MÜPRO

Seismic bracing installation

Foreword

About us

Established in 1964 in Frankfurt Höchst, MÜPRO has more than 60 years of industry experience and market presence as a leading solution provider and premium supplier for fastening technology, vibration control and fire protection. MÜPRO is a fast-growing, international group of companies with subsidiaries and sales partners throughout the world. Our products are developed and produced in Germany and are used worldwide.

What we do

Also you can benefit from our experience: our areas of expertise include building services areas and industrial and plant technology. Our core competency: fastening technology for piping and instruments, vibration control and preventive fire protection. Also in the case of heavy-duty pipe fastenings and energy-efficient insulation for heating or refrigerating lines, MÜPRO has many years of experience. Our portfolio is rounded off by our customer-oriented service, such as pre-assembly and special packaging for efficient and time-saving assembly at the construction site. If required by the building project, we offer individual design-solutions and order-related finished products according to customer requirements.

Safety due to high-quality products

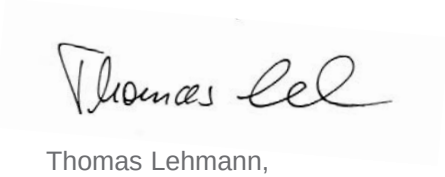
The increasing complexity of modern systems engineering and building technology increases the requirements on the planning and assembly of line installations. Industrial plants with power supply, control and data lines pose new challenges for designers and installers. Our wide spectrum of high-quality fastening technology offers the right products for you. The modular selection permits individual system solutions that can be adapted to your requirements.

Benefit from our experience

Regardless of whether you are the owner-operator, technical planner, plant manufacturer or engineering procurement construction contractor (EPC), we are here to support you. In order to find the optimal system solution for your structural requirements, we offer the following services:

- Targeted technical consultation and plans
- Layout and creation of designs
- Project and Key Account Management
- Continuous project support starting from the planning phase
- Expertise in preventive structural fire protection as well as additional specialist areas, such as corrosion protection, cleanroom and tunnel fastening

With the MÜPRO “Seismic” brochure, we would like to help you find the best solution possible for your project quickly and precisely. Our service supports you from preliminary planning to implementation.
In addition, we offer service specifications and technical consultation by experienced Key Account Managers who support you on site. For further details or more in-depth questions, our experienced MÜPRO Team is always there for you.



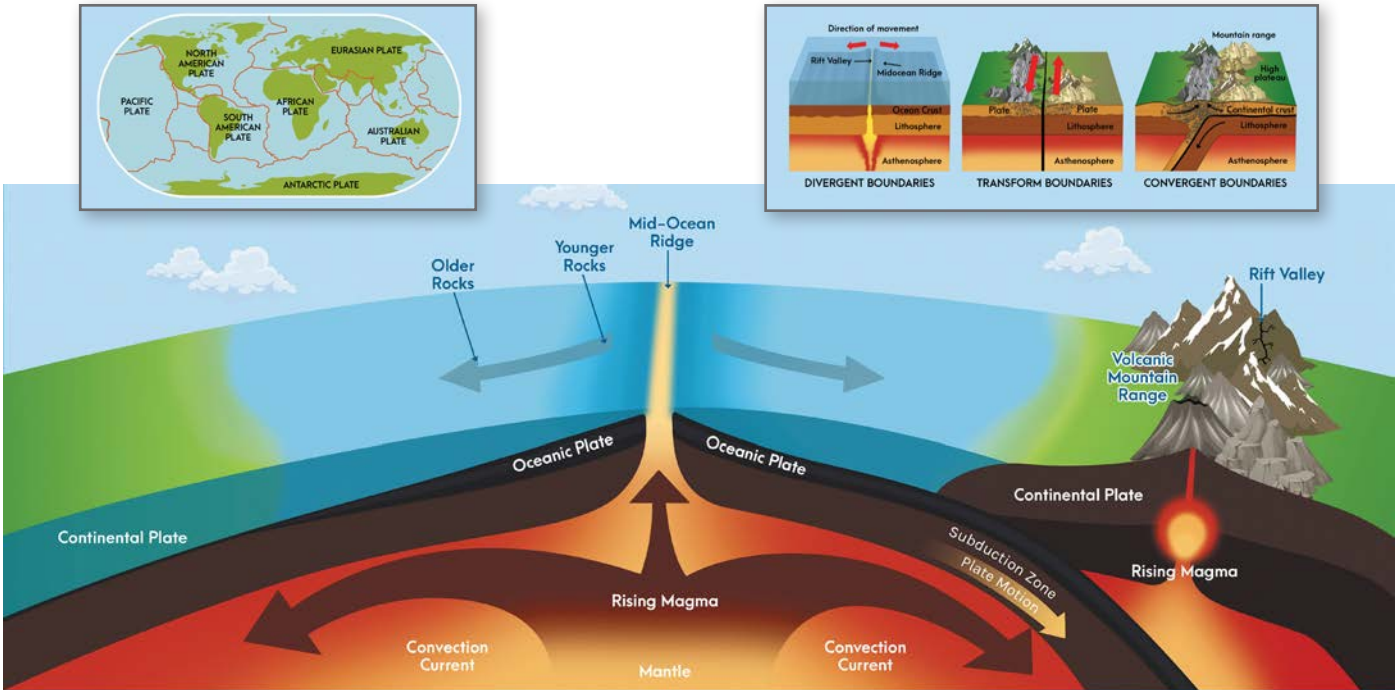
Thomas Lehmann,
Senior Expert Application Technology

Earthquake-resistant fastenings

Introduction

Every day, more than a hundred earthquakes take place around the world, often without advance warning. They occur as a result of a sudden release of energy along the plates in the Earth's crust or in the upper mantle. These movements release enormous amounts of energy in the form of seismic waves that cause tremors along the Earth's surface.

Movements of tectonic plates along faults are often the cause of earthquakes, but also volcanic activities and human intervention such as mining can trigger earthquakes. The strength of an earthquake is measured using the moment magnitude scale, whereas the intensity is assessed based on its effects on people and structures. Modern early-warning systems and global seismic networks help monitor and analyse the risks.



Earthquakes in Europe

Based on experience with earthquakes and scientific research, areas with a seismic risk worldwide are determined and mapped.

The European seismic hazard map uses colour gradations to show the magnitude of ground movements with a ten percent probability of reaching or exceeding the long-term average in 50 years.

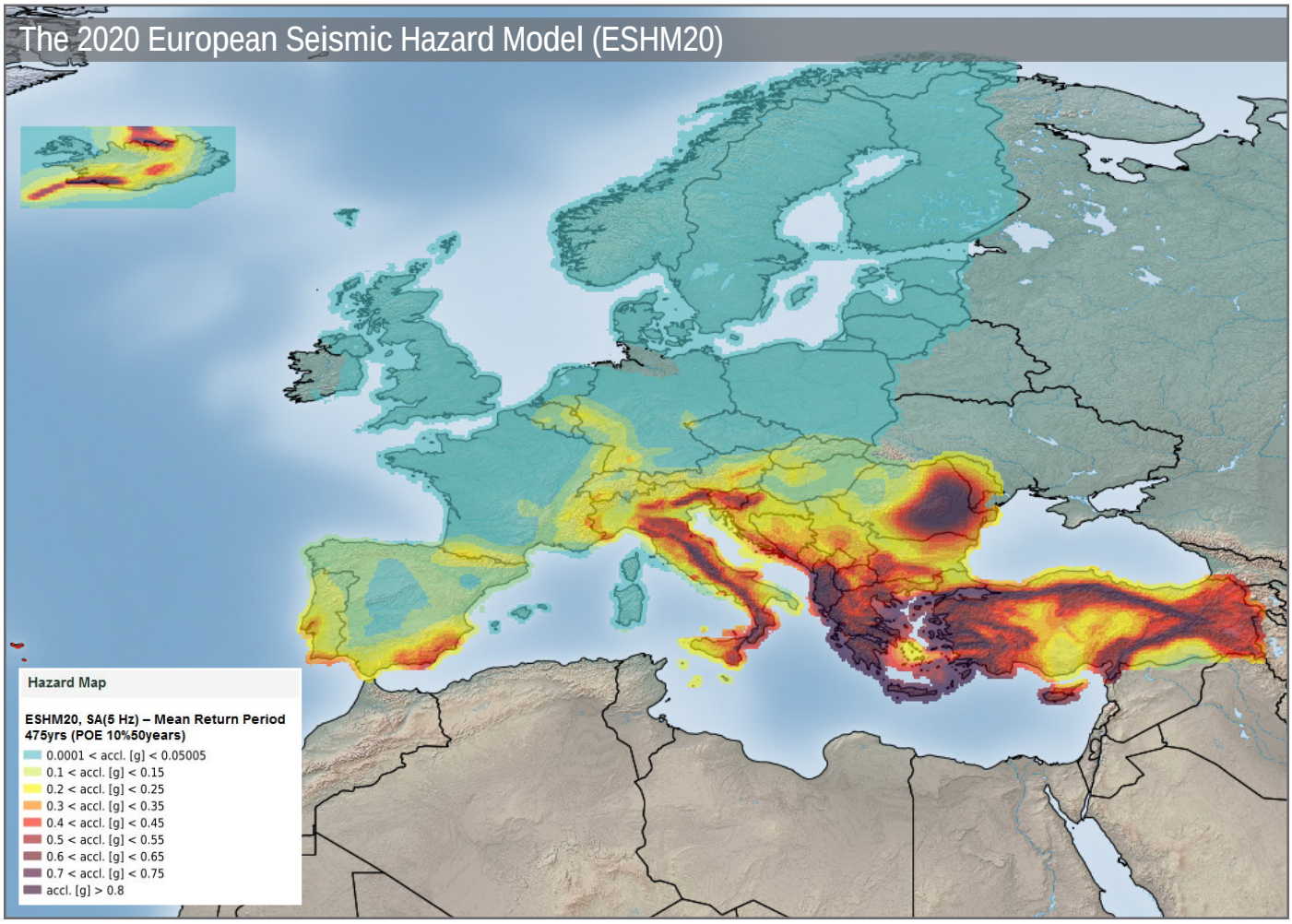


Image reference: Danciu L., Nandan S., Reyes C., Basili R., Weatherill G., Beauval C., Rovida A., Vilanova S., Sesetyan K., Bard P-Y., Cotton F., Wiemer S., Giardini D. (2021) - The 2020 update of the European Seismic Hazard Model: Model Overview, https://doi.org/10.12686/a15, EFEHR Technical Report 001. (http://www.hazard.efehr.org/en/licenses-copyright/)

The main seismic regions in Europe are listed below:

- Dark red/red (highest risk): the Balkan peninsula, the northern coast of Sicily, the inland areas of Italy, Turkey, Greece and parts of Iceland.
- Yellow/orange (medium risk): the Pyrenees, South-East Spain, Alps, Hungary, Bulgaria, Romania, Slovakia and Slovenia.
- White / blue / green (low risk): Scandinavia, France, the rest of the Iberian Peninsula, Ireland, the United Kingdom, Belgium, the Netherlands, Germany and Poland

Earthquakes and the resulting impacts on structures and their fixtures

An earthquake triggers seismic waves that cause buildings to vibrate. This does not only concern the structure of the building, but also the building services and equipment.

