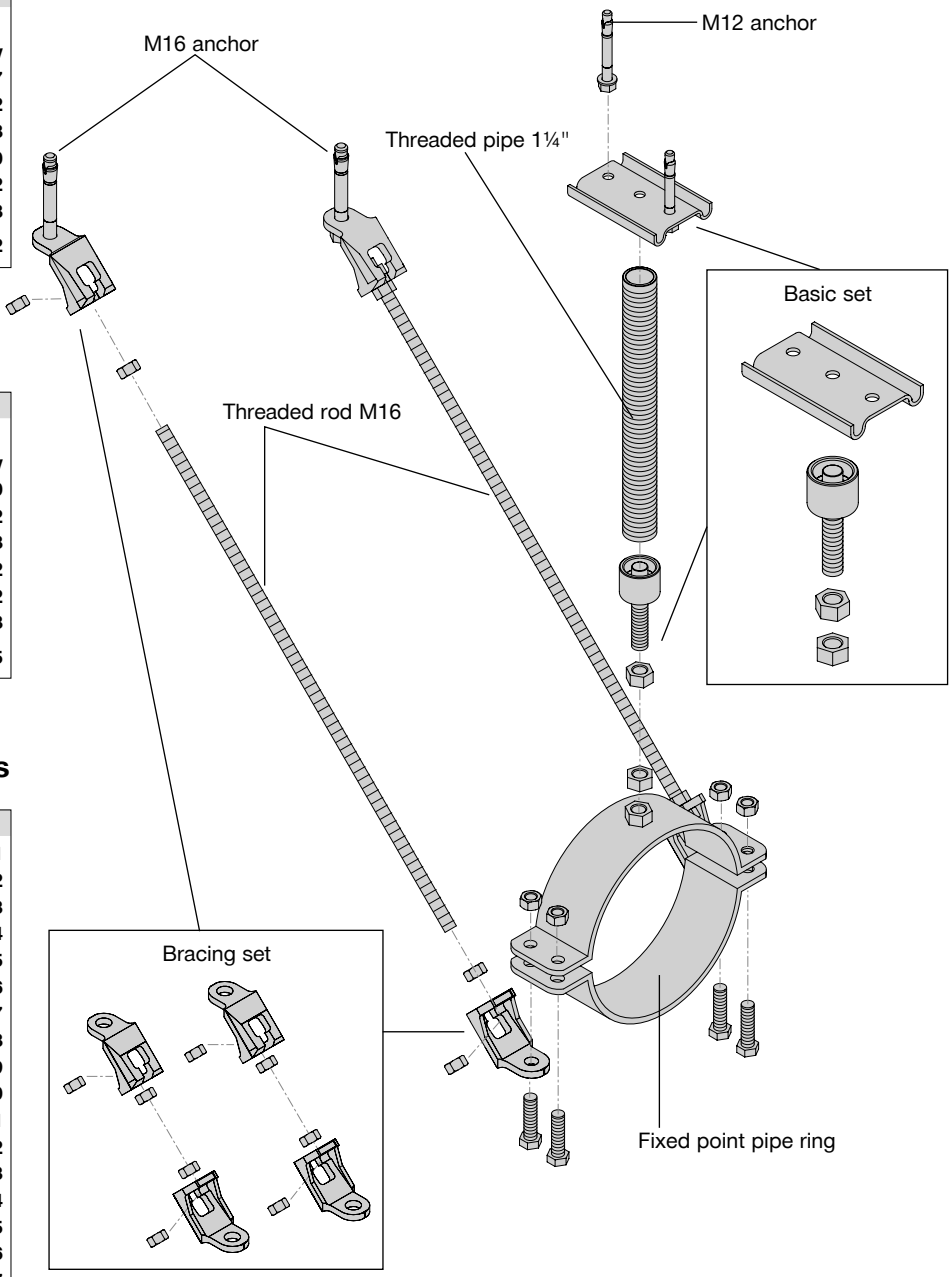
MFP-1a fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BP 20 basic set *	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10	**2105718**
1x MFP-AP2 bracing set *	**247830**
2x AM16x1000 threaded rod	**216422**
2x HST3 M16x135 35/15	**2105858**
*** MFP-BP 20 + MFP-AP2**	**2083242**

MFPI-2 sound-insulated

MFP-1a fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BPI 20 basic set *	**254460**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10	**2105718**
1x MFP-API2 bracing set *	**254462**
2x AM16x1000 threaded rod	**216422**
2x HST3 M16x135 35/15	**2105858**
*** MFP-BPI 20 + MFP-API2**	**2083245**

MFP-NW fixed point pipe rings

MFP-NW fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

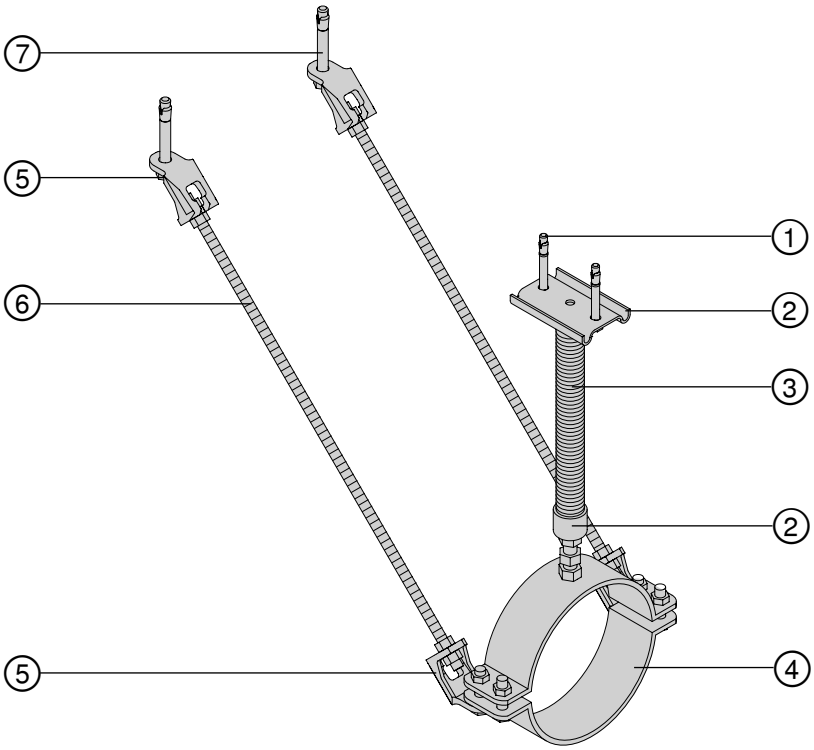


Application description	Application	Product lines	Base material
Heating – MFP-2 fixed point: metric connection boss	11	Fixed point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

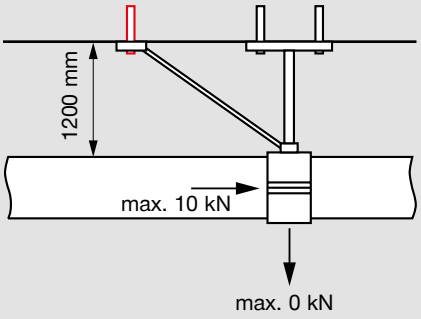
Heating Applications – MFP-2 Fixed Point

Type H-FP5

- Limited to 1x DN 250 (O.D. 273.0 mm) steel pipe
- Max. axial load 10 kN at a distance of 1200 mm to pipe surface
- Max. vertical load 0.0 KN
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**247827**	**MFP-BP 20 basic set**	1	-
③	**248532**	**GR-G 1 ¼" threaded pipe**	1	Depends on distance
④	**243542**	**MFP NW250 fixed point pipe ring**	1	-
⑤	**247830**	**MFP-AP2 bracing set**	1	-
⑥	**216422**	**AM16x1000 threaded rod**	1	Depends on distance
⑦	**2105859**	**HST3 M16x145 45/25 stud anchor**	2	-

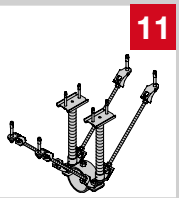
Application description

Heating – MFP-2 fixed point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max.10 kN at 1200 mm

Fixed Point On Concrete – MFPI-3 Fixed Point Options

MFP-3 - no sound insulation

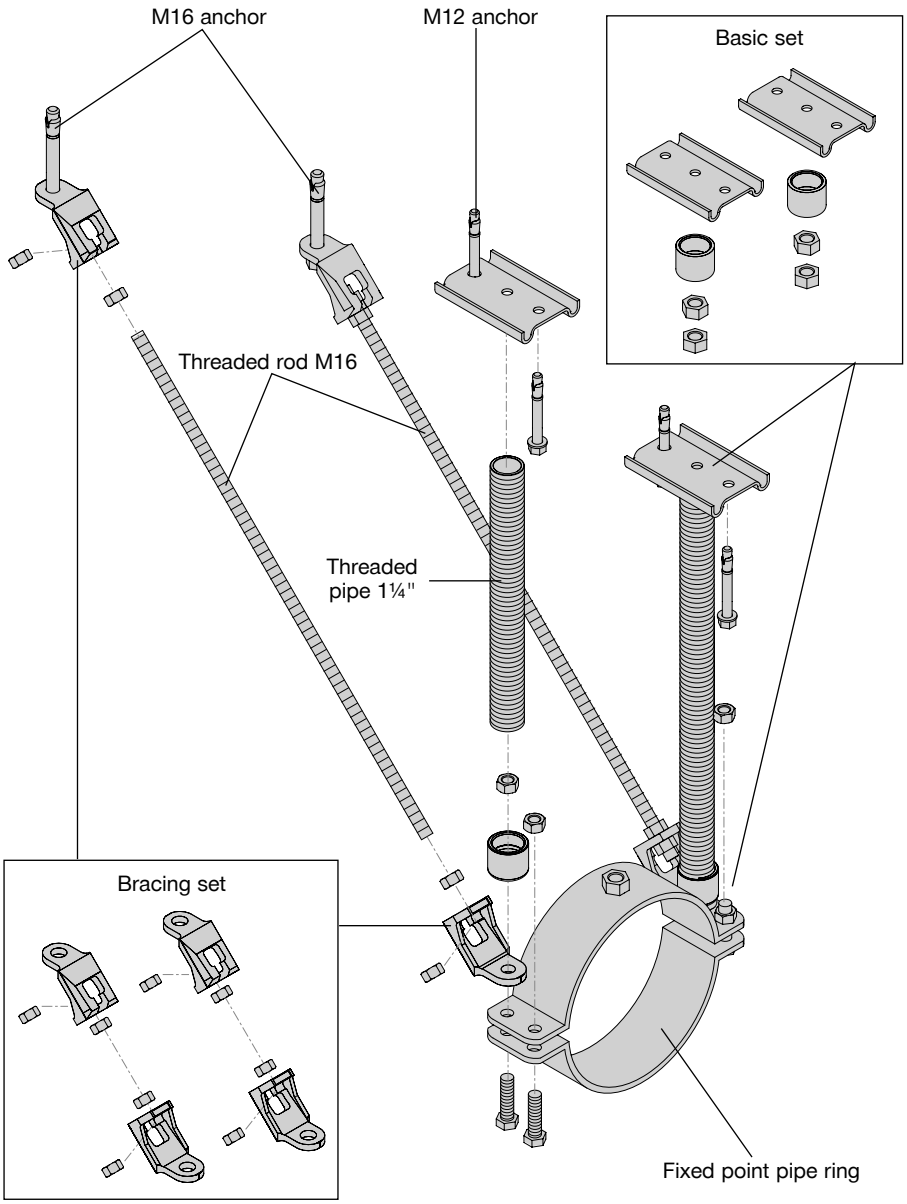
MFP-1a fixed point set	
1x MFP-NW Fixed point pipe ring	**See table below**
1x MFP-BP 16 basic set *	**247826**
2x GR-G 1 ¼" threaded pipe	**248532**
4x HST3 M12x105 30/10	**2105718**
1x MFP-AP3 bracing set *	**247831**
2x AM16x1000 threaded rod	**216422**
2x HST3 M20X170 -/30 stud anchor	**2105891**
2-3x Welded stoppers on pipe surface	
*** MFP-BP 16 + MFP-AP3**	**2083243**

MFPI-3 sound-insulated

MFP-1a fixed point set	
1x MFP-NW fixed point pipe ring	**See table below**
1x MFP-BPI 16 basic set *	**254459**
2x GR-G 1 ¼" threaded pipe	**248532**
4x HST3 M12x105 30/10	**2105718**
1x MFP-API3 bracing set *	**254463**
2x AM16x1000 threaded rod	**216422**
2x HST3 M20X170 -/30 stud anchor	**2105891**
2-3x Welded stoppers on pipe surface	
*** MFP-BPI 16 + MFP-API3**	**2083246**

MFP-NW fixed point pipe rings

MFP-NW fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

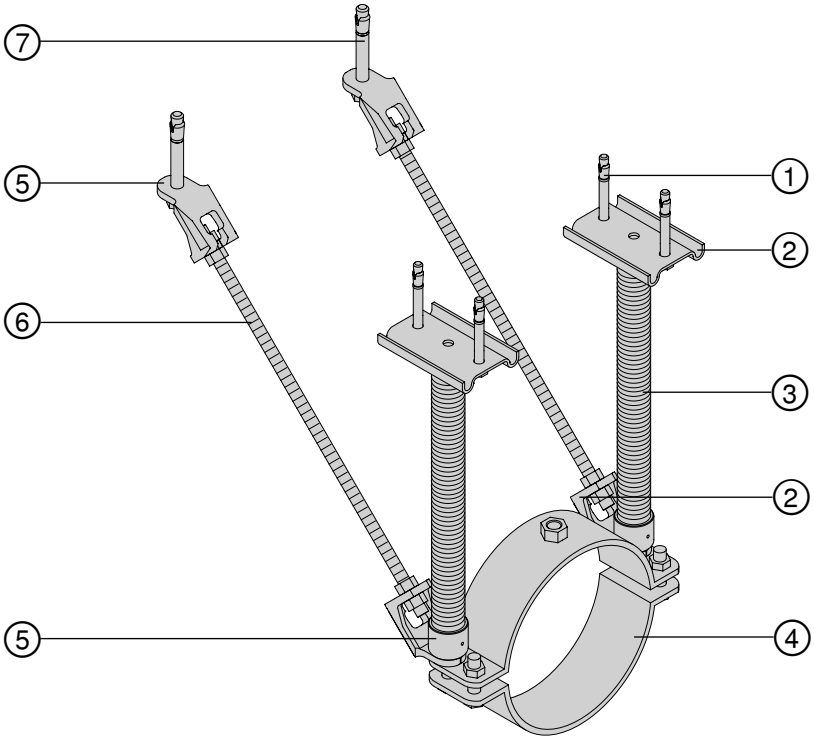


Application description	Application	Product lines	Base material
Heating – MFP-3 fixed point	11	Fixed point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application			