Piping and similar installations are considered non-structural components and do not influence the stability of the structure, but are however essential for safety, as their damage can endanger human life and jeopardise important functions. Examples of this include fire-extinguishing systems and gas lines, which could be damaged in the case of an earthquake and therefore block escape routes.

The horizontal vibrations to which buildings are subjected during earthquakes are particularly problematic, as they often are not designed for such loads.

While small earthquakes usually only causes dishes to rattle, strong earthquakes from a magnitude of 4 can cause serious damage, such as the shifting of foundations and the bursting of pipes. Therefore it is important to secure non-structural components so that also they can withstand an earthquake and not create further hazards.

Damage to the equipment for building services that can be caused by earthquakes:

- **Breakage and leakage of piping**
- **Destruction of and damage to electrical line systems**
- **Leakage in gas pipeline systems with the risk of explosions**
- **Destruction of suspended ceilings and blockage of escape and rescue routes**
- **Destruction of and damage to communication equipment**

Seismic bracing in fastening technology and what is important for fastening

Collapsed buildings, cracks in the ground and sunken roads – images from seismic regions around the world can be seen regularly in the media. There are regions at risk of earthquakes also in Germany, even if the effects to be expected are less serious when compared to the rest of the world.

Special requirements apply for building projects in these earthquake zones that are specified in Eurocode 8 (EC 8/EN 1998). These requirements apply not only to structural components, but often also to non-structural components and therefore must be taken into consideration during the planning and design of fastenings.

The energy that is released by earthquakes represents a considerable risk for installations in building technology. This changes the conditions for the layout and design of fastening solutions.

In building services, the energy released by earthqueakes must be taken into oarticular consideration when fastening non-structural components, such as piping, ventilation, electrical systems, etc.The fastenings must be designed such that the horizontal earthquake loads are added to the loads caused by gravity.

In order to absorb the horizontal forces, the fastenings must either have a sufficiently rigid design or have stress-transmitting bracing. It must be ensured that the horizontal loads can be absorbed transversely and longitudinally to the pipe axis by the fastening.

Legal basis

The legal regulations on earthquake safety can be found in Eurocode 8 “Design of structures for earthquake resistance” and in the national annexes, which take account of local geological conditions. EN 1998 applies to the design and construction of buildings and other civil engineering works in seismic regions.

Special structures such as nuclear power plants do not lie within the scope of EN 1998. These are regulated accordingly by the Nuclear Safety Standards Commission and the International Atomic Energy Agency, for example.

The purpose of EN 1998 is to ensure the following in the event of an earthquake

- Human life is protected
- Damage remains limited
- Safety-relevant systems, such as sprinkler systems remain intact
- Important structures that protect the population remain functional

Earthquake safety for non-structural components

In order to guarantee unified standards for construction projects in Europe, the European Commission introduced the Eurocodes. These European-wide standards regulate the structural planning for various construction methods and materials, including concrete, steel, wood and masonry.

Their purpose is to make structures safer and more durable by defining uniform calculation concepts for various influences such as snow, wind, fires and earthquakes.
Eurocode 8 (EN 1998): “Design of structures for earthquake resistance” focuses specifically on earthquake safety and defines requirements for structural and non-structural components to minimise damage and risks due to seismic impacts.

Non-structural components such as piping can fall down during an earthquake and cause considerable damage. In order to avoid this, the seismic loads must be measured accordingly and securely fastened. In particular, pipe supports in seismic regions should be designed to be flexible, provided with vibration-damping elements and anchored securely in the supporting structure.

Earthquake zones and seismicity in Germany

Which parameters must be taken into account for the concrete calculation, and to what extent, depends on many factors. The location of the structure is very important: Is it located in a seismic zone and if yes, which one?

The National Annex to EC 8 contains a map of Germany that shows seismic zones 0 to 3. The Deutsche Institut für Bautechnik (German Institute For Structural Engineering) also offers a list sorted according to postal code.

Seismic zones 0 to 3 are classified as areas with low seismicity according to the standard. For certain high-rise buildings in these zones, simplified seismic design procedures can be applied according to EN 1998 (see DIN EN 1998-1/NA:2011-01, 3.2.1(4)). Areas that are not categorized in any zone are classified as areas with very low seismicity (see DIN EN 1998-1/NA:2011-01, 3.2.1(5)). The requirements of EN 1998 do not need to be observed in these areas.

Earthquake zones in Germany

Additional factors for the measurement of the effects of earthquakes

Subsoil conditions: To consider the influence of the local subsoil condition on the effects of earthquakes, EC 8 has defined classes A to E.

Structures: For the design of above-ground structures, the EC 8 provides four importance classes to be assigned to buildings. These are based on how important earthquake safety is for the respective building. Each category is assigned a corresponding importance factor, which is used for further calculations.

In addition to these classifications, there are numerous other values and factors that are determined for each individual construction project and that must be taken into account for the calculation. Therefore in reference to the earthquake safety of the fastening, it can therefore already make a difference whether a structure within a building is planned for the first floor or the sixth floor.

Earthquake classification of above-ground structures and their importance factor γa according to EN 1998

BWK	Characteristics	Structure - Examples	γa
I	Buildings of minor importance for public safety Only occasional presence of people in the building	Agricultural buildings	0,8
II	Ordinary buildings, not belonging in the other categories No large assemblies of people in the building	Residential buildings, warehouses, garages	1,0
III	Buildings whose seismic resistance is important in view of the consequences associated with a collapse Large assembly of people	Large residential buildings, administrative buildings, schools, assembly halls, shopping centres	1,2
IV	Buildings whose integrity during earthquakes is important for protection of the general public Vital importance for civil protection	Hospitals, fire brigades, equipment for disaster control	1,4

Example of a calculation according to EC 8

Task:

Determination of the horizontal equivalent load Fa for the intended fastening
Anchor point for piping DN 200
Suspension height 411 mm

Earthquake calculation
The equivalent load is calculated according to DIN EN 1998-1/NA:2011-01

$Fa = Sa * Wa * \gamma a / qa$ (4.24)
$Sa = \alpha * S * [3 * (1 + z/H) / (1 + (1 - Ta/T1)^2) - 0,5]$
(4,25)

Position
Location of the construction project: Frankfurt

Information about the structure

Total height of the structure H = 20.00 [m]
Importance class of the building: I (Table 4.3)
Importance factor γ1 = 0.8 (Table NA.6)
First vibration period of the structure T1 = 1.00 [s]

Information about the fastening

Height of the fastening above the structure base point
z = 20.00 [m]
Importance factor γa = 1.0 (4.24)
Behaviour factor qa = 2.0 (Table 4.4)
First vibration period of the fastening Ta = 1.00 [s]

Calculation of the seismic coefficient Saz / H = 1,00
z / H = 1,00 liegt auf der sicheren Seite für z = H

Ta / T1 = 1,00
Ta / T1 = 1,00 lies on the safe side for Ta / T1 = 1,0

$\alpha = agR * \gamma 1 / 9,81 = 0,40 * 0,8 / 9,81 = 0,0326$

$Sa = \alpha * S * [3 * (1 + z/H) / (1 + (1 - Ta/T1)^2) - 0,5] =$

$= 0,0326 * 1,5 * [3 * (1 + 20,00) / (- 1,00 / 1,00)^2) - 0,5] = 0,269$

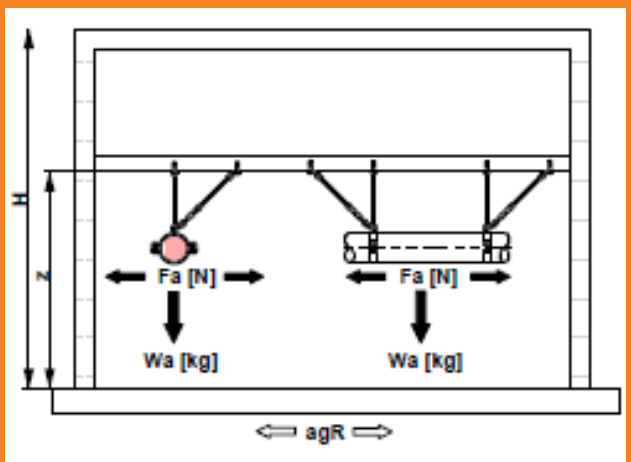
Calculation of the equivalent load
Weight of the fastening including the weight
of pipes and pipe contents, for example
Weight Wa = 100,0 [kg] ≙ 981,0 [N]

Seismic zone and ground acceleration

Seismic zone: Zone 1 Image NA.1
Ground acceleration agR = 0.4 [m/s²]

Information about the subsoil

Subsoil class: Class C (NDP to 3.1.2(1))
Underground class: Class R (Table NA.1)
Underground parameter S = 1.5 (Table NA.4)



$Fa = Sa * Wa * \gamma a / qa = 0,269 * 981,0 * 1,0 / 2,0 = 132$ [N]

Special situations for anchors, classification according to C1 and C2

Important information about anchors

- Only plugs that have an ETA (European technical assessment) for cracked and uncracked concrete, with a C1 and C2 classification, can be used
- Verifications can be carried out only for solid concrete
- No verification for fastenings in masonry
- No verification for fastenings in hollow slabs
- No use of plugs and anchors with internal thread
- No use of plugs and anchors with approval for multiple use in uncracked concrete
- The suitability of the plug/anchor must be demonstrated by a European Technical Assessment (ETA)
- Data regarding suitable diameters, anchoring depths and additional performance categories must be available

Magnitude[a]		Importance class of buildings according to EN 1998-1:2004, 4.2.5			
Class	$a_g * S^c$	I	II	III	IV
Very low[b]	$a_g * S \leq 0{,}05$ g	No seismic performance categories required			
low[b]	$0{,}05$ g $< a_g * S \leq 0{,}1$ g	C1	C1[d] or C2[e]		C2
> low	$a_g * S > 0{,}1$ g	C1	C2		

a The values that define the magnitude are subject to a national Annex. The recommended values are provided here.

b Definition according to EN 1998-1:2004, 3.2.1

c a_g = Rated value of the ground acceleration for subsoil class A (see EN 1998-1:2004, 3.2.1), S = Ground parameter (see EN 1998-1:2004, 3.2.2).

d C1 for fastening structural components to structures (Typ "B" connection)

e C2 for fastening structural components to structures (Typ "A" connection)

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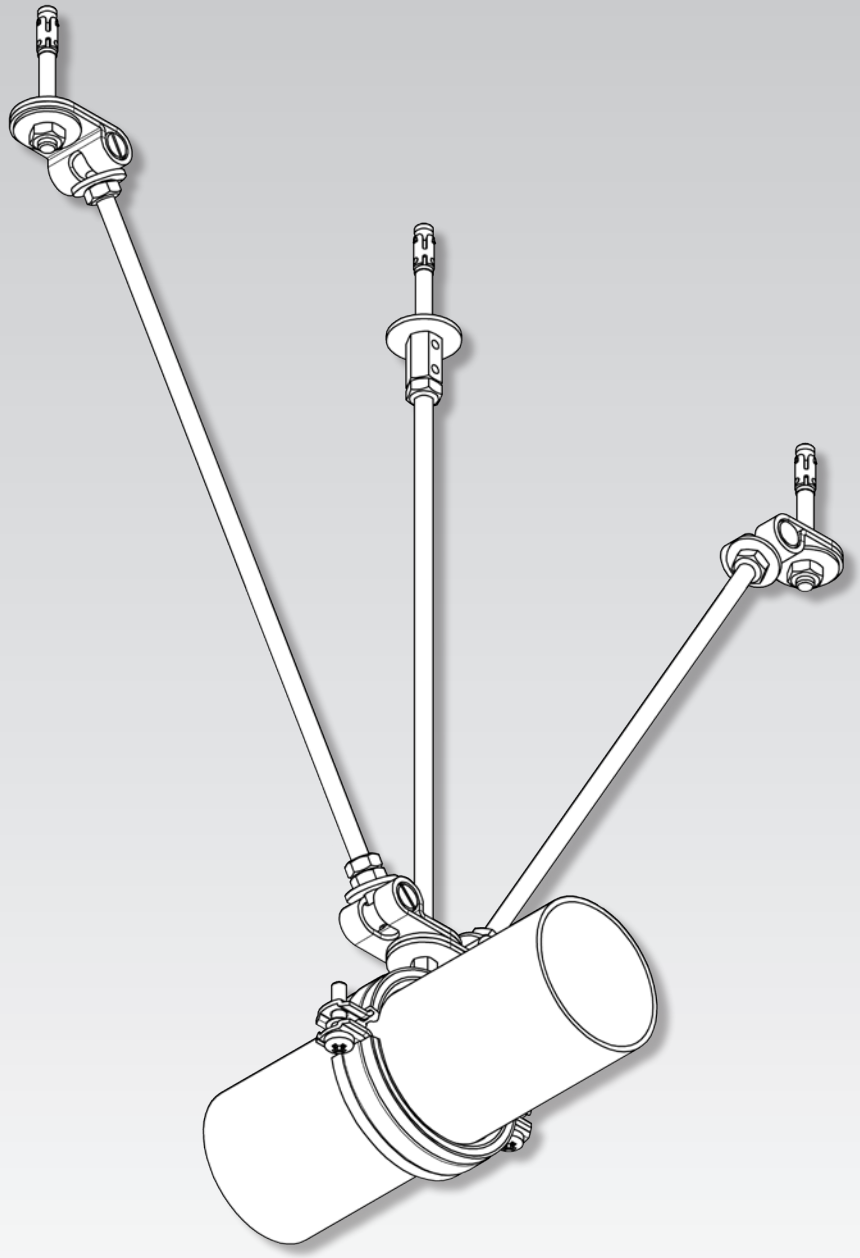
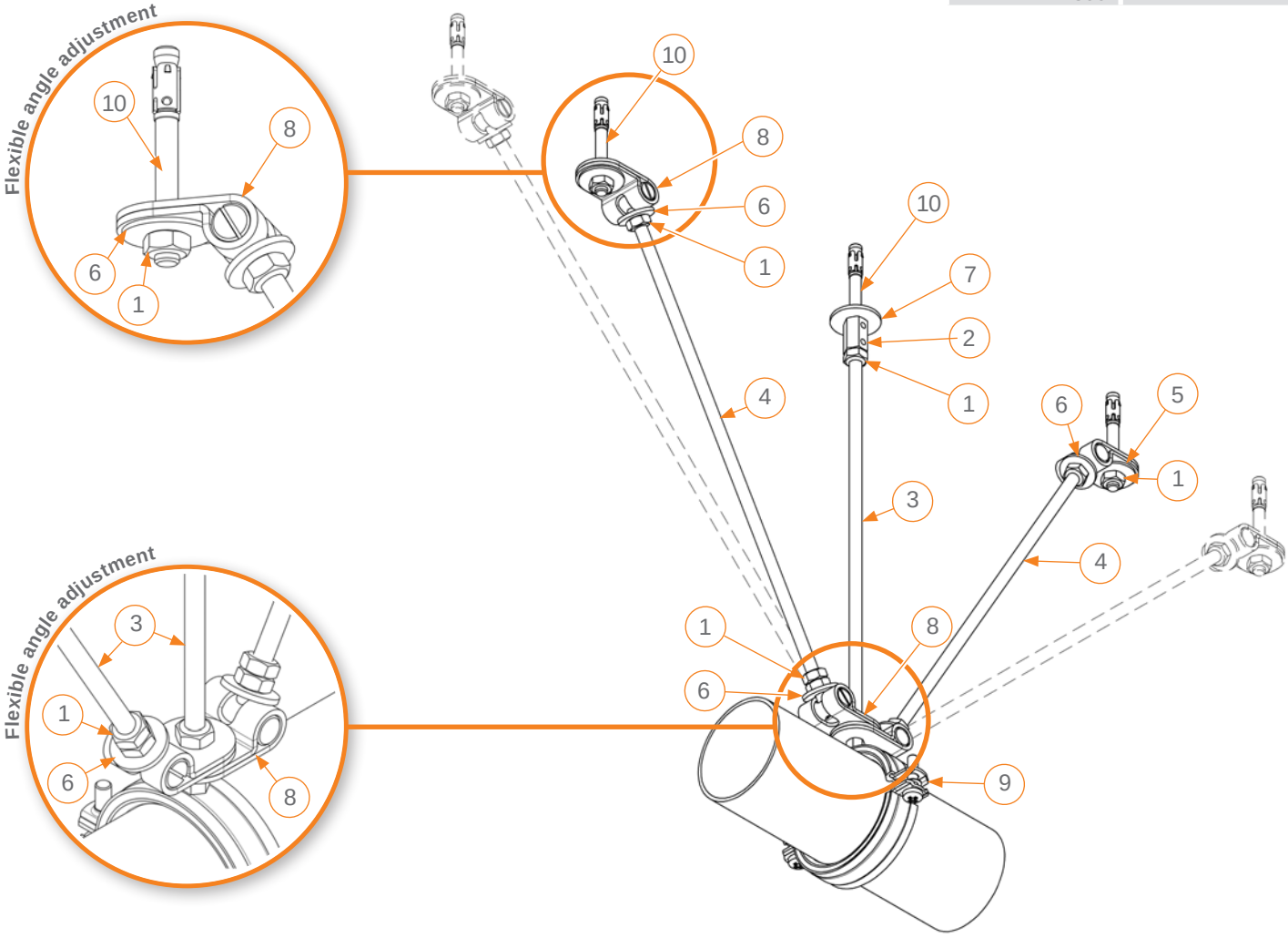


Single pipe fastening

Bracing in the longitudinal direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

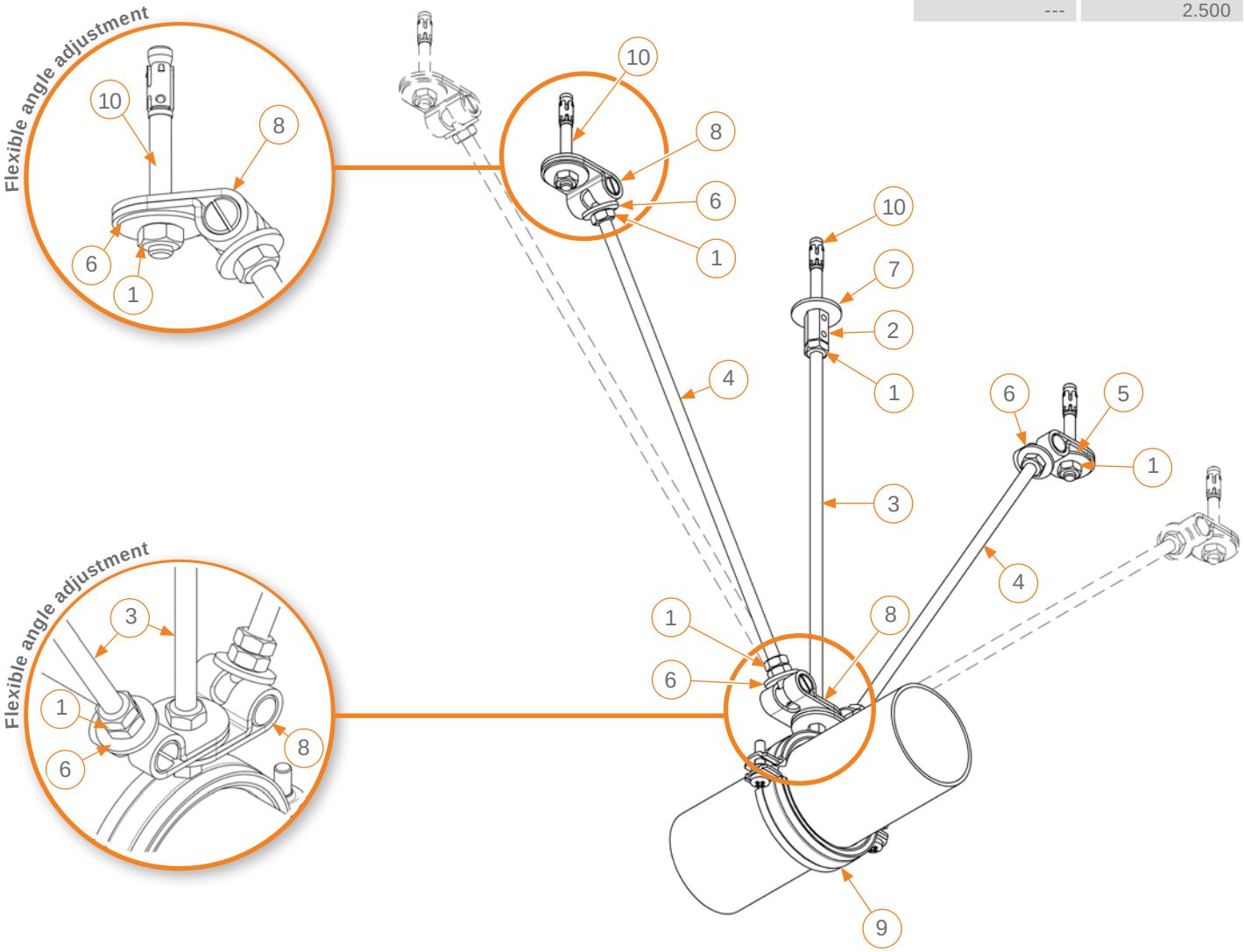


Pos.	Quantity	Part no.	Product description
1	7	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	1	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	3	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	127121	Washers, 10,5 x 36 x 2 mm, galvanised
6	4	140876	Washers, 10,5 x 30 x 3 mm, galvanised
7	1	151102	Washers, 10,5 x 40 x 3 mm, galvanised
8	4	170452	VARIO-Bolt joint M10, galvanised, assambled
9	1		Single bossed clamp
10	3		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500