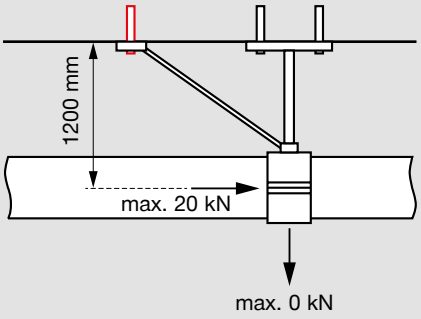
Heating Applications – MFP-3 Fixed Point

Type H-FP6

- Limited to 1x DN 250 (O.D. 273.0 mm) steel pipe
- Max. axial load 10 kN at a distance of 1200 mm
- Max. vertical load 0.0 KN
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
②	**247826**	**MFP-BP 16 basic set**	1	-
③	**248532**	**GR-G 1 ¼" threaded pipe**	2	Depends on distance
④	**243542**	**MFP NW250 fixed point pipe ring**	1	-
⑤	**247831**	**MFP-AP3 bracing set**	1	-
⑥	**216422**	**AM16x1000 threaded rod**	2	Depends on distance
⑦	**2105891**	**HST3 M20X170 -/30 stud anchor**	2	-
⑧	**No item number**	**Welded stoppers on pipe surface**	2-3x	

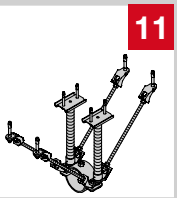
Application description

Heating – MFP-3 fixed point

General comments

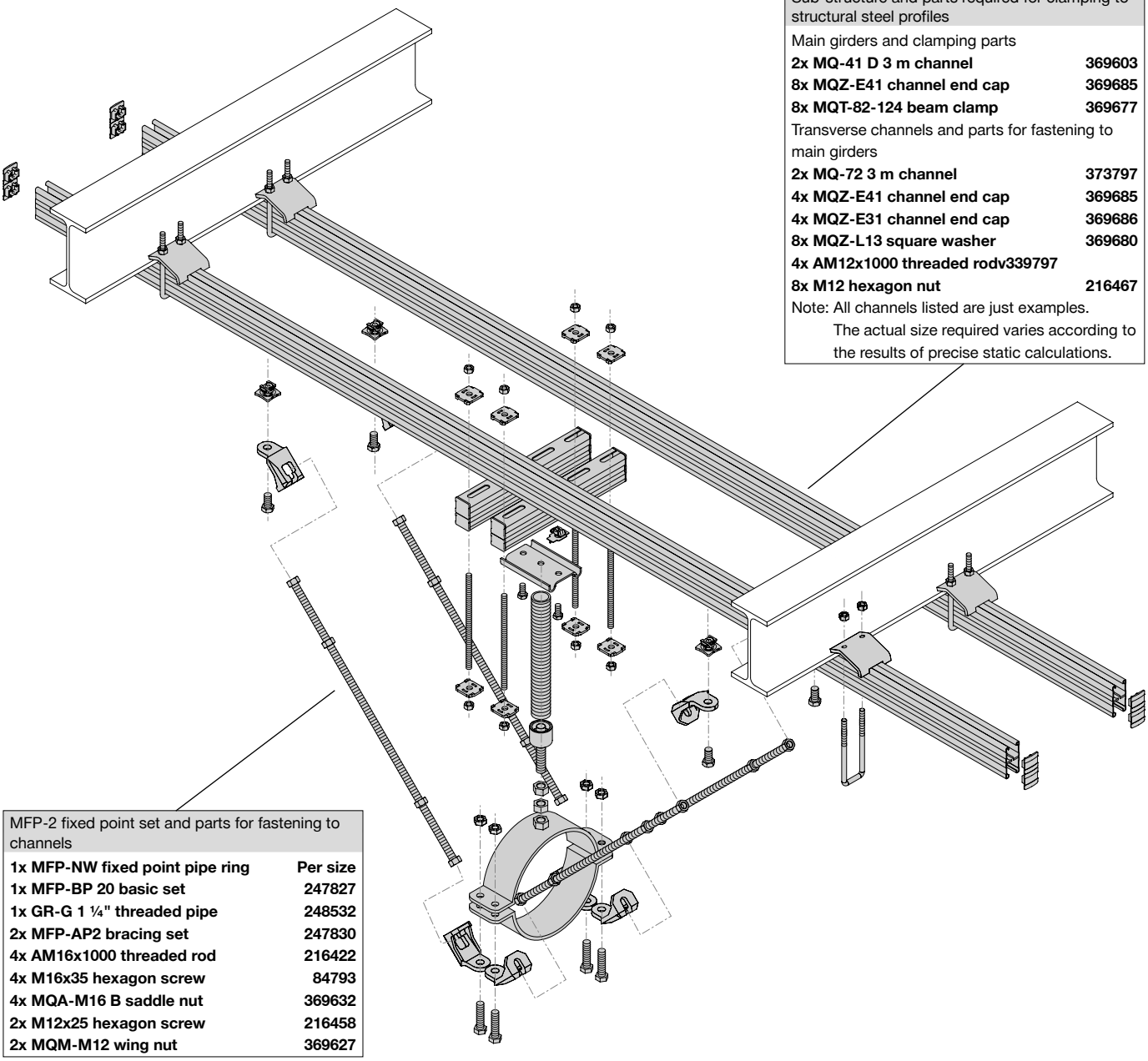
- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max.20 kN at 1200 mm

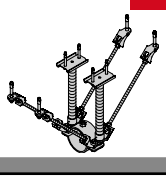
Fixed Point On Steel – MFP-2 Fixed Point Incl. Sub-structure Options



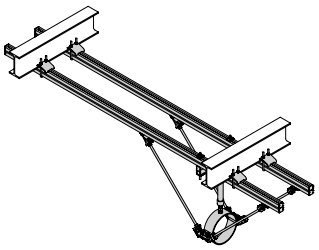
Sub-structure and parts required for clamping to structural steel profiles	
Main girders and clamping parts	
2x MQ-41 D 3 m channel	**369603**
8x MQZ-E41 channel end cap	**369685**
8x MQT-82-124 beam clamp	**369677**
Transverse channels and parts for fastening to main girders	
2x MQ-72 3 m channel	**373797**
4x MQZ-E41 channel end cap	**369685**
4x MQZ-E31 channel end cap	**369686**
8x MQZ-L13 square washer	**369680**
4x AM12x1000 threaded rodv339797	
8x M12 hexagon nut	**216467**

Note: All channels listed are just examples.
The actual size required varies according to the results of precise static calculations.

MFP-2 fixed point set and parts for fastening to channels	
1x MFP-NW fixed point pipe ring	**Per size**
1x MFP-BP 20 basic set	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x MFP-AP2 bracing set	**247830**
4x AM16x1000 threaded rod	**216422**
4x M16x35 hexagon screw	**84793**
4x MQA-M16 B saddle nut	**369632**
2x M12x25 hexagon screw	**216458**
2x MQM-M12 wing nut	**369627**

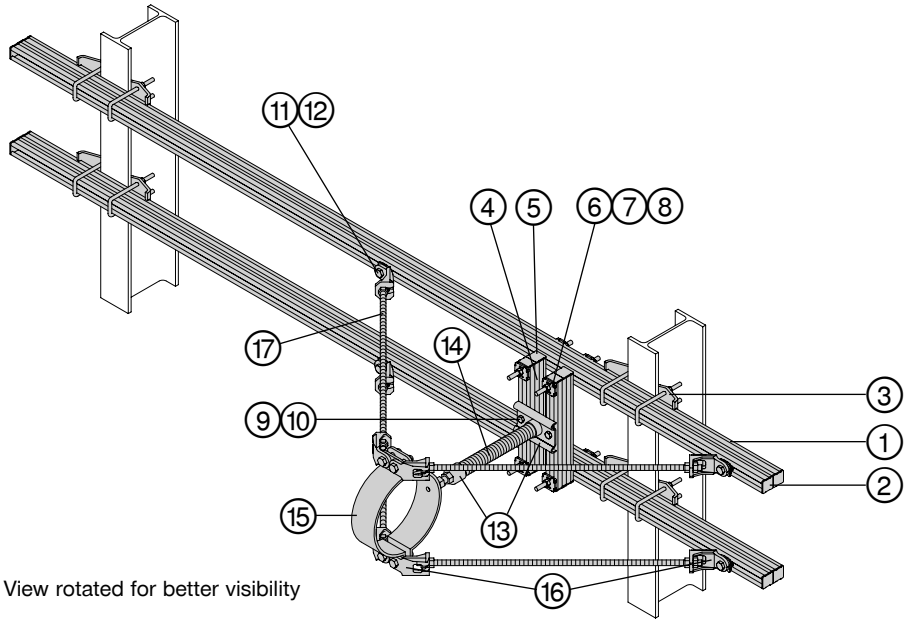
Application description	Application	Product lines	Base material
Heating – MFP-2 fixed point: metric connection boss	11 	Fixed point sets	Steel
General comments		MQ System	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Threaded parts	

Heating Applications – MFP-2 Fixed Point On Steel Structure



Type H-FP7

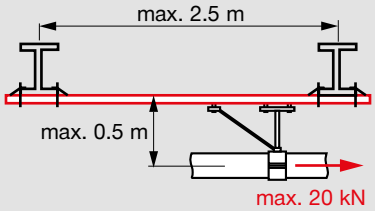
- Limited to 1x DN 250 (O.D. 273.0 mm) steel pipe
- Max. axial load 3.05 kN at a axial distance of 500 mm
- No insulation on the pipe at the fixed point



View rotated for better visibility

Additional capacity limits

This particular case is a very complex, but relatively common structure.
Every individual part is influenced by several factors which can vary.
Proper evaluation must be done based on the set of loads to which each individual part is subjected, compared to their loading capacity limits.
The most common limiting factors are the brace to channel connector, the channel itself and slippage at the beam clamps.



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**369603**	**MQ-41 D 3 m channel**	2	Depends on span
②	**369685**	**MQZ-E41 channel end cap**	12	-
③	**369677**	**MQT-82-124 beam clamp**	8	-
④	**373797**	**MQ-72 3 m channel**	2	Depends on pipe size
⑤	**369686**	**MQZ-E31 channel end cap**	4	-
⑥	**369680**	**MQZ-L13 square washer**	8	Depends on distance
⑦	**339797**	**AM12x1000 threaded rod**	4	Approx. 250 mm
⑧	**216467**	**M12 hexagon nut**	8	-
⑨	**369627**	**MQM-M12 wing nut**	2	-
⑩	**216458**	**M12x25 hexagon screw**	2	-
⑪	**369632**	**MQA-M16 B saddle nut**	4	-
⑫	**84793**	**M16x35 hexagon screw**	4	
⑬	**247827**	**MFP-BP 20 basic set**	1	-
⑭	**248532**	**GR-G 1 ¼" threaded pipe**	1	Depends on distance
⑮	**243542**	**MFP NW250 fixed point pipe ring**	1	-
⑯	**247830**	**MFP-AP2 bracing set**	2	-
⑰	**216422**	**AM16x1000 threaded rod**	4	Depends on distance

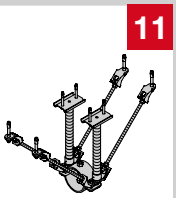
Application description

Heating – MFP-2 fixed point with bracing on both sides

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



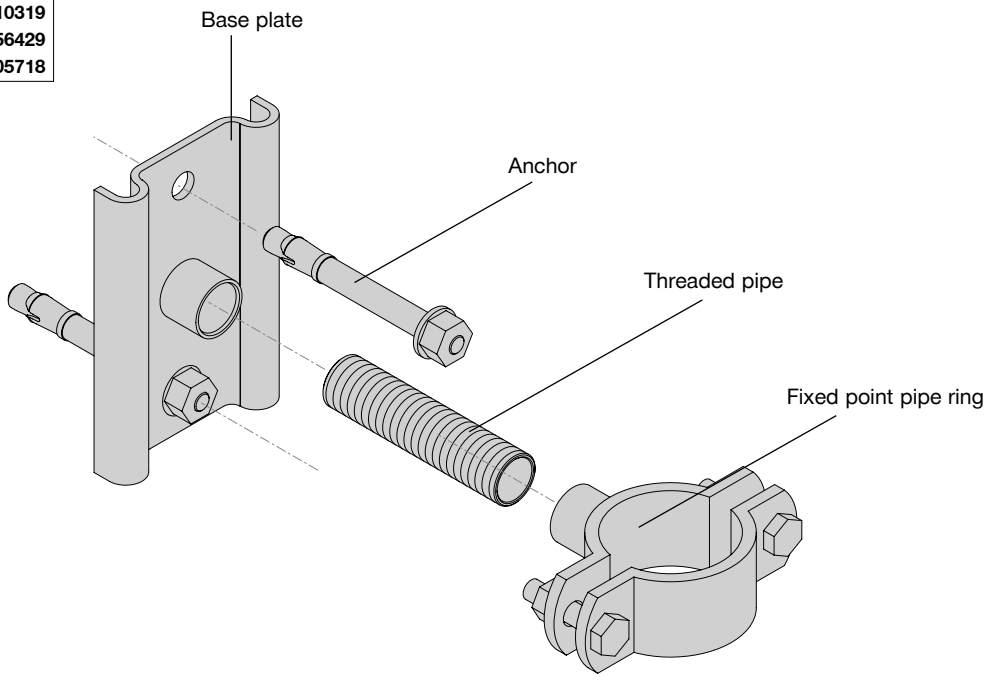
Base material	Steel
Product line	MFP fixed points
Capacity limit	Max. 20 kN in 500 mm

Riser Fixed Point On Concrete - Fixed Point MFP-L Imperial Connections Options

No sound insulation

Set of Fixed point MFP-L with ½" connection	
1x MFP-L fixed point pipe ring	
MFP-L NW 15 ½"	**310307**
MFP-L NW 20 ½"	**310308**
MFP-L NW 25 ½"	**310309**
1x MFP-GP ½" base plate	**310318**
1x GR-GP ½" threaded pipe	**56428**
2x HST3 M12x105 30/10 stud anchor	**2105718**

Set of Fixed point MFP-L with ¾" connection	
1x MFP-L Fixed point pipe ring	
MFP-L NW 32 ¾"	**310310**
MFP-L NW 40 ¾"	**310311**
MFP-L NW 50 ¾"	**310312**
MFP-L NW 68/72 ¾"	**310313**
MFP-L NW 65 ¾"	**310314**
MFP-L NW 80 ¾"	**310315**
MFP-L NW 4"¾"	**310316**
MFP-L NW 125 ¾"	**310317**
1x MFP-GP ¾" base plate	**310319**
1x GR-G ¾" threaded pipe	**56429**
2x HST3 M12x105 30/10 stud anchor	**2105718**