Pos.	Quantity	Part no.	Product description
1	7	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	1	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	3	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	127121	Washers, 10,5 x 36 x 2 mm, galvanised
6	4	140876	Washers, 10,5 x 30 x 3 mm, galvanised
7	1	151102	Washers, 10,5 x 40 x 3 mm, galvanised
8	4	170452	VARIO-Bolt joint M10, galvanised, assambled
9	1		Single bossed clamp
10	3		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
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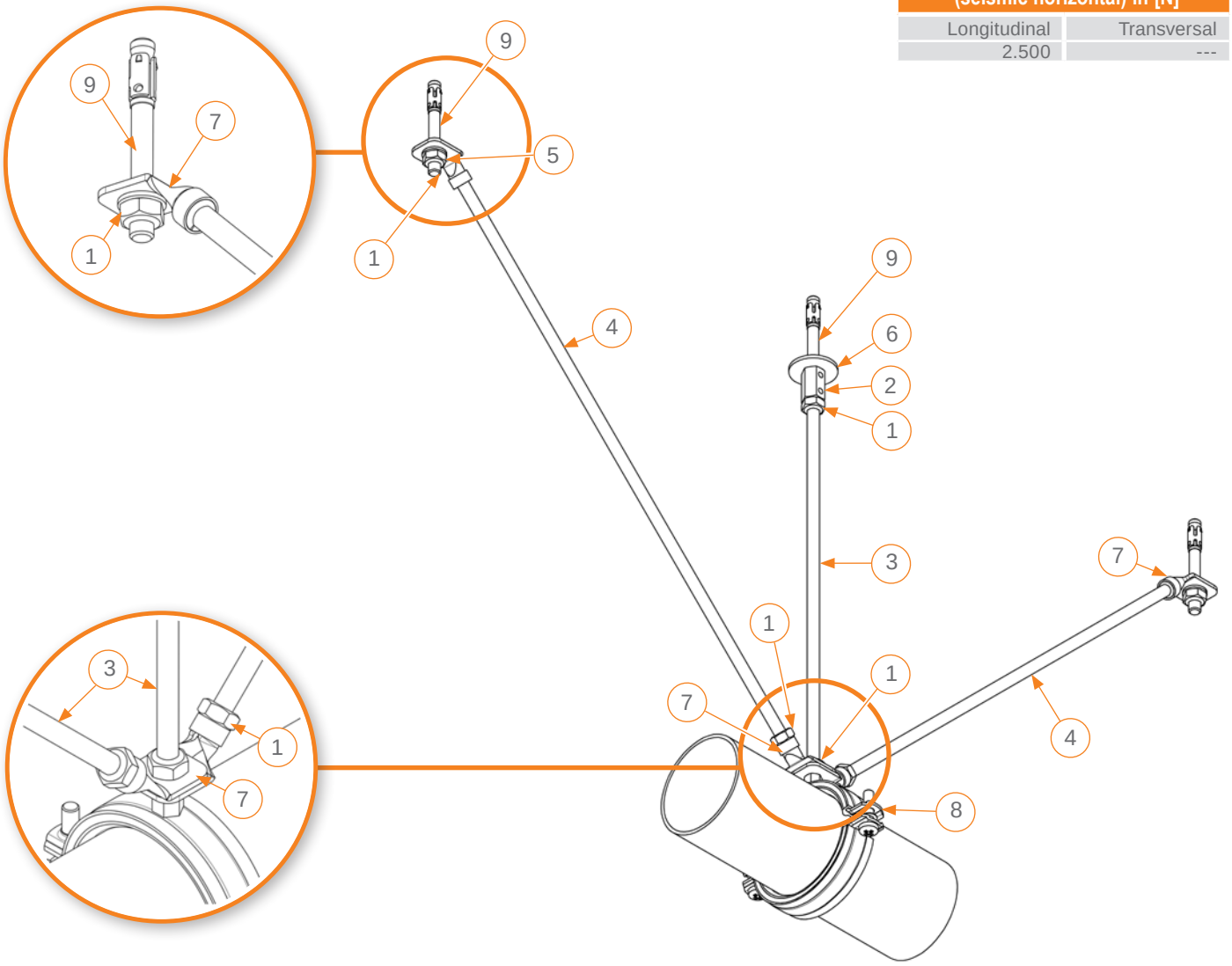
Bracing in the longitudinal direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

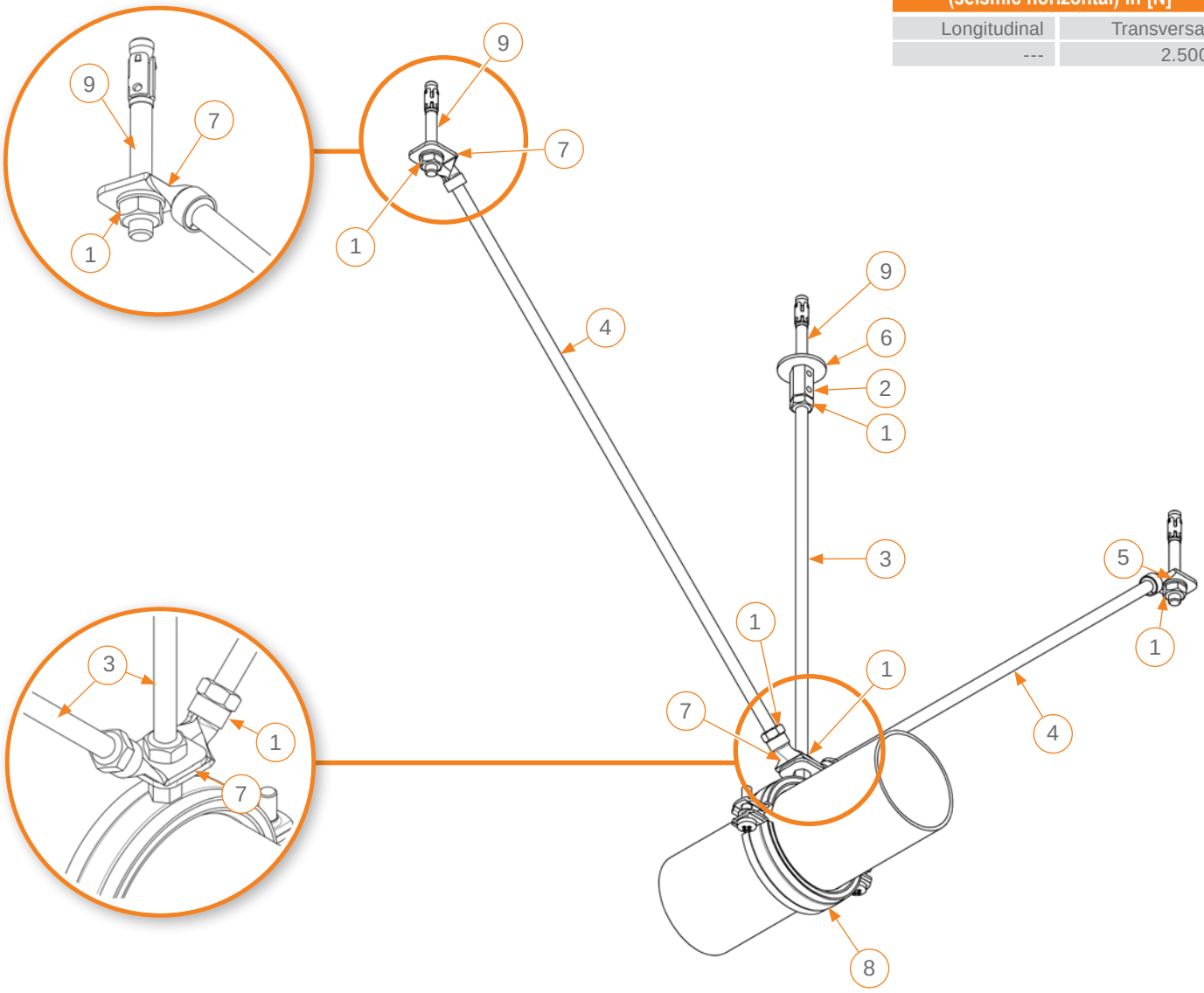


Pos.	Quantity	Part no.	Product description
1	3	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	1	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	3	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	127277	Washers, DIN 125, M10, galvanised
6	1	151102	Washers, 10,5 x 40 x 3 mm, galvanised
7	4	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
8	1		Single bossed clamp
9	3		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500

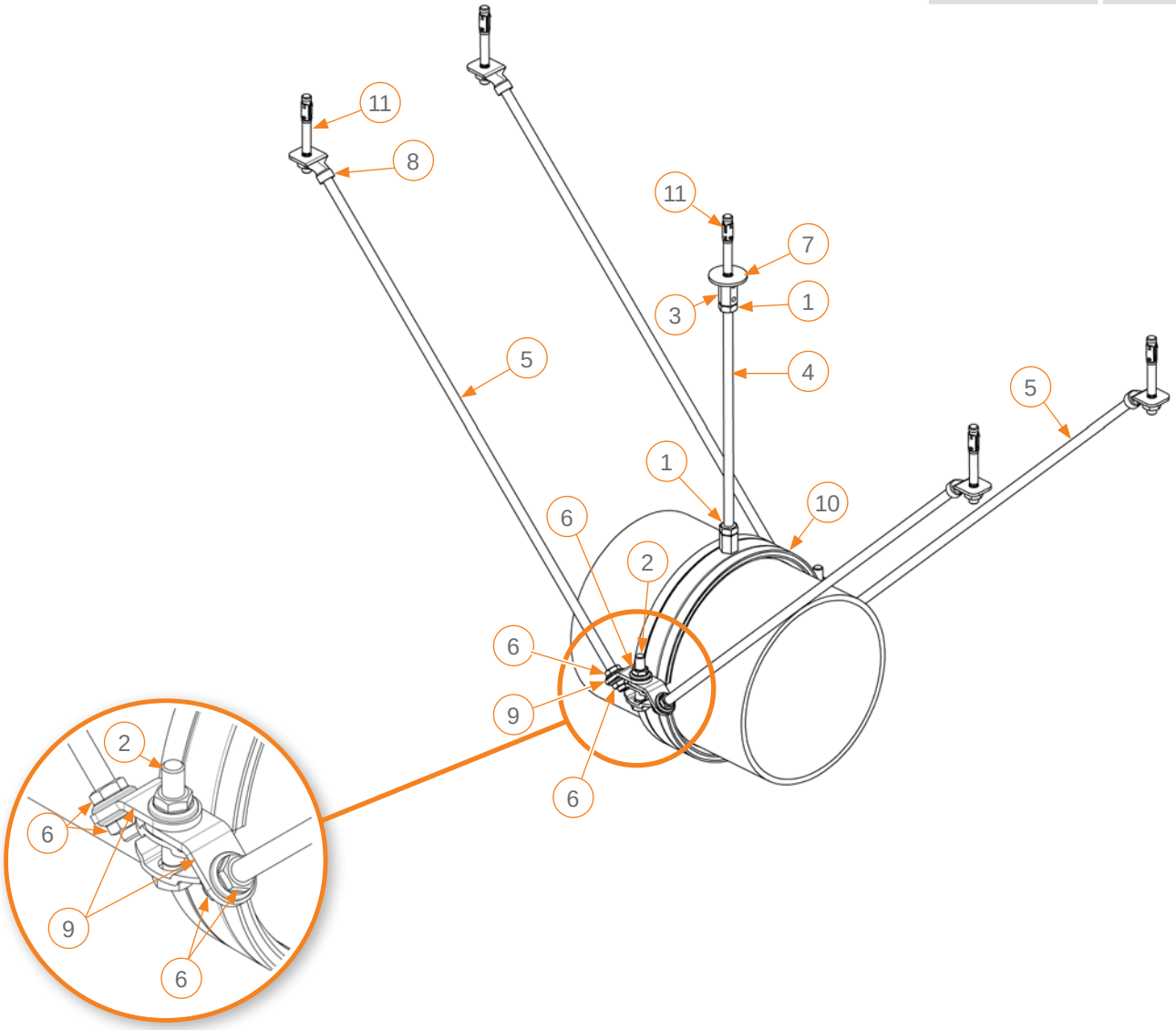


Pos.	Quantity	Part no.	Product description
1	3	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	1	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	3	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	127277	Washers, DIN 125, M10, galvanised
6	1	151102	Washers, 10,5 x 40 x 3 mm, galvanised
7	4	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
8	1		Single bossed clamp
9	3		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
6.000	---

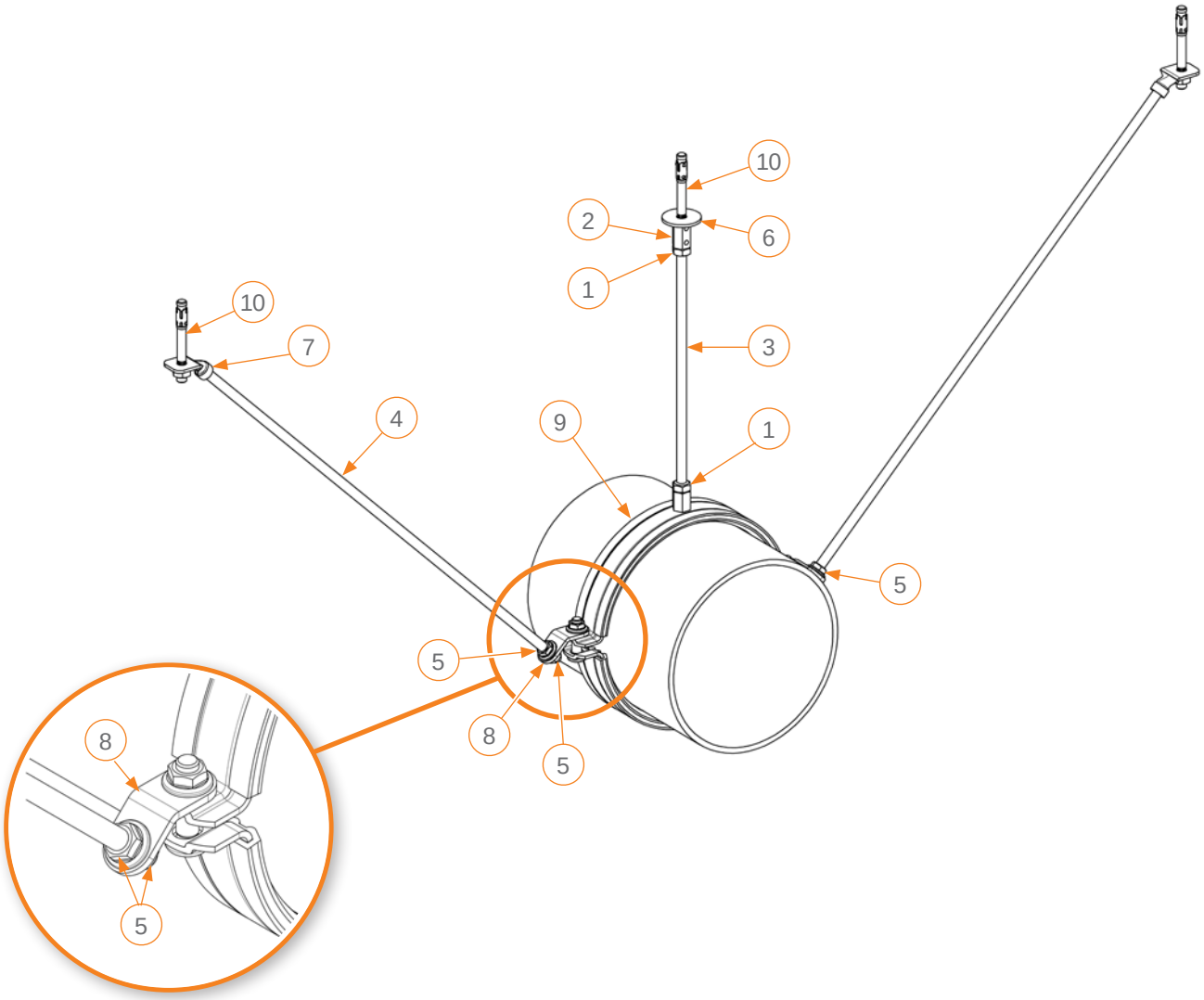


Pos.	Quantity	Part no.	Product description
1	2	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105600	Hexagon head bolts, DIN 933, M10x55 mm, galvanised
3	1	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4/5	5	113467	Threaded rods, M10, 1.000 mm, Grade 4.8, galvanised
6	10	142930	Locking nut Verbus Tensilock W196, M10, SW15, galvanised
7	1	151102	Washers, 10,5 x 40 x 3 mm, galvanised
8	4	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
9	4	177943	Bracing angles for pipe clamp flange M10, galvanised
10	1		Single bossed clamp
11	5		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	3.000

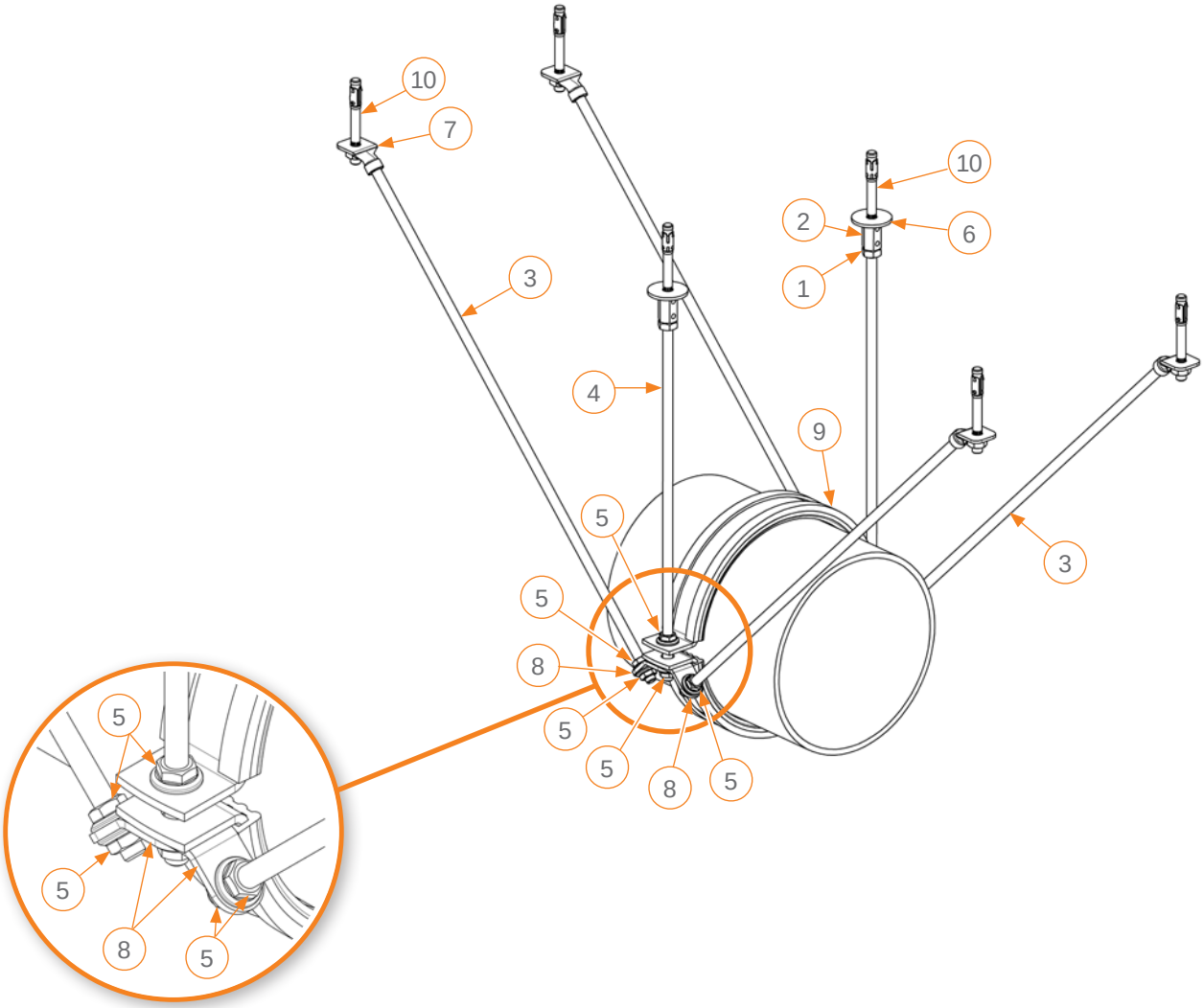


Pos.	Quantity	Part no.	Product description
1	2	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	1	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	3	113467	Threaded rods, M10, 1.000 mm, galvanised
5	6	142930	Locking nut Verbus Tensilock W196, M10, SW15, galvanised
6	1	151102	Washers, 10,5 x 40 x 3 mm, galvanised
7	2	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
8	2	177943	Bracing angles for pipe clamp flange M10, galvanised
9	1		Single bossed clamp
10	3		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
6.000	---