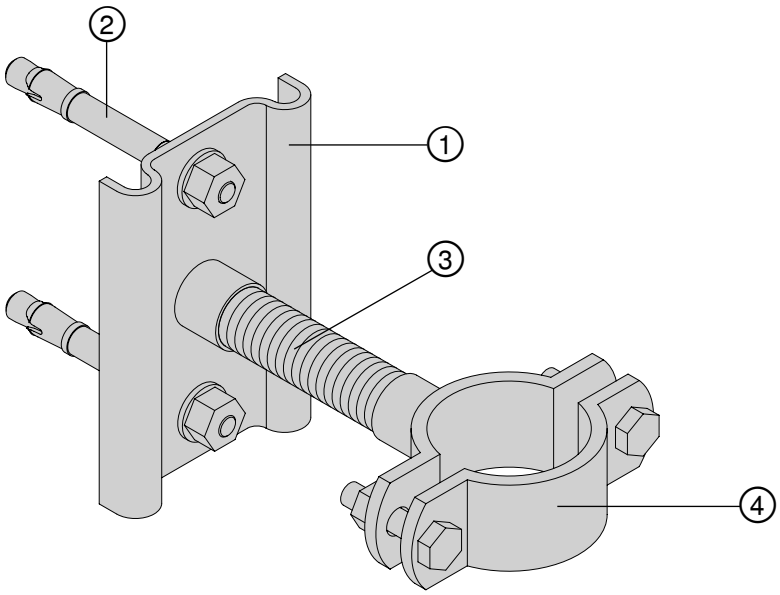


Application description	Application	Product lines	Base material
Heating - Riser Fixed Point	12	Fixed Point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

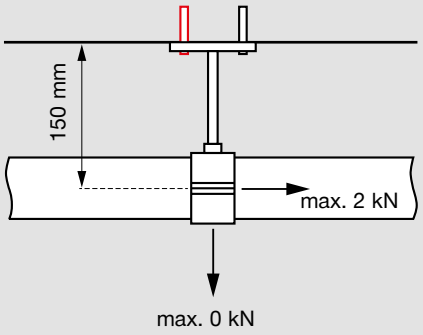
Heating Applications – Riser Fixed Point MFP-L

Type H-RFP1

- Limited to max. 1 x DN 125 (O.D. 139.7 mm) steel pipe
- Max. axial load 2.00 kN at an axial distance of 150 mm
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**310319**	**MFP-GP ¾" base plate**	1	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
③	**56429**	**GR-G ¾" threaded pipe**	1	0.095
④	**310317**	**MFP-L NW 125 ¾"**	1	-

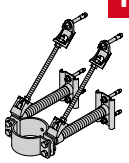
Application description

Heating – MFP-L Riser Fixed Point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP-L fixed points
Capacity limit	Max. 2 kN in 150 mm

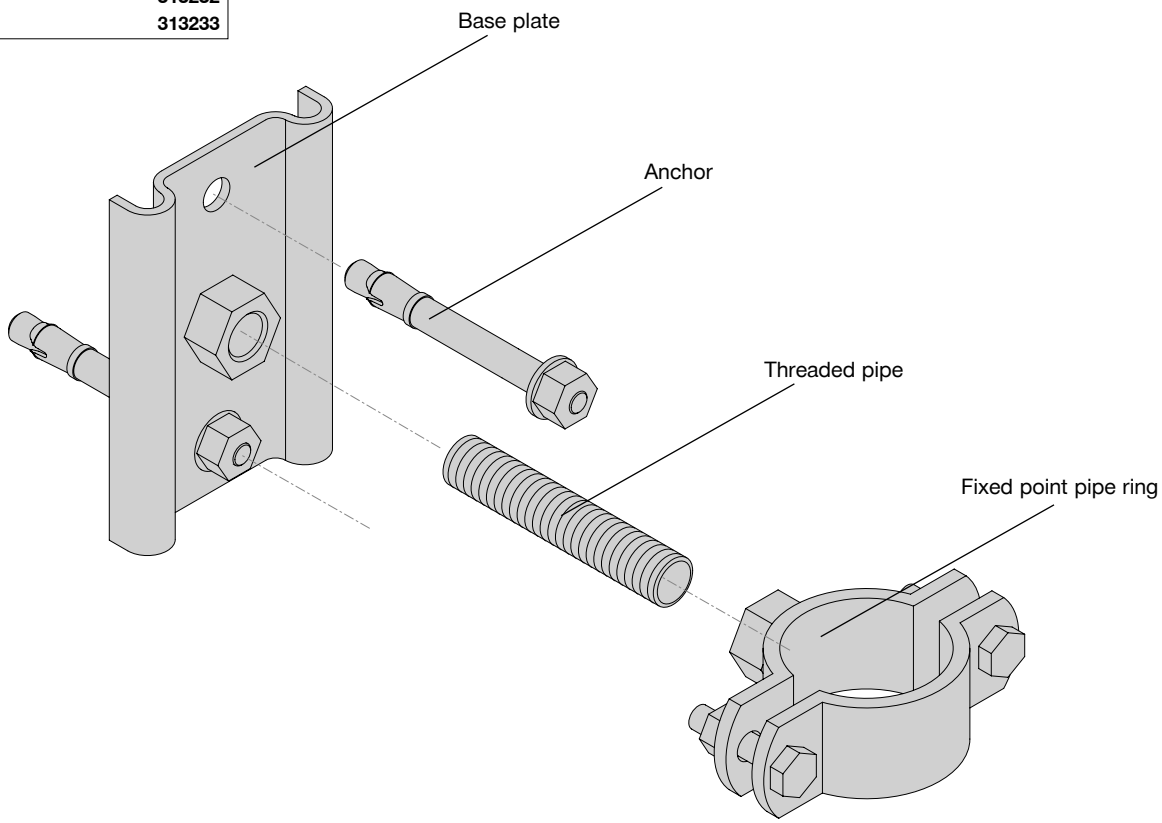
Riser Fixed Point On Concrete - Fixed Point MFP-L Metric Connections Options

No sound insulation

Set of Fixed point MFP-L with M20 connection	
1x MFP-L Fixed point pipe ring	**See table below**
1x MFP-GP M20 base plate	**257001**
1x AM20x1000 threaded rod	**216425**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFP-L Fixed point pipe rings

MFP-L fixed point pipe rings	
MFP-L NW15 M20	**313223**
MFP-L NW20 M20	**313224**
MFP-L NW25 M20	**313225**
MFP-L NW32 M20	**313226**
MFP-L NW40 M20	**313227**
MFP-L NW50 M20	**313228**
MFP-L NW68/72 M20	**313229**
MFP-L NW65 M20	**313230**
MFP-L NW80 M20	**313231**
MFP-L NW4" M20	**313232**
MFP-L NW125 M20	**313233**

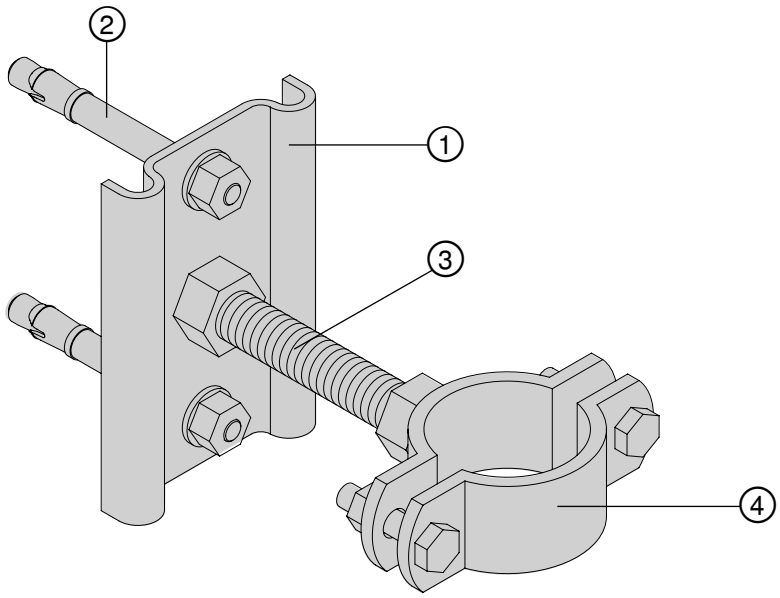


Application description	Application	Product lines	Base material
Heating - Riser Fixed Point	12	Fixed Point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

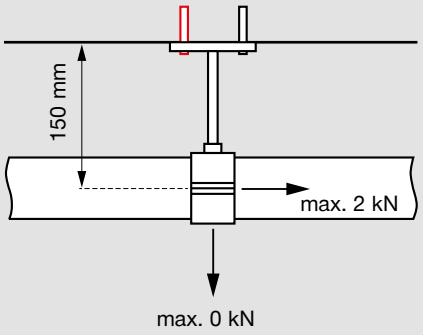
Heating Applications – Riser Fixed Point MFP-L

Type H-RFP2

- Limited to max. 1 x DN 125 (O.D. 139.7 mm) steel pipe
- Max. axial load 2.00 kN at an axial distance of 150 mm
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**257001**	**MFP-GP M20 base plate**	1	-
②	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
③	**216425**	**AM20x1000 threaded rod**	1	0.1
④	**313233**	**MFP-L NW125 M20**	1	-

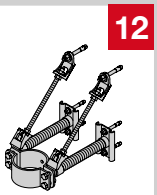
Application description

Heating – MFP-L Riser Fixed Point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP-L fixed points
Capacity limit	Max. 2 kN in 150 mm

Riser Fixed Point On Concrete - Fixed Point MFP-1a Options

MFP-1a - no sound insulation

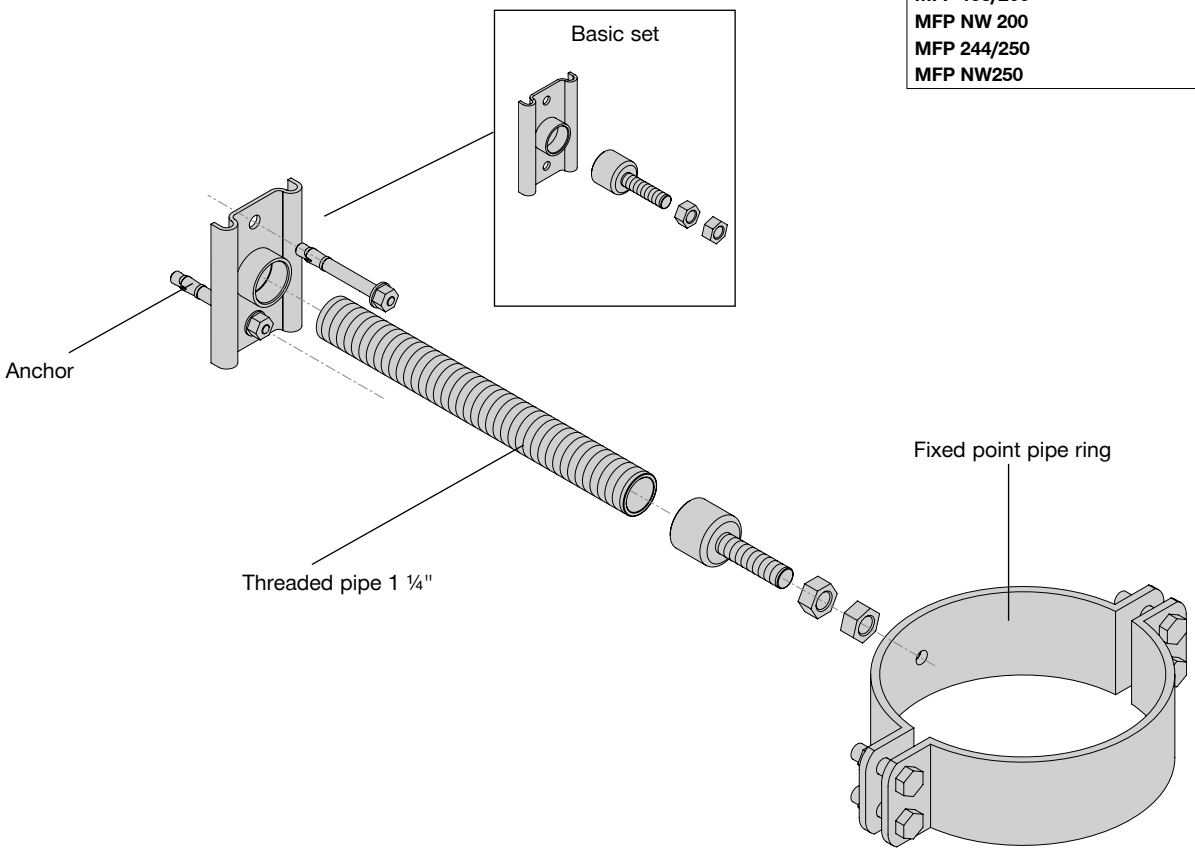
Set of Fixed point MFP-1a	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BP 20 basic set	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFPI-1a sound insulated

Set of Fixed point MFP-1a	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BPI 20 basic set	**254460**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**

MFP-NW Fixed point pipe rings

MFP-NW Fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4“	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6“	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

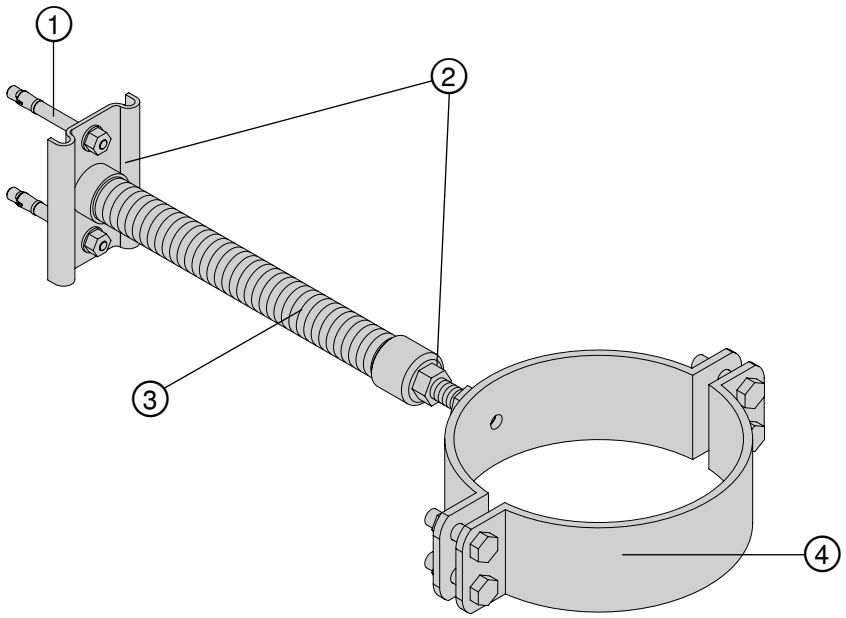


Application description	Application	Product lines	Base material
Heating - Riser Fixed Point	12	Fixed Point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