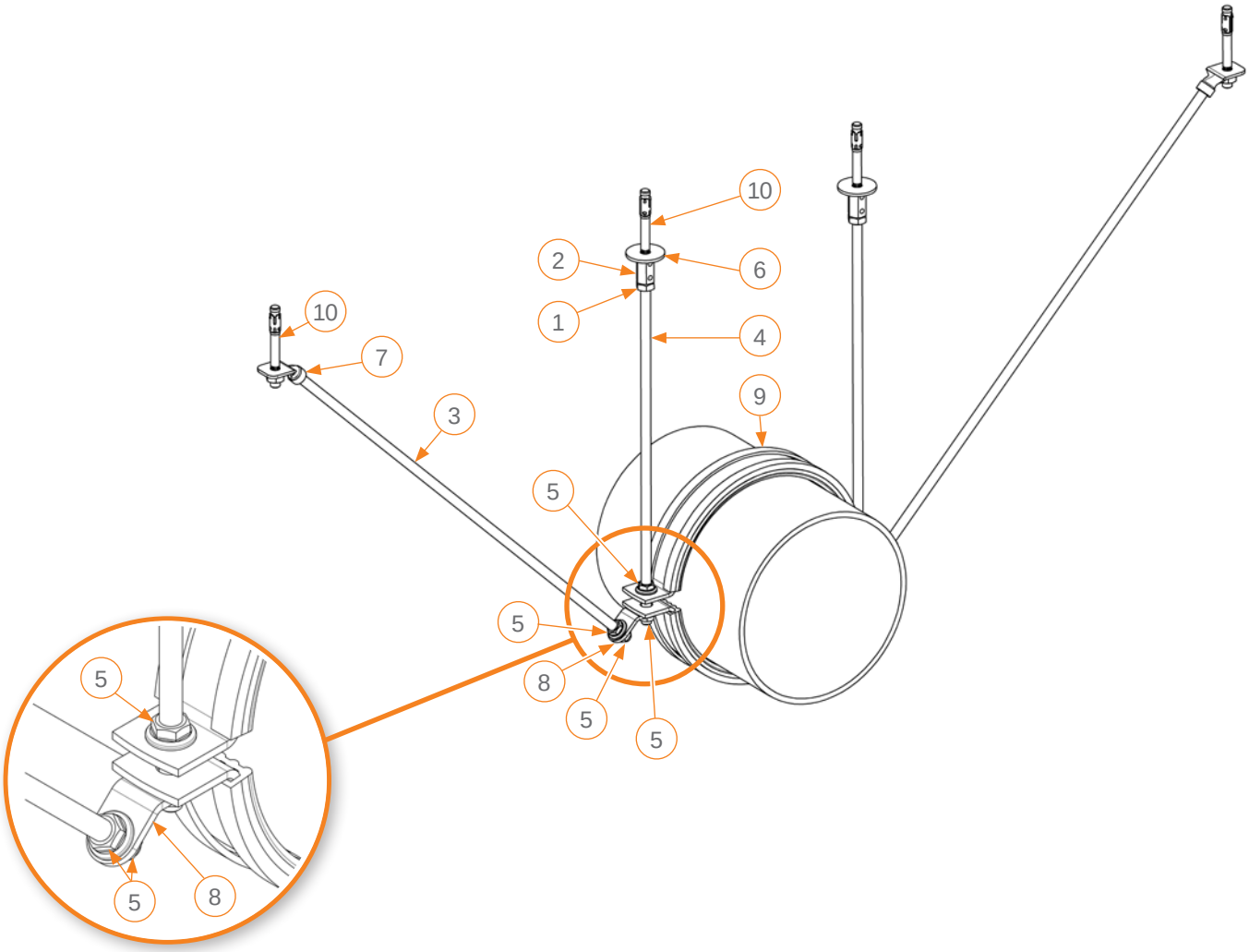


Pos.	Quantity	Part no.	Product description
1	2	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	6	113467	Threaded rods, M10, 1.000 mm, galvanised
5	12	142930	Locking nut Verbus Tensilock W196, M10, SW15, galvanised
6	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
7	4	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
8	4	177943	Bracing angles for pipe clamp flange M10, galvanised
9	1		STATO® clamps
10	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction for single pipes

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	3.000



Pos.	Quantity	Part no.	Product description
1	4	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
3/4	4	113467	Threaded rods, M10, 1.000 mm, galvanised
5	8	142930	Locking nut Verbus Tensilock W196, M10, SW15, galvanised
6	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
7	2	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
8	2	177943	Bracing angles for pipe clamp flange M10, galvanised
9	1		STATO® clamps
10	4		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

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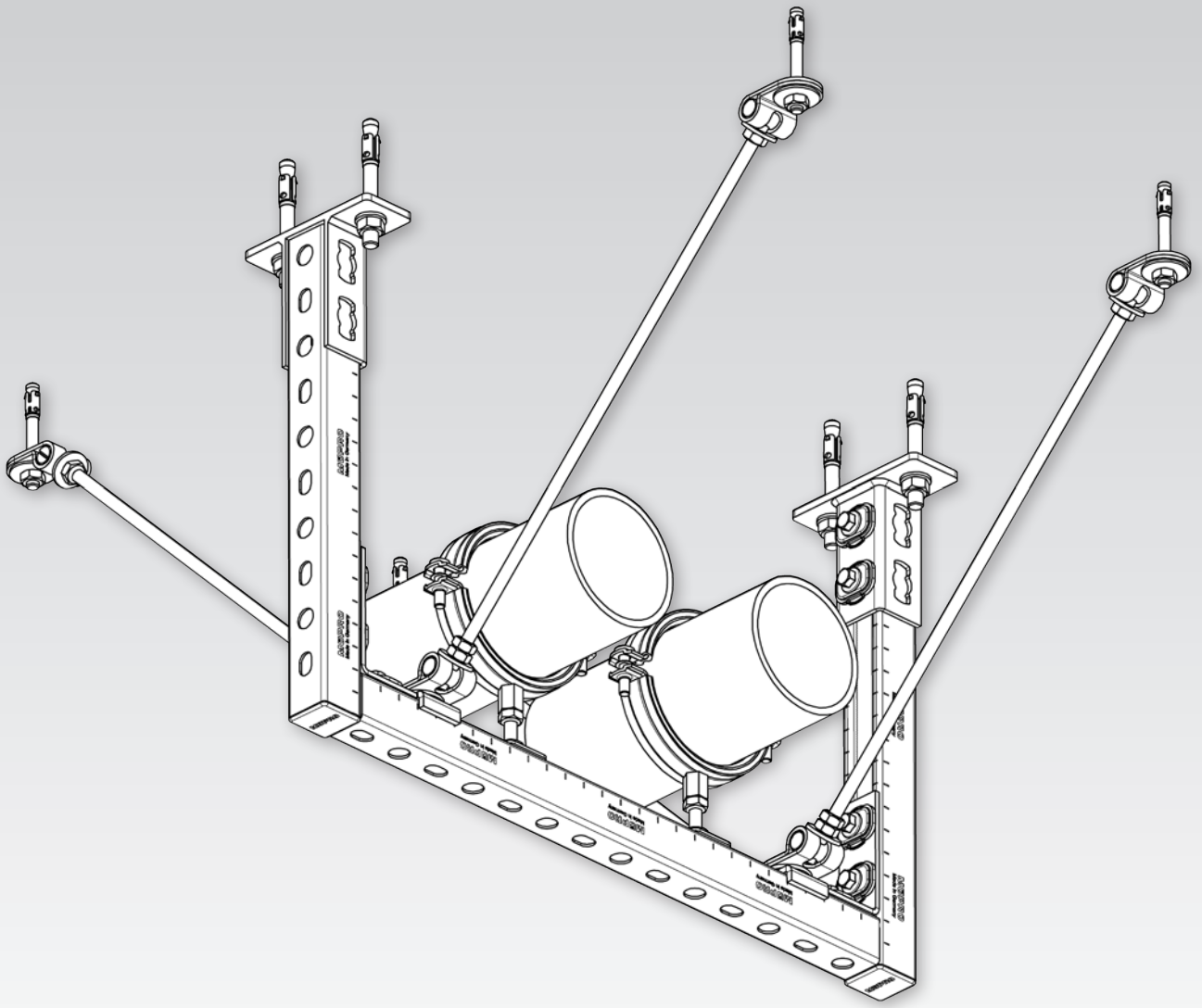
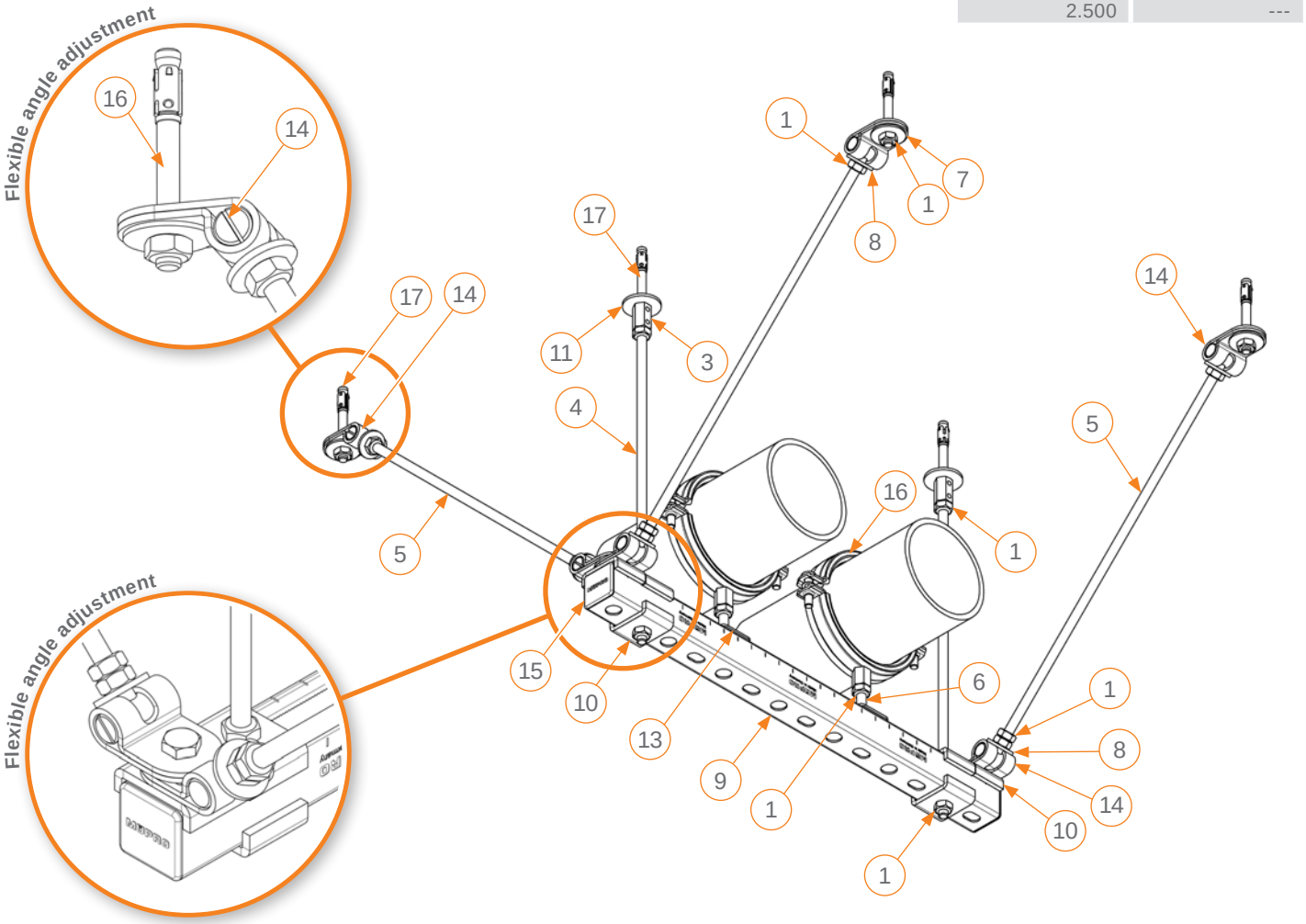


Installation on trapeze

Bracing with threaded rods

Bracing in the longitudinal direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

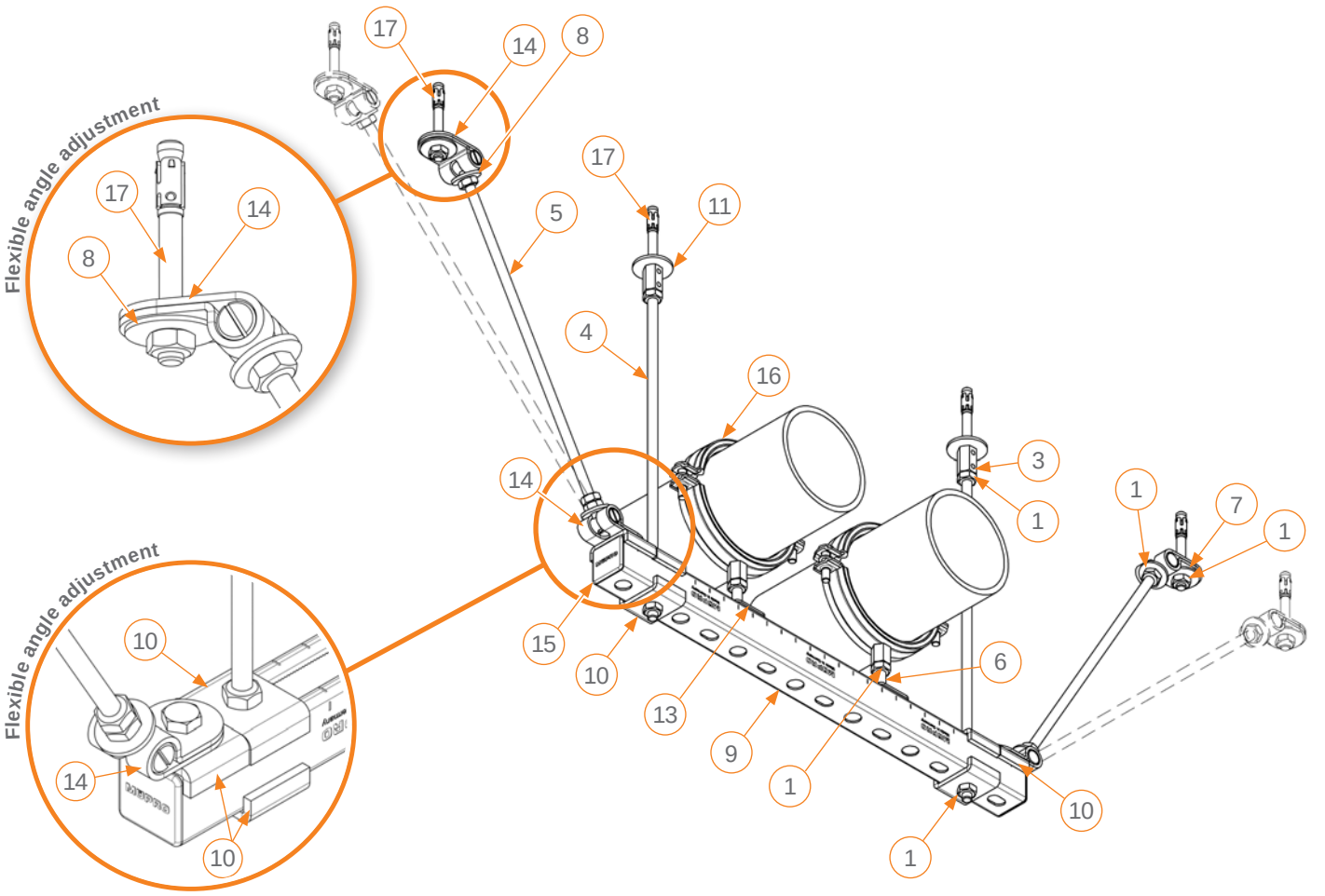


Pos.	Quantity	Part no.	Product description
1	20	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105590	Hexagon head bolts, DIN 933, M10 x 40 mm, galvanised
3	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4/5	6	113467	Threaded rods, M10, 1.000 mm, galvanised
6	2	113825	Threaded pins, M10 x 55 mm, galvanised
7	4	127121	Washers, 10,5 x 36 x 2 mm, galvanised
8	8	140876	Washers, 10,5 x 30 x 3 mm, galvanised
9	1	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
10	6	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
11	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
12	2	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
13	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
14	8	170452	VARIO-Bolt joint M10, galvanised, assambled
15	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
16	2		Single bossed clamp
17	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500

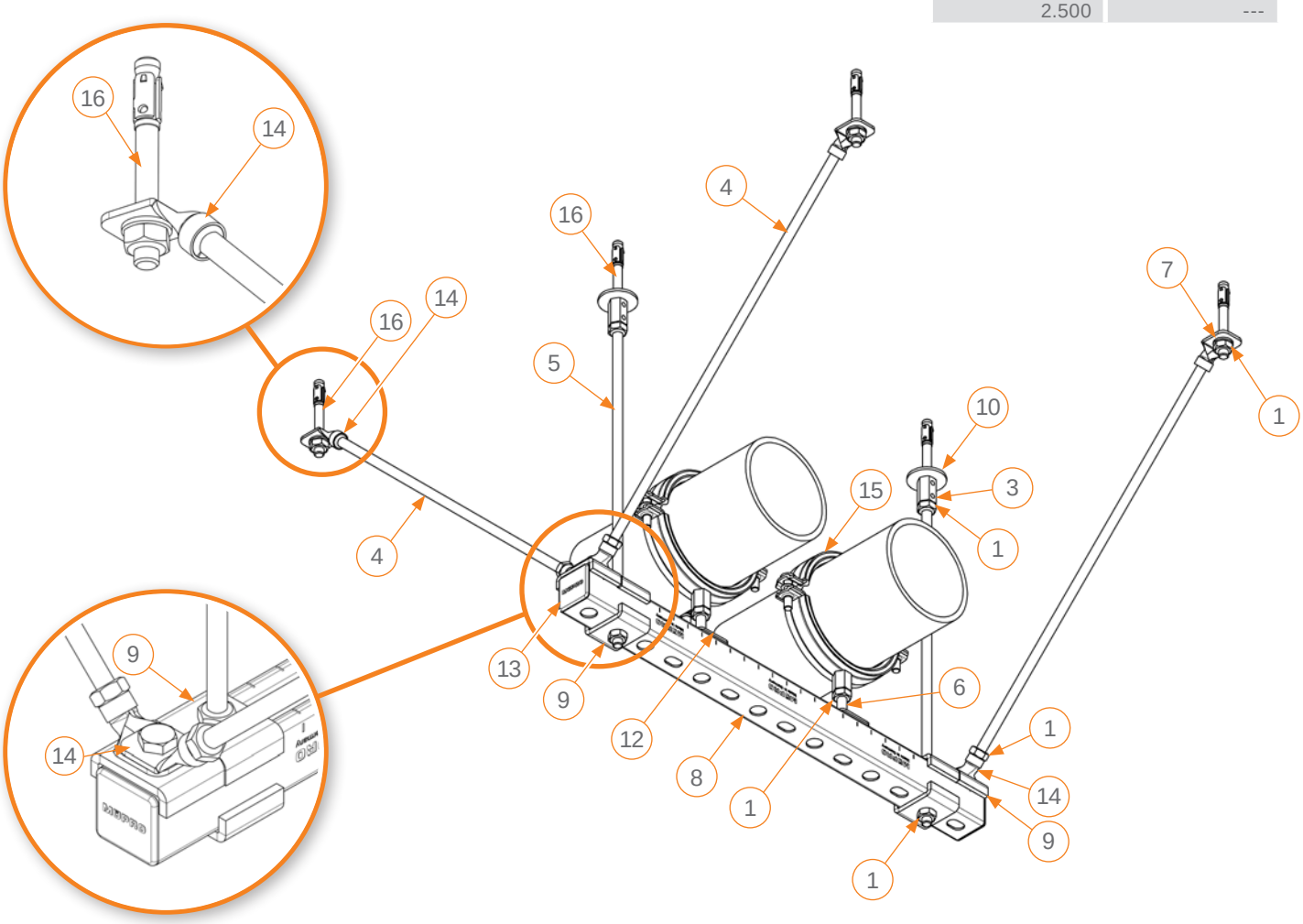


Pos.	Quantity	Part no.	Product description
1	14	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
3	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4/5	4	113467	Threaded rods, M10, 1.000 mm, galvanised
6	2	113825	Threaded pins, M10 x 55 mm, galvanised
7	2	127121	Washers, 10,5 x 36 x 2 mm, galvanised
8	4	140876	Washers, 10,5 x 30 x 3 mm, galvanised
9	1	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
10	6	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
11	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
12	2	165673	MPR-Slide nuts Typ S+, M10, for profiles 41/21-41/124, galvanised
13	2	165679	MPR-Quick fasteners Typ S+ M10, for profiles 41/21-41/124, galvanised
14	4	170452	VARIO-Bolt joint M10, galvanised, assambled
15	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
16	2		Single bossed clamp
17	4		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