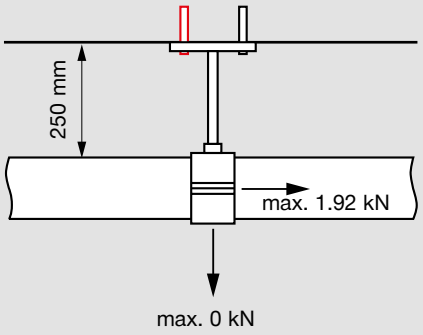
Heating Applications – Riser Fixed Point MFP-1a

Type H-RFP3

- Limited to max. 1 x DN 80 (O.D. 88.9 mm) this case e.g. steel pipe 11 m long without expansion impact
- Max. axial load 1.92 kN at a surface distance of 250 mm
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**247827**	**MFP-BP 20 basic set**	1	-
③	**248532**	**GR-G 1 ¼" threaded pipe**	1	0.148
④	**243532**	**MFP NW80 fixed point pipe ring**	1	-

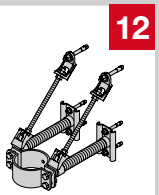
Application description

Heating – MFP-1a Riser Fixed Point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max.1.92 kN in 250 mm

Riser Fixed Point On Concrete - Fixed Point MFP-1 Options

MFP-1a - no sound insulation

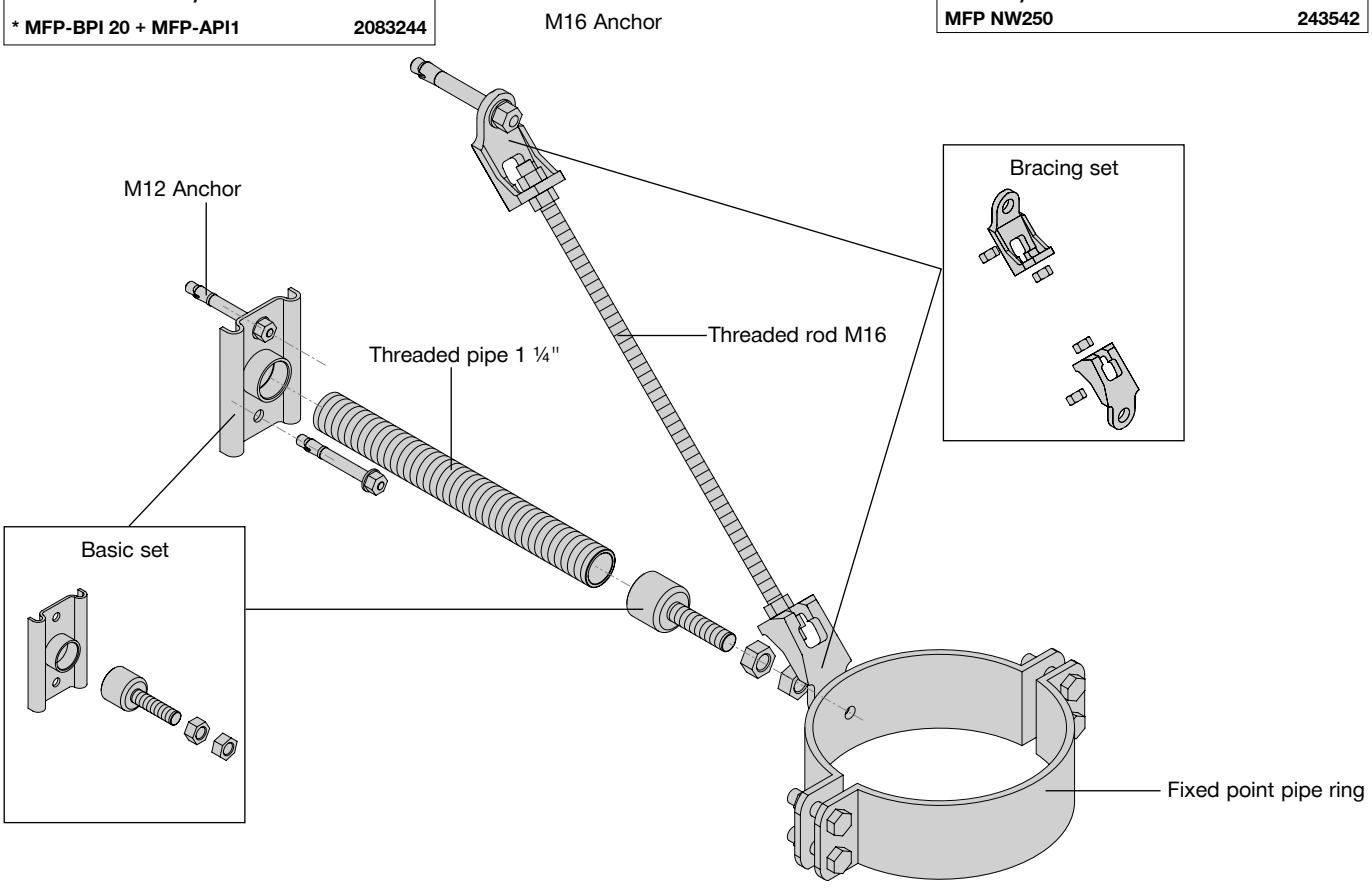
Set of Fixed point MFP-1	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BP 20 basic set *	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-AP1 bracing set *	**247829**
1x AM16x1000 threaded rod	**216422**
1x HST3 M16x135 45/15 stud anchor	**2105858**
*** MFP-BP 20 + MFP-AP1**	**2083241**

MFPI-1a sound insulated

Set of Fixed point MFP-1	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BPI 20 basic set *	**254460**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFPI-API1 bracing set *	**254461**
1x AM16x1000 threaded rod	**216422**
1x HST3 M16x135 45/15 stud anchor	**2105858**
*** MFP-BPI 20 + MFP-API1**	**2083244**

MFP-NW Fixed point pipe rings

MFP-NW Fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

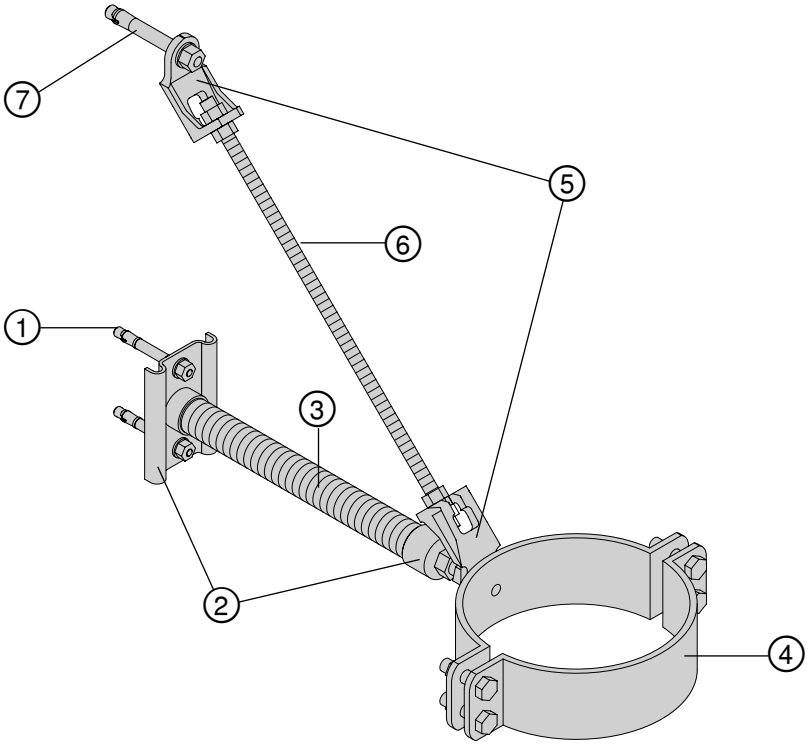


Application description	Application	Product lines	Base material
Heating - Riser Fixed Point	12	Fixed Point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

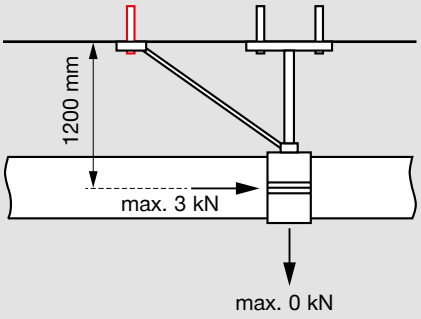
Heating Applications – Riser Fixed Point MFP-1

Type H-RFP4

- Limited to max. 1 x DN 80 (O.D. 88.9 mm) this case e.g. steel pipe 17.7 m long without expansion impact
- Max. axial load 3 kN at a surface distance of 1200 mm
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**247827**	**MFP-BP 20 basic set**	1	-
③	**248532**	**GR-G 1¼" threaded pipe**	1	Depends on distance
④	**243532**	**MFP NW80 fixed point pipe ring**	1	-
⑤	**247829**	**MFP-AP1 bracing set**	1	-
⑥	**216423**	**AM16x2000 threaded rod**	1	Depends on distance
⑦	**2105859**	**HST3 M16x135 45/25 stud anchor**	1	Depends on distance

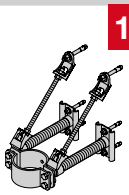
Application description

Heating – MFP-1 Riser Fixed Point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max. 3 kN in 1200 mm

Riser Fixed Point On Concrete - Fixed Point MFP-2 Options

MFP-2 - no sound insulation

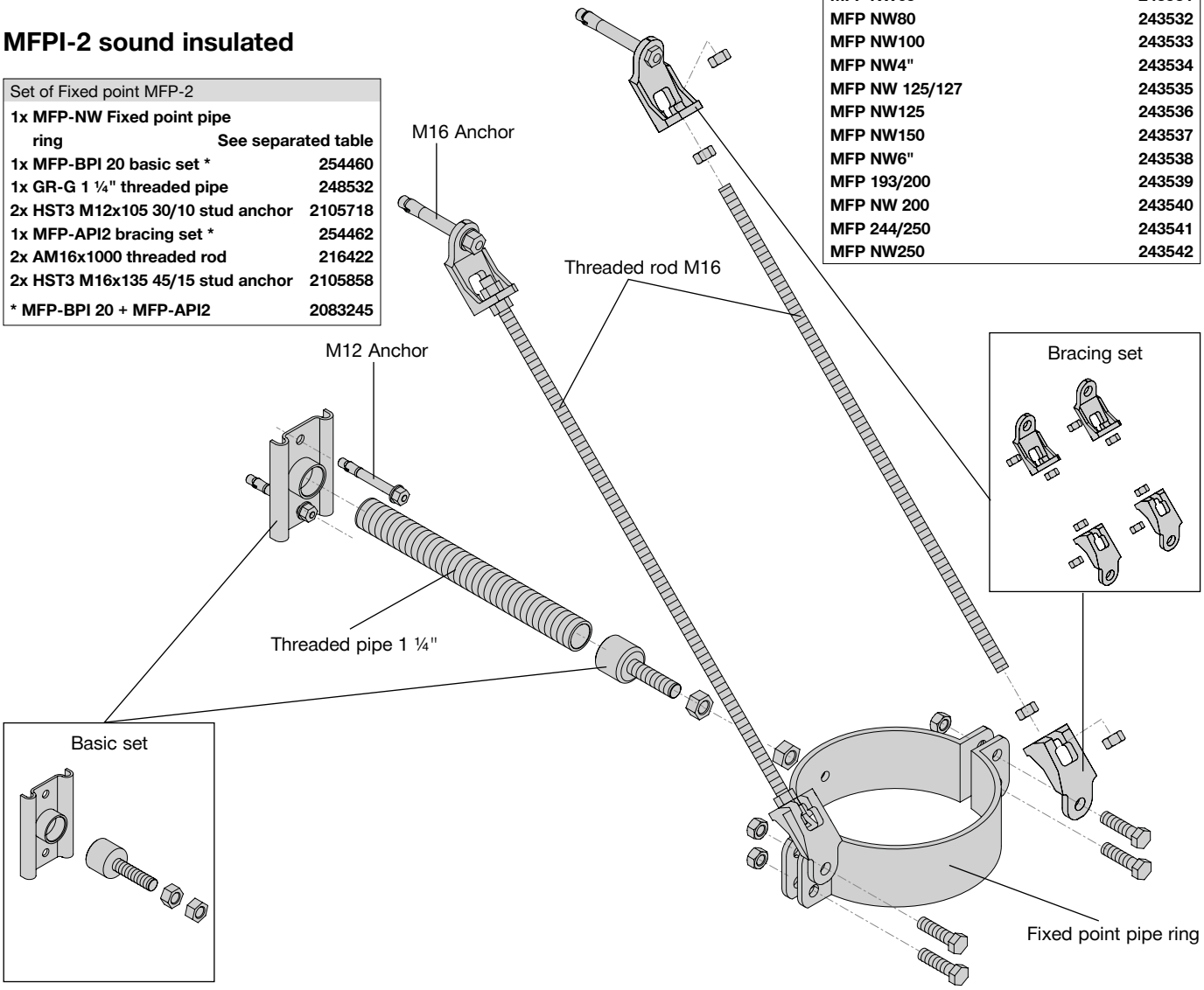
Set of Fixed point MFP-2	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BP 20 basic set *	**247827**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-AP2 bracing set *	**247830**
2x AM16x1000 threaded rod	**216422**
2x HST3 M16x135 45/15 stud anchor	**2105858**
*** MFP-BP 20 + MFP-AP2**	**2083242**

MFPI-2 sound insulated

Set of Fixed point MFP-2	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BPI 20 basic set *	**254460**
1x GR-G 1 ¼" threaded pipe	**248532**
2x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-API2 bracing set *	**254462**
2x AM16x1000 threaded rod	**216422**
2x HST3 M16x135 45/15 stud anchor	**2105858**
*** MFP-BPI 20 + MFP-API2**	**2083245**

MFP-NW Fixed point pipe rings

MFP-NW Fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

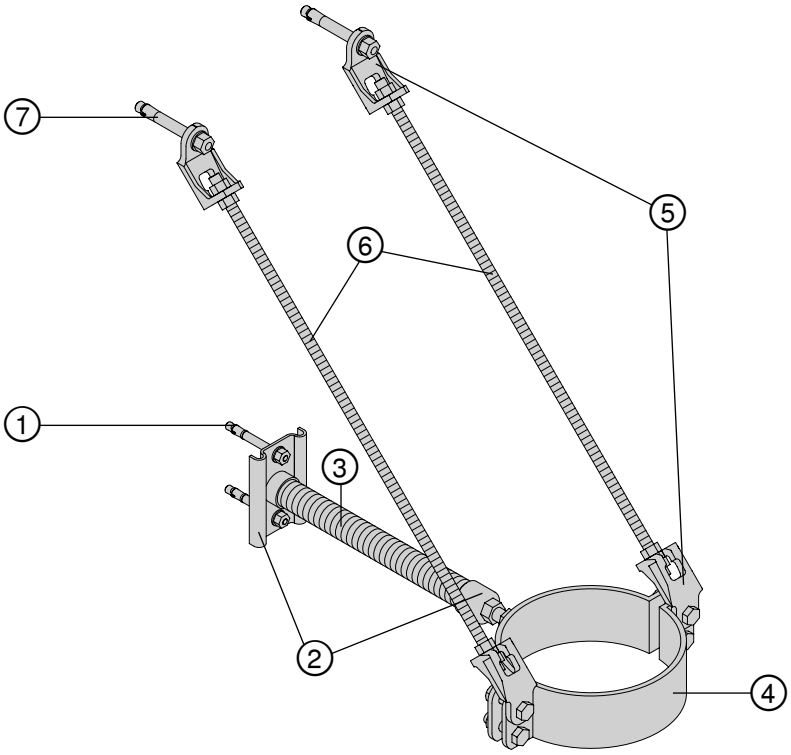


Application description	Application	Product lines	Base material
Heating - Riser Fixed Point	12	Fixed Point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

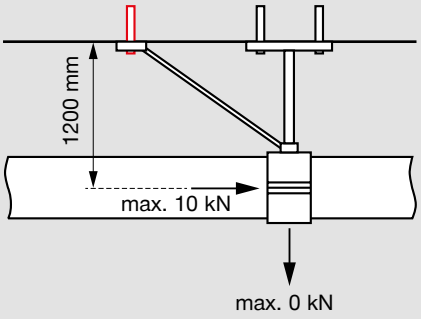
Heating Applications – Riser Fixed Point MFP-2

Type H-RFP5

- Limited to max. 1 x DN 80 (O.D. 88.9 mm) steel pipe 59 m long without expansion impact
- Max. axial load 10 kN at a surface distance of 1200 mm
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	2	-
②	**247827**	**MFP-BP 20 basic set**	1	-
③	**248532**	**GR-G 1 ¼" threaded pipe**	1	Depends on distance
④	**243532**	**MFP NW80 fixed point pipe ring**	1	-
⑤	**247830**	**MFP-AP2 bracing set**	1	-
⑥	**216422**	**AM16x1000 threaded rod**	1	Depends on distance
⑦	**2105858**	**HST3 M16x135 45/15 stud anchor**	2	-

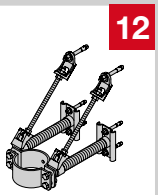
Application description

Heating – MFP-2 Riser Fixed Point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max.10 kN in 1200 mm

Riser Fixed Point On Concrete - Fixed Point MFP-3 Options

MFP-3 - no sound insulation

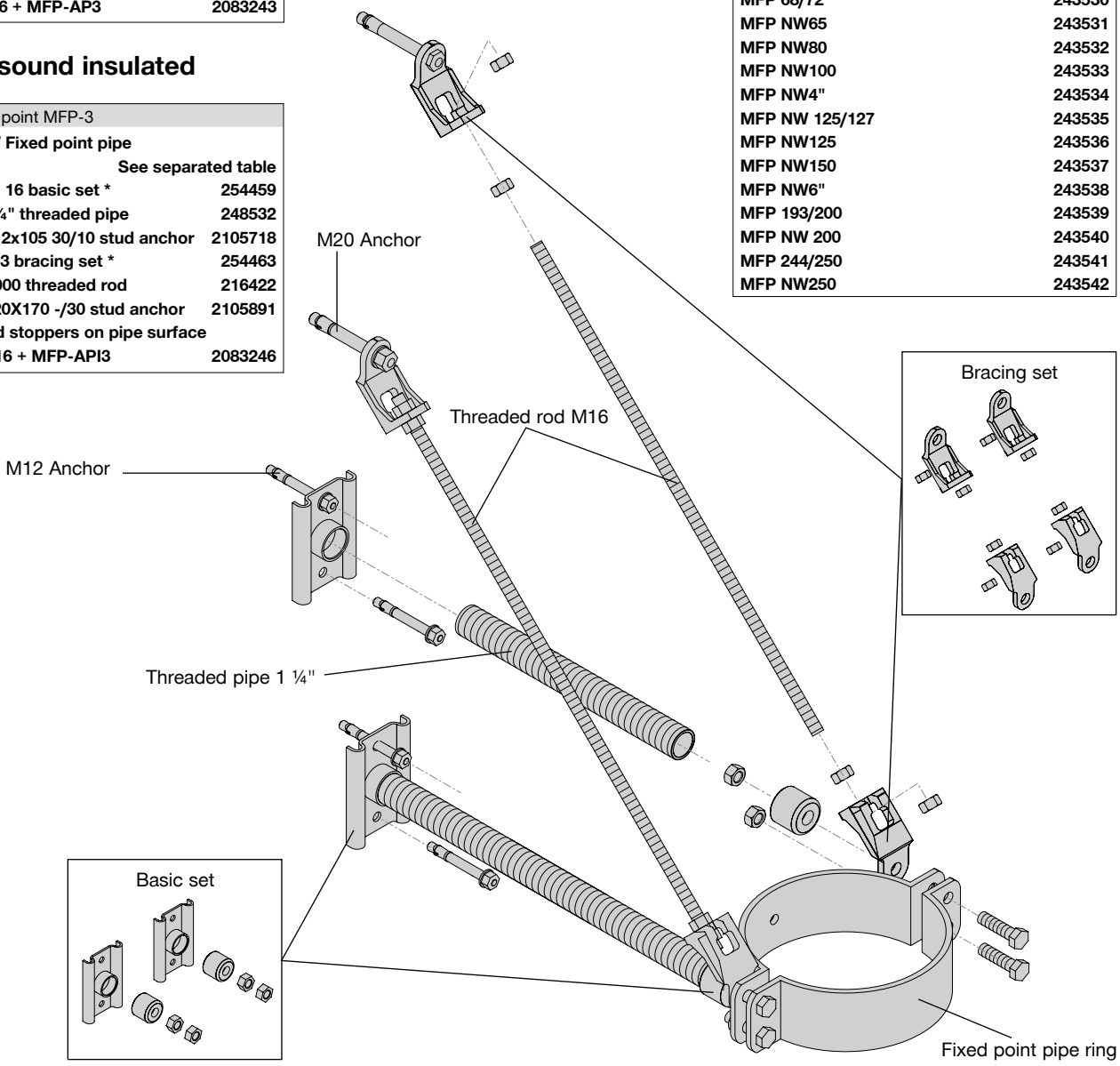
Set of Fixed point MFP-3	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BP 16 basic set *	**247826**
2x GR-G 1 ¼" threaded pipe	**248532**
4x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-AP3 bracing set *	**247831**
2x AM16x1000 threaded rod	**216422**
2x HST3 M20X170 -/30 stud anchor	**2105891**
2-3x Welded stoppers on pipe surface	
*** MFP-BP 16 + MFP-AP3**	**2083243**

MFPI-3 sound insulated

Set of Fixed point MFP-3	
1x MFP-NW Fixed point pipe ring	**See separated table**
1x MFP-BPI 16 basic set *	**254459**
2x GR-G 1 ¼" threaded pipe	**248532**
4x HST3 M12x105 30/10 stud anchor	**2105718**
1x MFP-API3 bracing set *	**254463**
2x AM16x1000 threaded rod	**216422**
2x HST3 M20X170 -/30 stud anchor	**2105891**
2-3x Welded stoppers on pipe surface	
*** MFP-BPI 16 + MFP-API3**	**2083246**

MFP-NW Fixed point pipe rings

MFP-NW Fixed point pipe rings	
MFP NW15	**243521**
MFP NW20	**243522**
MFP 28/30	**243523**
MFP NW25	**243524**
MFP NW32	**243525**
MFP NW40	**243526**
MFP NW54/56	**243527**
MFP NW50	**243528**
MFP 63/66	**243529**
MFP 68/72	**243530**
MFP NW65	**243531**
MFP NW80	**243532**
MFP NW100	**243533**
MFP NW4"	**243534**
MFP NW 125/127	**243535**
MFP NW125	**243536**
MFP NW150	**243537**
MFP NW6"	**243538**
MFP 193/200	**243539**
MFP NW 200	**243540**
MFP 244/250	**243541**
MFP NW250	**243542**

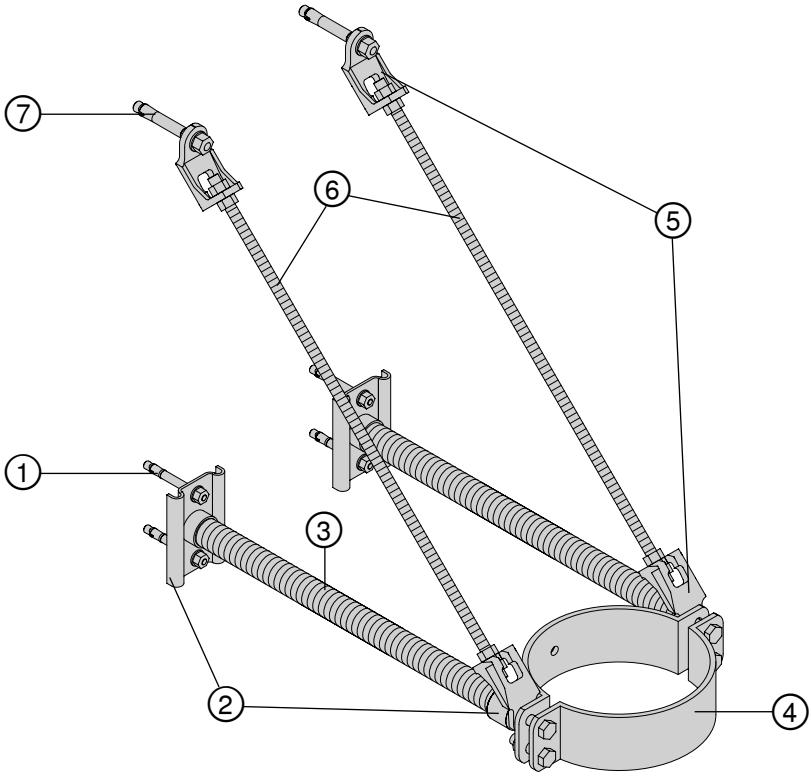


Application description	Application	Product lines	Base material
Heating - Riser Fixed Point	12	Fixed Point sets	Concrete
General comments		Threaded parts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

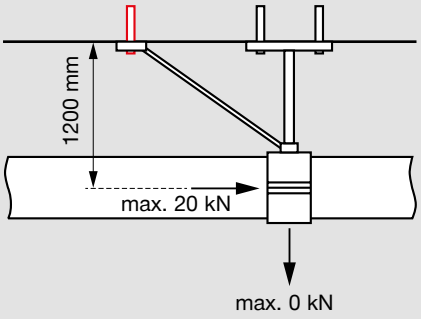
Heating Applications – Riser Fixed Point MFP-3

Type H-RFP8

- Limited to max. 1 x DN 80 (O.D. 88.9 mm) this case e.g. steel pipe 1 18 m long without expansion impact
- Max. axial load 20 kN at an axial distance of 1200 mm
- No insulation on the pipe at the fixed point



Additional capacity limits



Bill of materials

Reference	Item no.	Description	Piece	Length (m)
①	**2105718**	**HST3 M12x105 30/10 stud anchor**	4	-
②	**247826**	**MFP-BP 16 basic set**	1	-
③	**248532**	**GR-G 1 ¼" threaded pipe**	2	Depends on distance
④	**243542**	**MFP NW250 fixed point pipe ring**	1	-
⑤	**247831**	**MFP-AP3 bracing set**	1	-
⑥	**216422**	**AM16x1000 threaded rod**	2	Depends on distance
⑦	**2105891**	**HST3 M20X170 -/30 stud anchor**	2	-
⑧	**No item number**	**Welded stoppers**	2-3x	

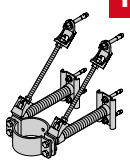
Application description

Heating – MFP-3 Riser Fixed Point

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Application



Base material	Concrete
Product line	MFP fixed points
Capacity limit	Max.20 kN in 1200 mm

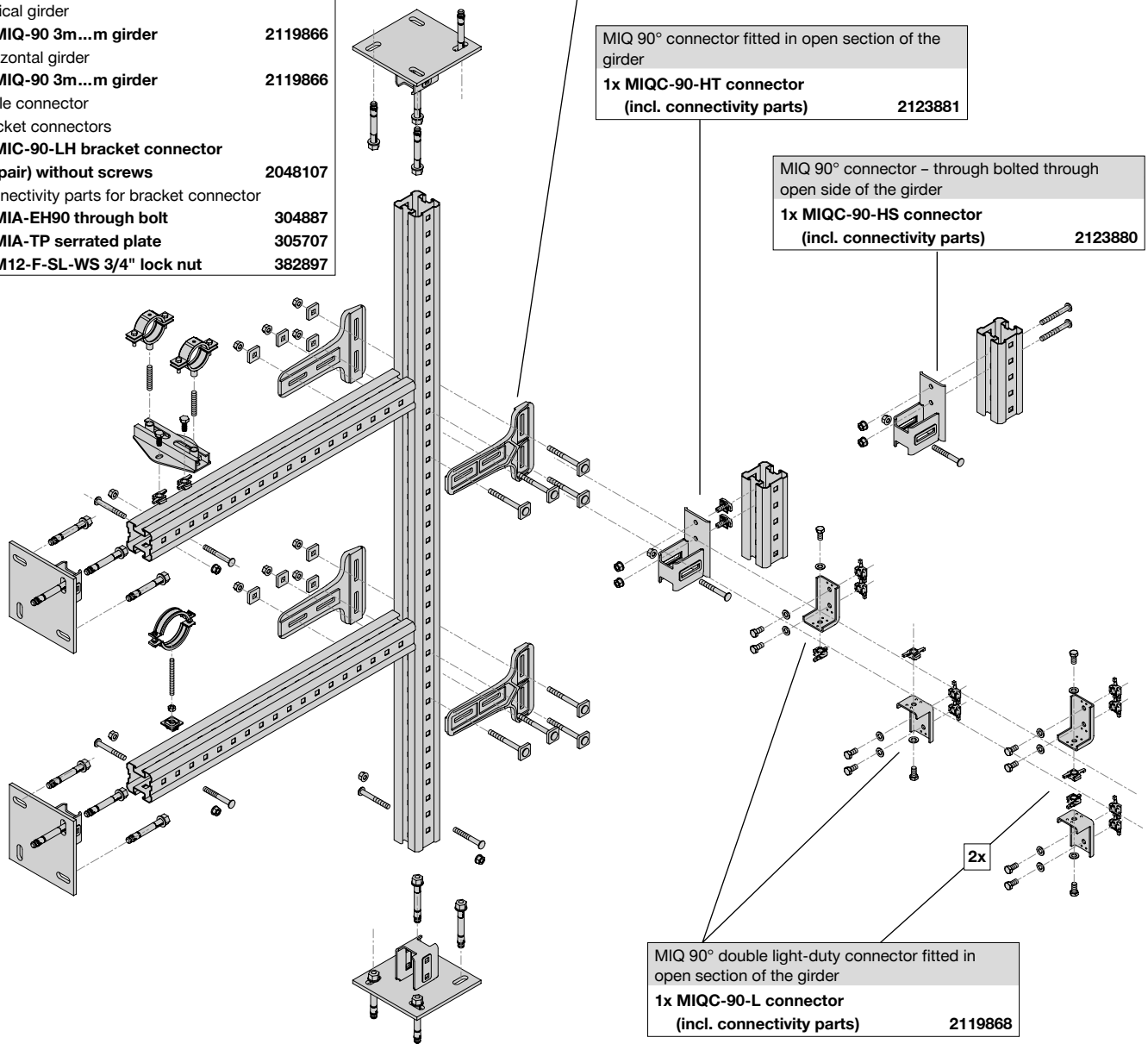
Primary Heating Media Collector Bracket - MIQ System Frame

MIQ collector frame BOM for entire application without pipe ring and sliders / rollers connections	
Base material connector	
4x MIQC-C90 base connector (incl. connectivity parts) upper screw are not used	**2120144**
Anchors	
16x HST3-R M16x135 35/15 stud anchor	**2105876**
Vertical girder	
2x MIQ-90 3m...m girder	**2119866**
Horizontal girder	
2x MIQ-90 3m...m girder	**2119866**
Angle connector	
Bracket connectors	
2x MIC-90-LH bracket connector (pair) without screws	**2048107**
Connectivity parts for bracket connector	
8x MIA-EH90 through bolt	**304887**
8x MIA-TP serrated plate	**305707**
8x M12-F-SL-WS 3/4" lock nut	**382897**

Bracket connector BOM for 1 connection	
Bracket connectors	
1x MIC-90-LH bracket connector (pair) without screws	**2048107**
Connectivity parts for bracket connector	
4x MIA-EH90 through bolt	**304887**
4x MIA-TP serrated plate	**305707**
4x M12-F-SL-WS 3/4" lock nut	**382897**

MIQ 90° connector fitted in open section of the girder	
1x MIQC-90-HT connector (incl. connectivity parts)	**2123881**

MIQ 90° connector – through bolted through open side of the girder	
1x MIQC-90-HS connector (incl. connectivity parts)	**2123880**



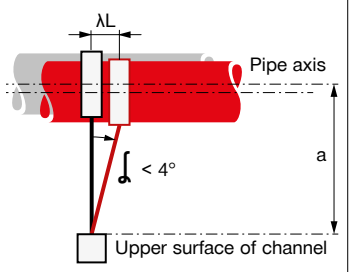
MIQ 90° double light-duty connector fitted in open section of the girder	
1x MIQC-90-L connector (incl. connectivity parts)	**2119868**

Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MIQ System	Concrete
General comments		MI System	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Anchors	

Primary Heating Media Collector Bracket - MIQ System Frame - Pipe Ring Connections

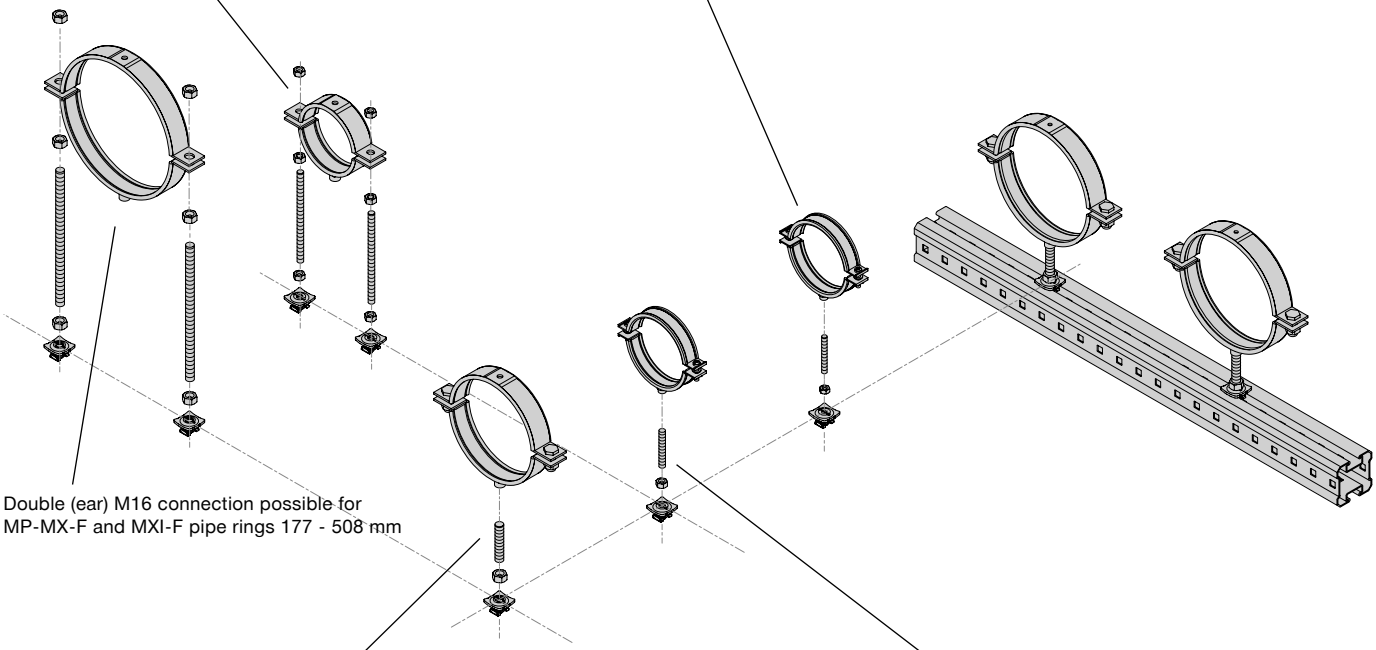
MIQ pipe ring connection for M10	
Saddle nut	
1x MQA-M10-F saddle nut	**304139**
Hexagonal nut	
1x M10-F hex nut	**304765**
Threaded rod	
1x AM10x1000-F 4.8 t-rod	**304773**
Pipe rings for M10	
1x MP-MI-F 1/2" - 3" pipe ring	**various**
MP-M-F 1/2" - 3" pipe ring	**various**
MP-MXI-F 2" - 3" pipe ring	**various**
MP-MX-F 2" - 3" pipe ring	**various**

For quiet zone solutions



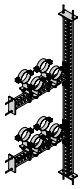
Double (ear) M12 connection possible for MP-MX-F and MXI-F pipe rings 4" - 6" mm

Double (ear) M16 connection possible for MP-MX-F and MXI-F pipe rings 177 - 508 mm



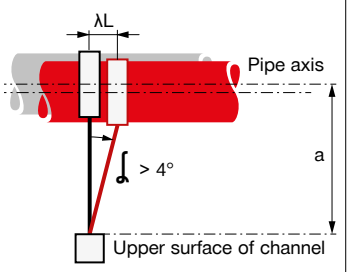
MIQ pipe ring connection for M16	
Saddle nut	
1x MQA-M16-F saddle nut	**304141**
Hexagonal nut	
1x M16-F hex nut	**304767**
Threaded rod	
1x AM16x1000-F 4.8 t-rod	**304776**
Pipe rings for M16	
1x MP-MXI-F 4" - 508 mm pipe ring	**various**
1x MP-MX-F 4" - 508 mm pipe ring	**various**

MIQ pipe ring connection for M12	
Saddle nut	
1x MQA-M12-F saddle nut	**304140**
Hexagonal nut	
1x M12-F hex nut	**304766**
Threaded rod	
1x AM12x1000-F 4.8 t-rod	**304774**
Pipe rings for M12	
1x MP-MXI-F 2" - 3" pipe ring	**various**
1x MP-MX-F 2" - 3" pipe ring	**various**

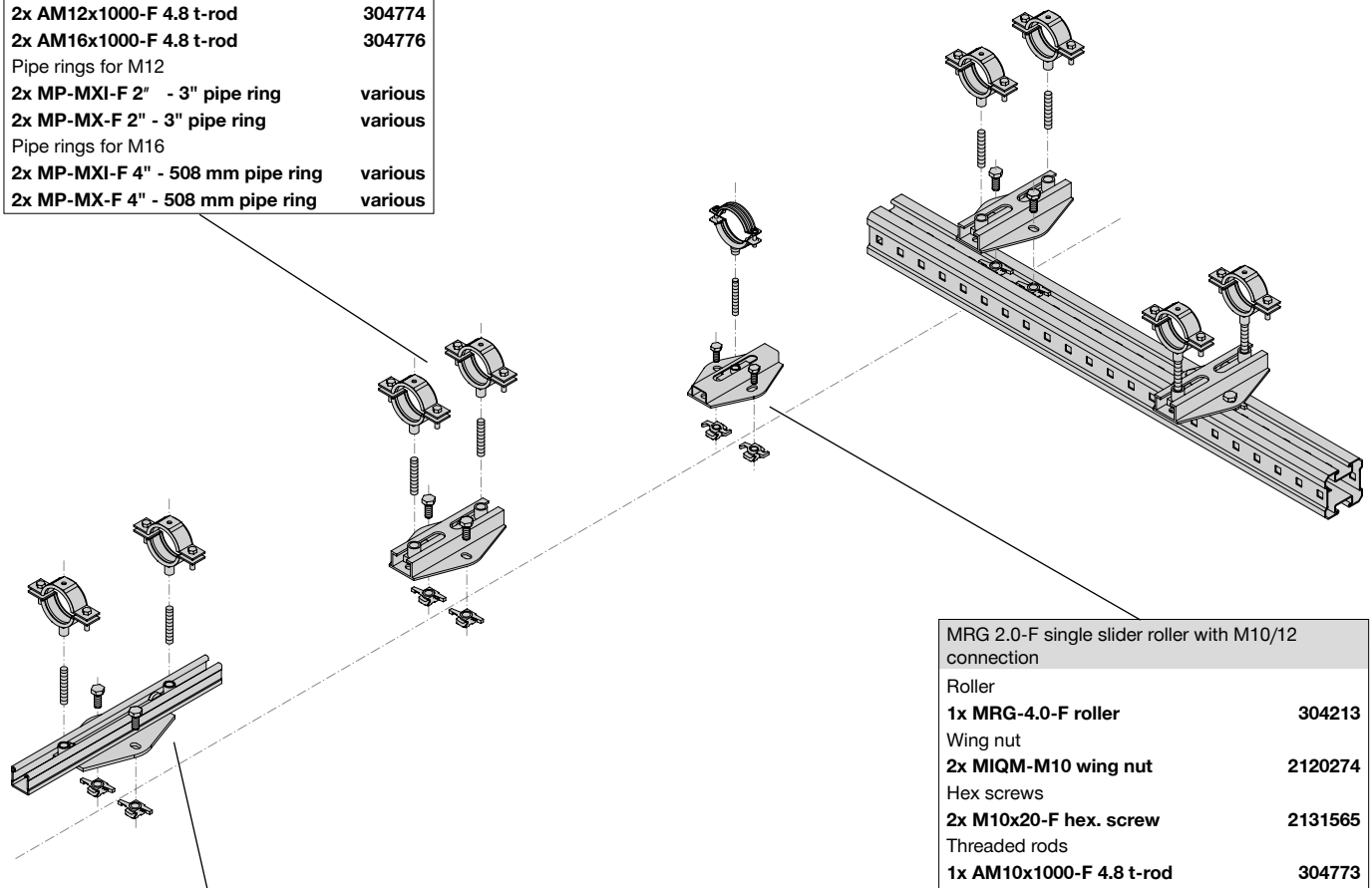
Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	 13	MIQ System	
General comments		MQ-F Saddle nuts	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Pipe rings	

Primary Heating Media Collector Bracket - MIQ System Frame - Sliders / Rollers Connections

For expansion zone solutions



MRG-D6-F double slider roller with M12/16 connection	
Roller	
1x MRG-D6-F roller	**304214**
Wing nut	
2x MIQM-M12 wing nut	**2120275**
Hex screws	
2x M12x20-F hex. screw	**2131566**
Threaded rods	
2x AM12x1000-F 4.8 t-rod	**304774**
2x AM16x1000-F 4.8 t-rod	**304776**
Pipe rings for M12	
2x MP-MXI-F 2″ - 3" pipe ring	**various**
2x MP-MX-F 2" - 3" pipe ring	**various**
Pipe rings for M16	
2x MP-MXI-F 4" - 508 mm pipe ring	**various**
2x MP-MX-F 4" - 508 mm pipe ring	**various**



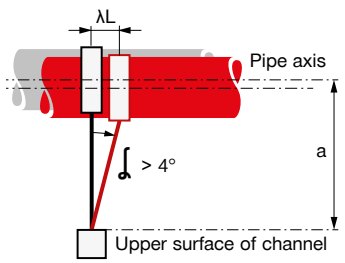
MRG 2.0-F single slider roller with M10/12 connection	
Roller	
1x MRG-4.0-F roller	**304213**
Wing nut	
2x MIQM-M10 wing nut	**2120274**
Hex screws	
2x M10x20-F hex. screw	**2131565**
Threaded rods	
1x AM10x1000-F 4.8 t-rod	**304773**
1x AM12x1000-F 4.8 t-rod	**304774**
Pipe rings for M10	
1x MP-MI-F 1/2" - 3" pipe ring	**various**
1x MP-M-F 1/2" - 3" pipe ring	**various**
Pipe rings for M10 and M12	
1x MP-MXI-F 2" - 3" pipe ring	**various**
1x MP-MX-F 2" - 3" pipe ring	**various**

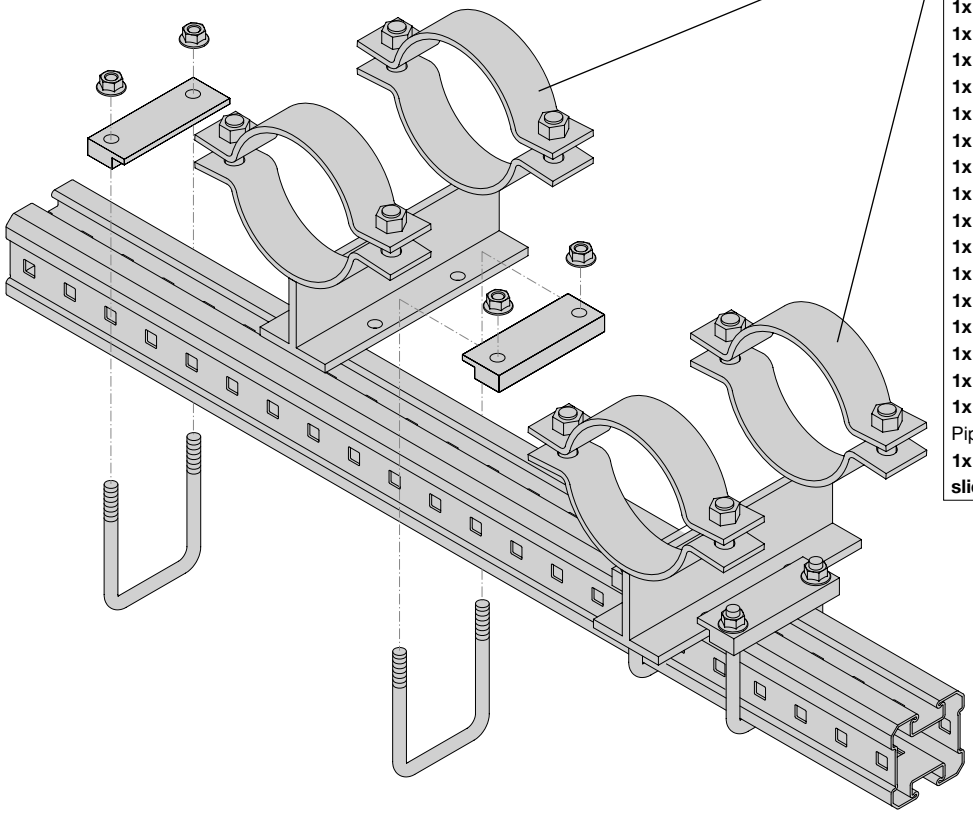
MRG-D225-F double slider roller with M12/16 connection	
Roller	
1x MRG-D225-F roller	**specials**
The rest of the BOM the same as in case of MRG-D6-F	

Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MIQ System	
General comments		Sliders/rollers	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Pipe rings	

Primary Heating Media Collector Bracket - MIQ System Frame - Pipe Shoe Connections

For expansion zone solutions



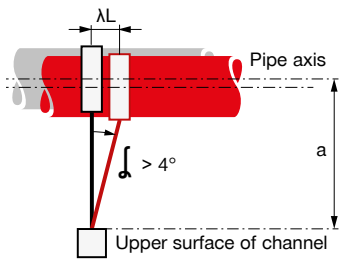


Fastening pipe shoes on MIQ girder (channel)	
Pipe shoe	
1x MI-PS2/1 25-85	**304852**
1x MI-PS2/1 25-140	**286965**
1x MI-PS2/1 40-85	**304853**
1x MI-PS2/1 40-140	**286966**
1x MI-PS2/1 50-85	**304854**
1x MI-PS2/1 50-140	**286967**
1x MI-PS2/1 65-85	**304855**
1x MI-PS2/1 65-140	**286968**
1x MI-PS2/1 80-85	**304856**
1x MI-PS2/1 80-140	**286969**
1x MI-PS2/1 100-85	**304857**
1x MI-PS2/1 100-140	**286970**
1x MI-PS2/1 125-85	**304858**
1x MI-PS2/1 125-140	**286971**
1x MI-PS2/1 150-85	**304859**
1x MI-PS2/1 150-140	**286972**
1x MI-PS2/1 200-107	**304860**
1x MI-PS2/1 200-142	**286973**
Pipe shoe connector	
1x MIC-PS90 (pair) pipe shoe sliding connector	**304838**

Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MIQ System	
General comments		MI System	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		Pipe shoes	

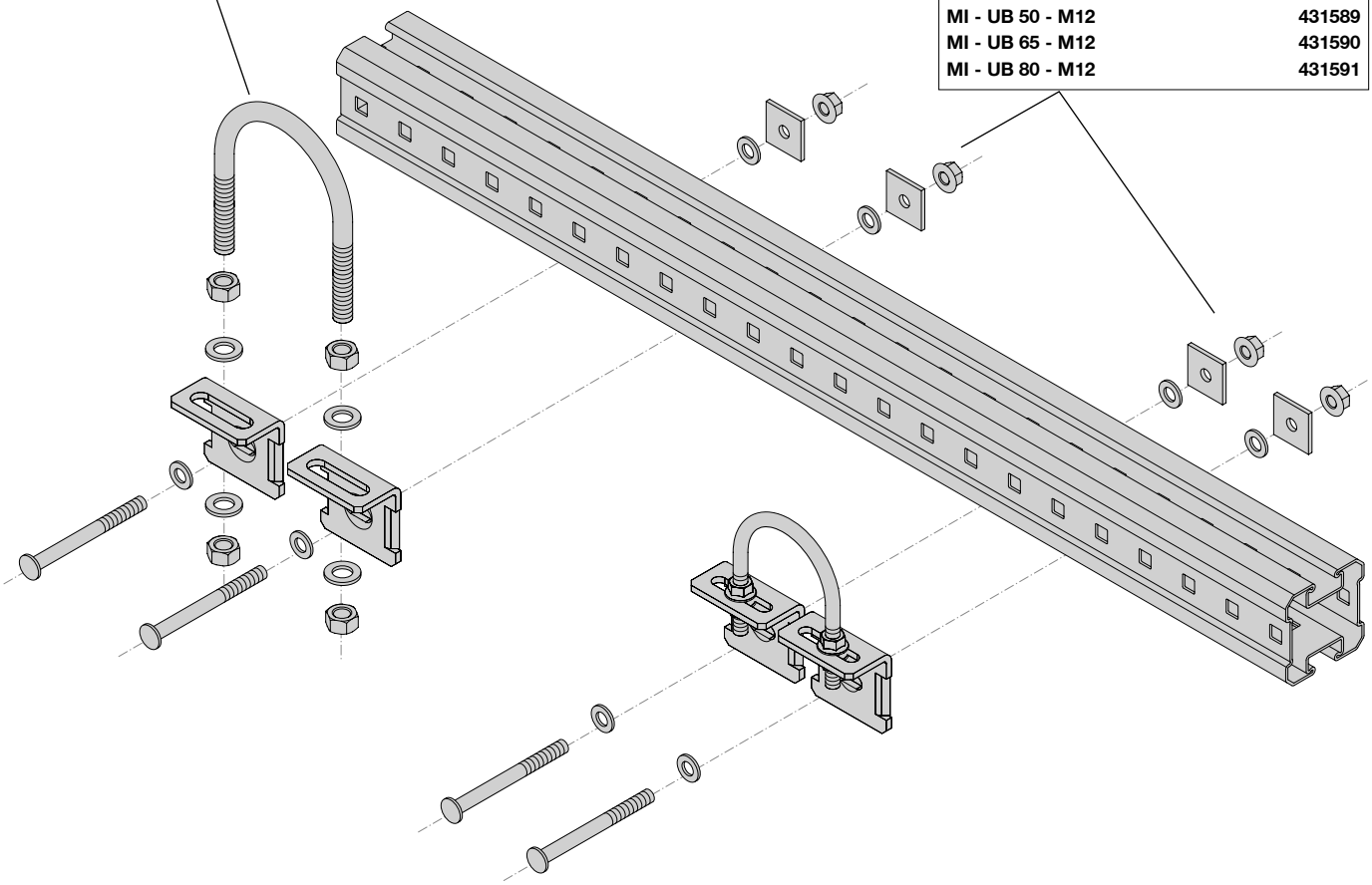
Primary Heating Media Collector Bracket - MIQ System Frame - U-bolt Connections

For expansion zone solutions



Connection for M16 U-bolts	
U-bolt clamp	
1x MIC-UB90-M16 U-bolt clamp (pair) with complete through bolting connectivity material	**304834**
M16 U-bolts	
1x MI-UB U-bolt with 4x nuts and 4x washers	
MI - UB 100 - M16	**431592**
MI - UB 125 - M16	**431593**
MI - UB 150 - M16	**431594**
MI - UB 200 - M16	**431595**
MI - UB 250 - M16	**431598**

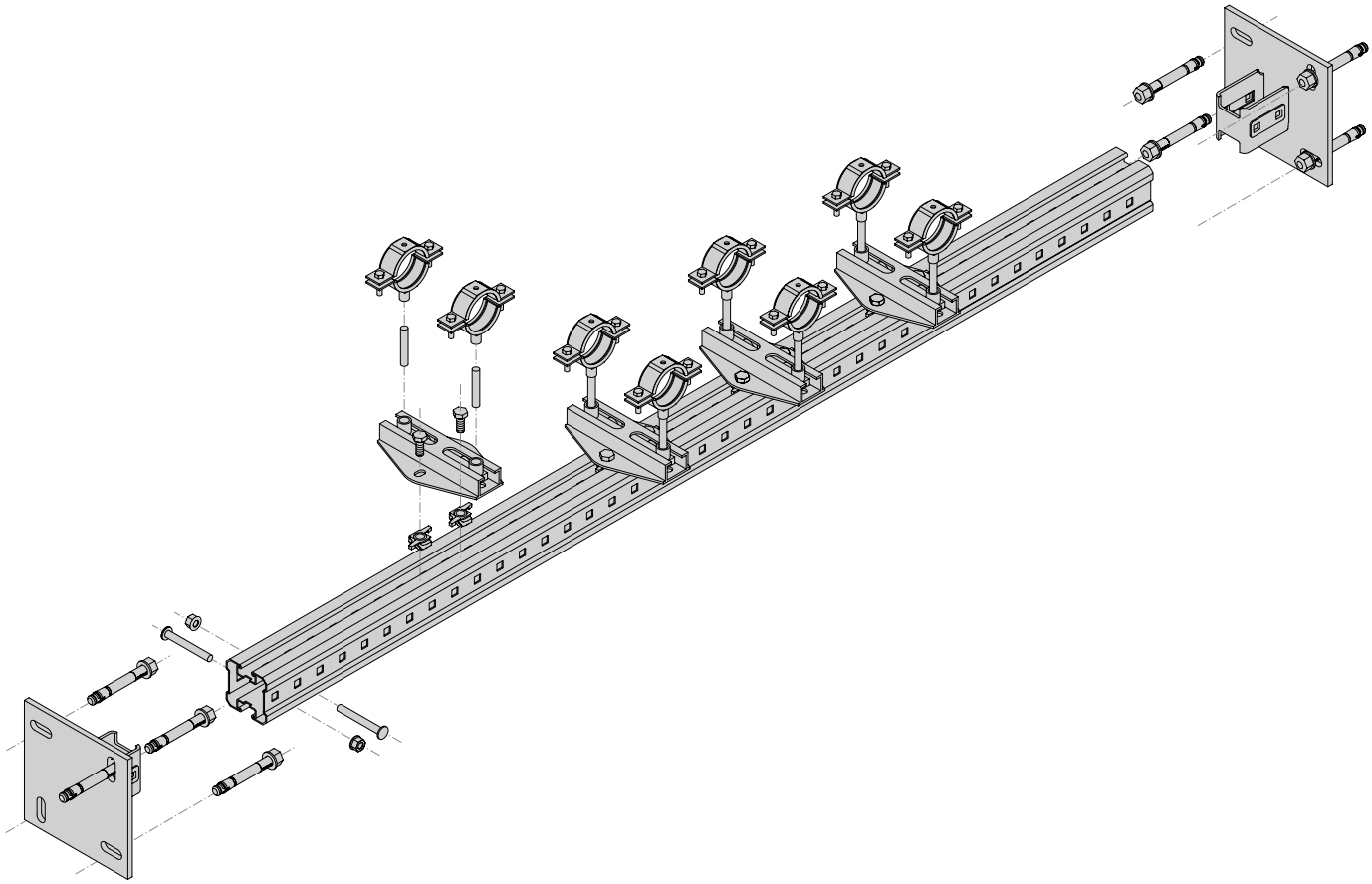
Connection for M12 U-bolts	
U-bolt clamp	
1x MIC-UB90 U-bolt clamp (pair) with complete through bolting connectivity material	**304831**
M12 U-bolts	
1x MI-UB U-bolt with 4x nuts and 4x washers	
MI - UB 50 - M12	**431589**
MI - UB 65 - M12	**431590**
MI - UB 80 - M12	**431591**



Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MIQ System	
General comments		MI System	
▪ Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact ▪ Loading and load impact must always be compared with 3D capacity limits for every single part of the application		U-bolts	

Primary Heating Media Collector Bracket - MIQ System Frame - Wall to Wall Girder

Wall to wall application BOM for entire solution without pipe rings, pipe ring connections and sliders / rollers	
Girder (channel)	
2x MIQ-90 3m...m girder	**2119866**
Base material connector	
2x MIQC-C90 base connector (incl. connectivity parts) on one side screw are not used	**2120144**
Anchors	
8x HST3-R M16x135 35/15 stud anchor	**2105876**

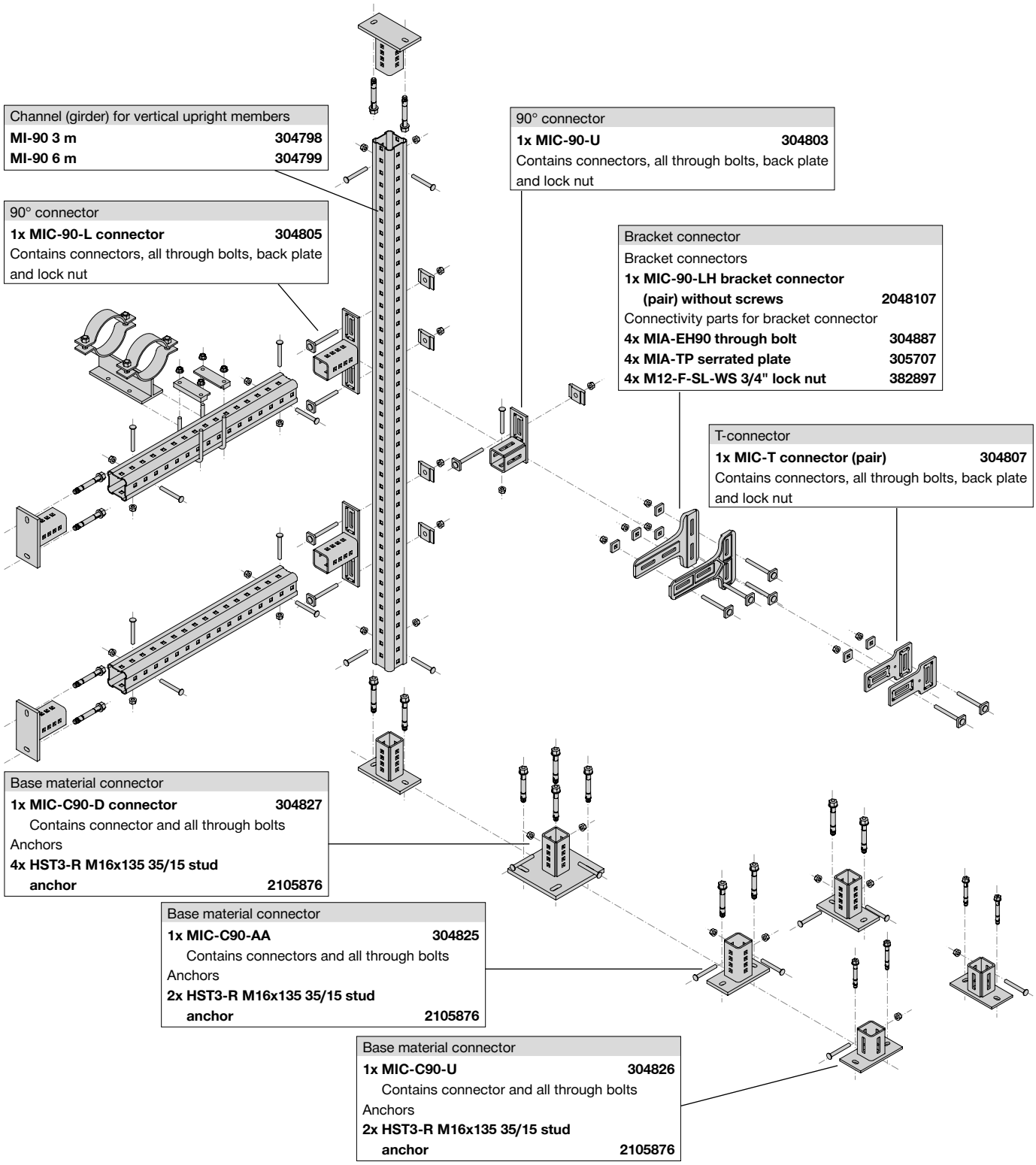


Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MIQ System	Concrete
		MI System	
		Sliders / rollers	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Primary Heating Media Collector Bracket - MI System Frame



Channel (girder) for vertical upright members
MI-90 3 m **304798**
MI-90 6 m **304799**

90° connector
1x MIC-90-L connector **304805**
Contains connectors, all through bolts, back plate and lock nut

90° connector
1x MIC-90-U **304803**
Contains connectors, all through bolts, back plate and lock nut

Bracket connector
Bracket connectors
1x MIC-90-LH bracket connector (pair) without screws **2048107**
Connectivity parts for bracket connector
4x MIA-EH90 through bolt **304887**
4x MIA-TP serrated plate **305707**
4x M12-F-SL-WS 3/4" lock nut **382897**

T-connector
1x MIC-T connector (pair) **304807**
Contains connectors, all through bolts, back plate and lock nut

Base material connector
1x MIC-C90-D connector **304827**
Contains connector and all through bolts
Anchors
4x HST3-R M16x135 35/15 stud anchor **2105876**

Base material connector
1x MIC-C90-AA **304825**
Contains connectors and all through bolts
Anchors
2x HST3-R M16x135 35/15 stud anchor **2105876**

Base material connector
1x MIC-C90-U **304826**
Contains connector and all through bolts
Anchors
2x HST3-R M16x135 35/15 stud anchor **2105876**

Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MI System	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Primary Heating Media Collector Bracket - MQ System Frame

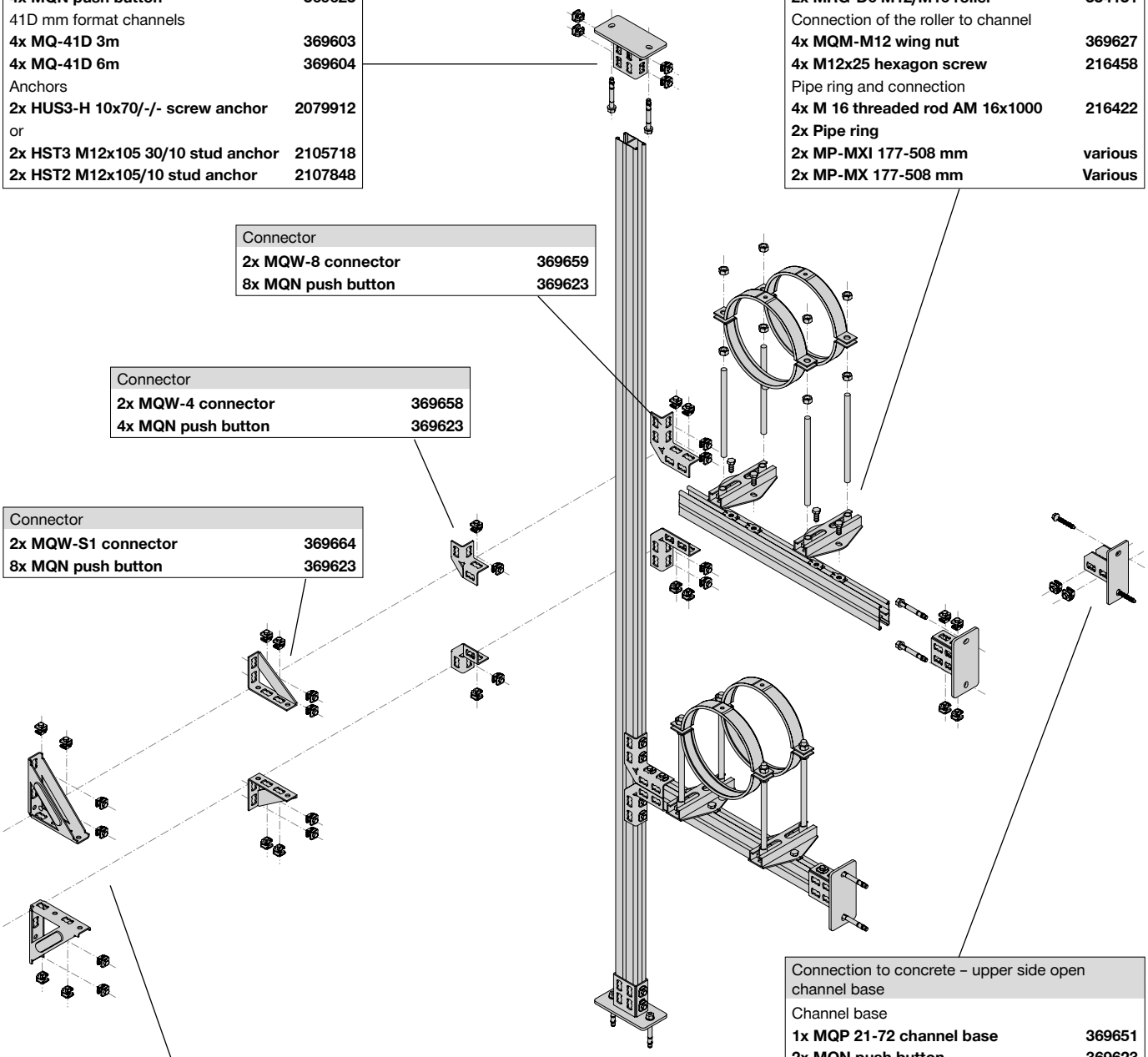
MQP 82 Channel base with associated channels	
1x MQP 82 channel base	**369652**
4x MQN push button	**369623**
41D mm format channels	
4x MQ-41D 3m	**369603**
4x MQ-41D 6m	**369604**
Anchors	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
2x HST2 M12x105/10 stud anchor	**2107848**

2x Double roller in channel	
Roller	
2x MRG-D6 M12/M16 roller	**334131**
Connection of the roller to channel	
4x MQM-M12 wing nut	**369627**
4x M12x25 hexagon screw	**216458**
Pipe ring and connection	
4x M 16 threaded rod AM 16x1000	**216422**
2x Pipe ring	
2x MP-MXI 177-508 mm	**various**
2x MP-MX 177-508 mm	**Various**

Connector	
2x MQW-8 connector	**369659**
8x MQN push button	**369623**

Connector	
2x MQW-4 connector	**369658**
4x MQN push button	**369623**

Connector	
2x MQW-S1 connector	**369664**
8x MQN push button	**369623**



Connection to concrete – upper side open channel base	
Channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**
Anchors	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
2x HST2 M12x105/10 stud anchor	**2107848**

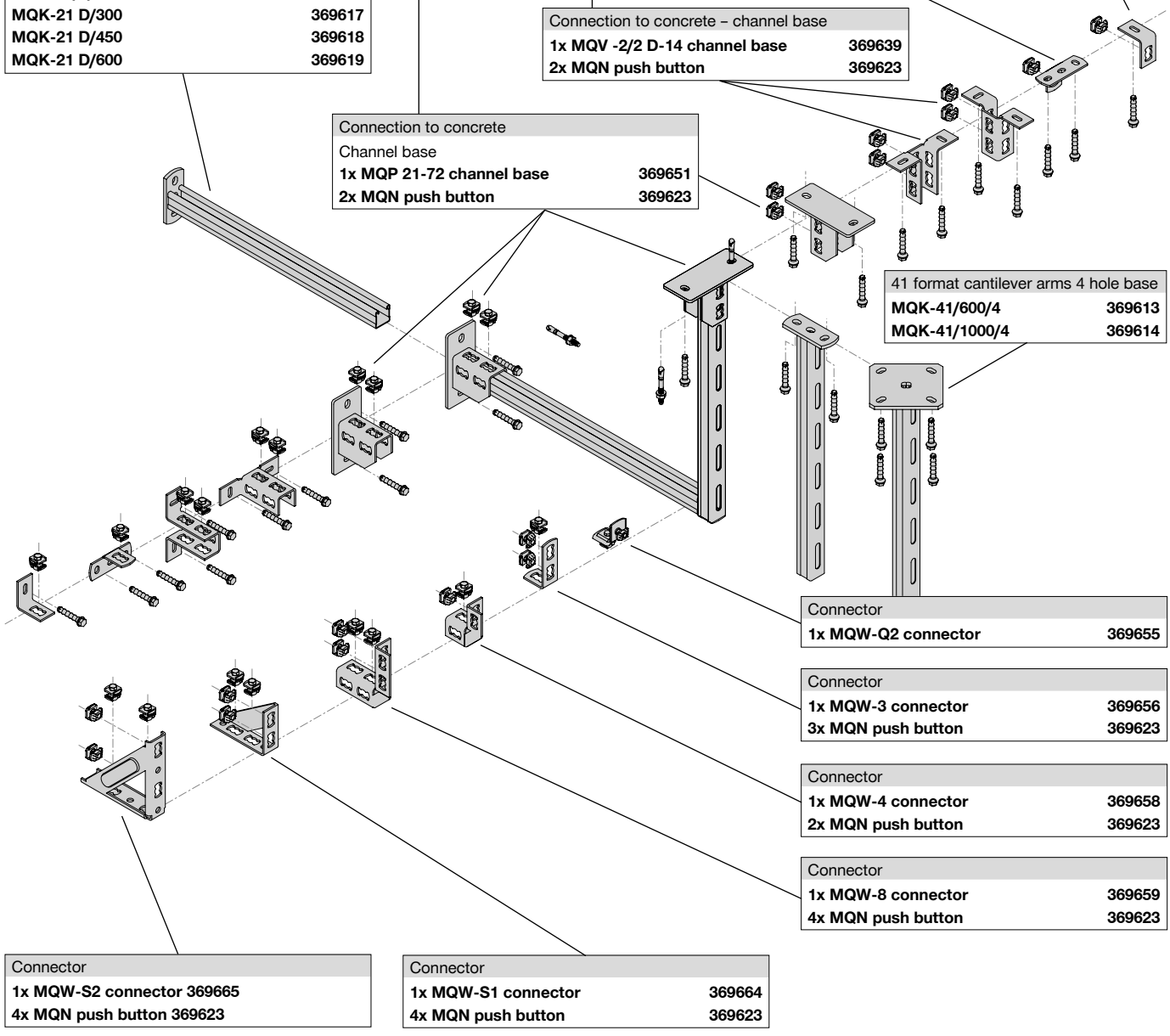
Connector	
2x MQW-S2 connector	**369665**
8x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating - Primary heating media collector bracket	13	MQ System	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

Various Other Applications - MQ System Frame



41 format cantilever arms 2 hole base	
MQK-41/300	**369609**
MQK-41/450	**369610**
MQK-41/600	**369611**
MQK-41/1000	**369612**
MQK-41/3/300	**370595**
MQK-41/3/450	**370596**
MQK-41/3/600	**370597**
MQK-21 D/300	**369617**
MQK-21 D/450	**369618**
MQK-21 D/600	**369619**

Relevant anchors for channel bases	
2x HUS3-H 10x70/-/- screw anchor	**2079912**
or	
2x HST3 M12x105 30/10 stud anchor	**2105718**
HST2 M12x105/10 stud anchor	**2107848**

1x

Connection to concrete – channel base	
1x MQP 1/1 channel base	**369646**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQP 1/3 channel base	**369647**
1x MQN push button	**369623**

Connection to concrete – channel base	
1x MQV -2/2 D-14 channel base	**369639**
2x MQN push button	**369623**

Connection to concrete	
Channel base	
1x MQP 21-72 channel base	**369651**
2x MQN push button	**369623**

41 format cantilever arms 4 hole base	
MQK-41/600/4	**369613**
MQK-41/1000/4	**369614**

Connector	
1x MQW-Q2 connector	**369655**

Connector	
1x MQW-3 connector	**369656**
3x MQN push button	**369623**

Connector	
1x MQW-4 connector	**369658**
2x MQN push button	**369623**

Connector	
1x MQW-8 connector	**369659**
4x MQN push button	**369623**

Connector	
1x MQW-S2 connector	**369665**
4x MQN push button	**369623**

Connector	
1x MQW-S1 connector	**369664**
4x MQN push button	**369623**

Application description	Application	Product lines	Base material
Heating - Various other applications	14	MQ System	Concrete
		Anchors	

General comments

- Application subject to thermal expansion impact, no seismic, no fatigue, no high/low temperature impact
- Loading and load impact must always be compared with 3D capacity limits for every single part of the application

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