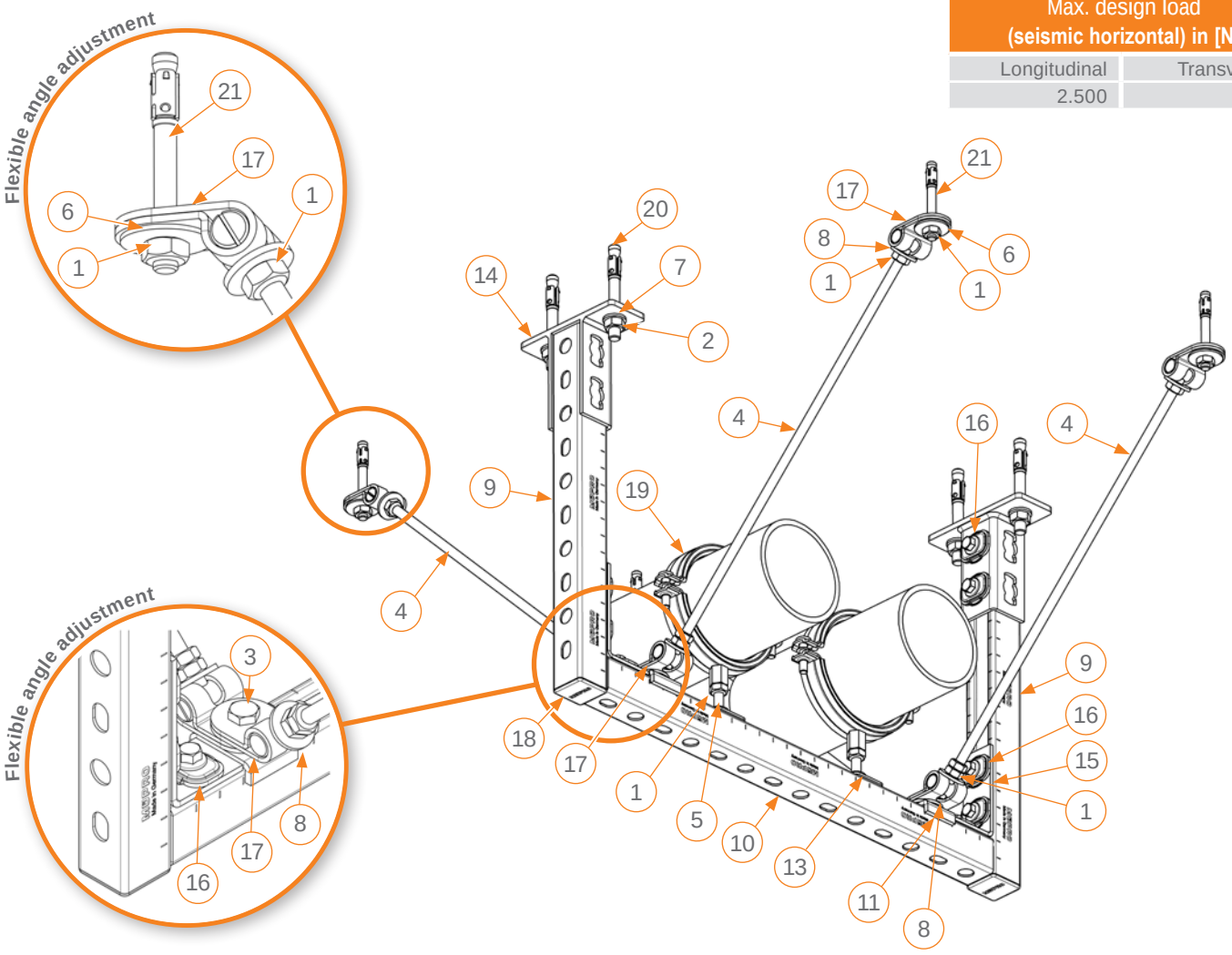


Pos.	Quantity	Part no.	Product description
1	12	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
3	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4/5	6	113467	Threaded rods, M10, 1.000 mm, galvanised
6	2	113825	Threaded pins, M10 x 55 mm, galvanised
7	4	127277	Washers, DIN 125, M10, galvanised
8	1	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
9	6	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
10	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
11	2	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
12	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
13	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
14	8	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
15	2		Single bossed clamp
16	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

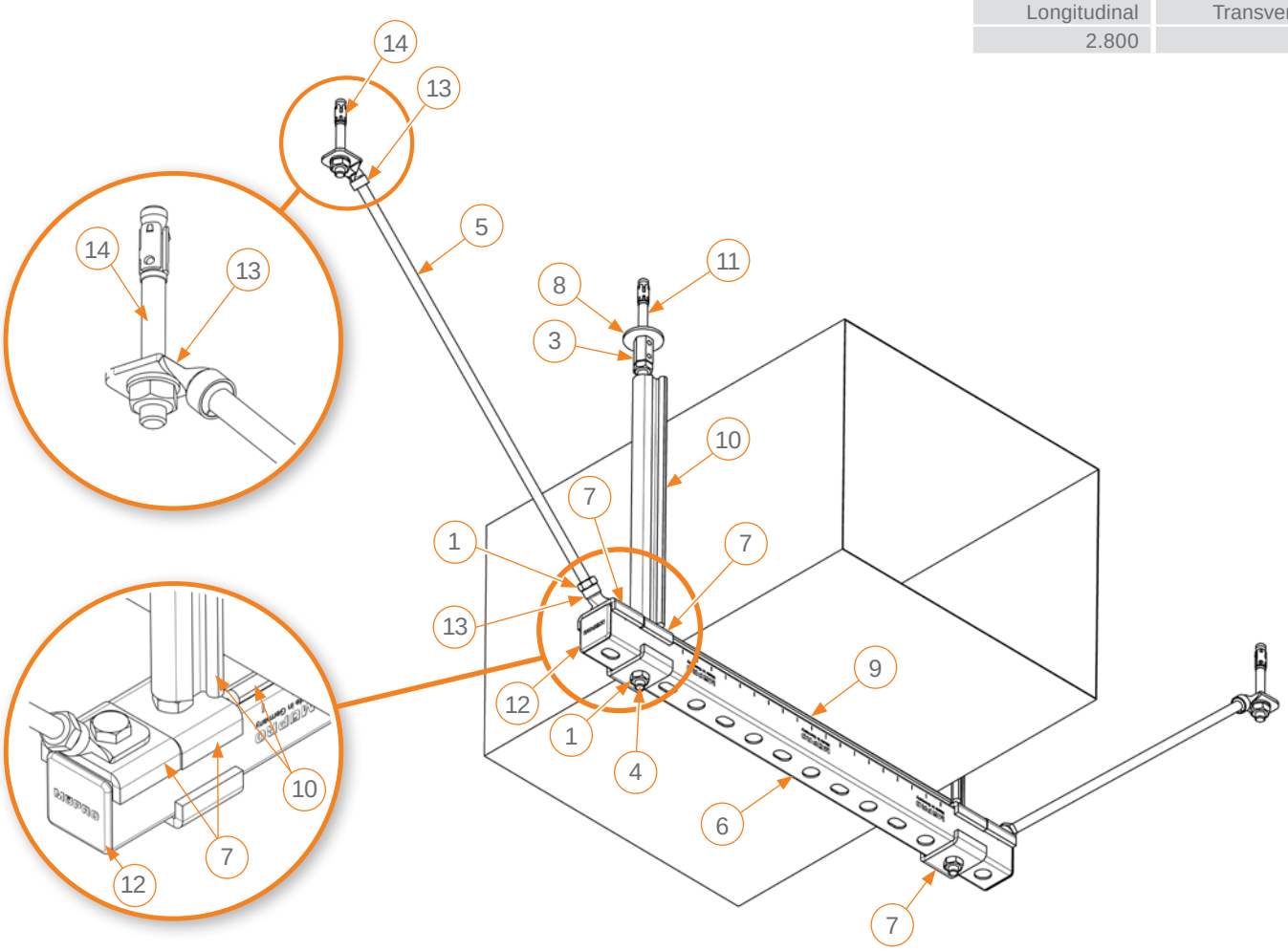


Pos.	Quantity	Part no.	Product description
1	16	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105585	Hexagon head bolts, DIN 933, M10 x 35 mm, galvanised
4	4	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	113825	Threaded pins, M10 x 55 mm, galvanised
6	4	127121	Washers, 10,5 x 36 x 2 mm, galvanised
7	4	127286	Washers, DIN 125, M12, galvanised
8	8	140876	Washers, 10,5 x 30 x 3 mm, galvanised
9/10	3	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
11	2	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
12	2	165673	MPR-Slide nuts Typ S+, M10, for profiles 41/21-41/124, galvanised
13	2	165679	MPR-Quick fasteners Typ S+ M10, for profiles 41/21-41/124, galvanised
14	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
15	2	165839	MPR-Mounting angles 90° Typ S+, 1+2, for profiles 41/21-41/124, galvanised
16	10	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
17	8	170452	VARIO-Bolt joint M10, galvanised, assambled
18	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
19	2		Single bossed clamp
20/21	8		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.800	---

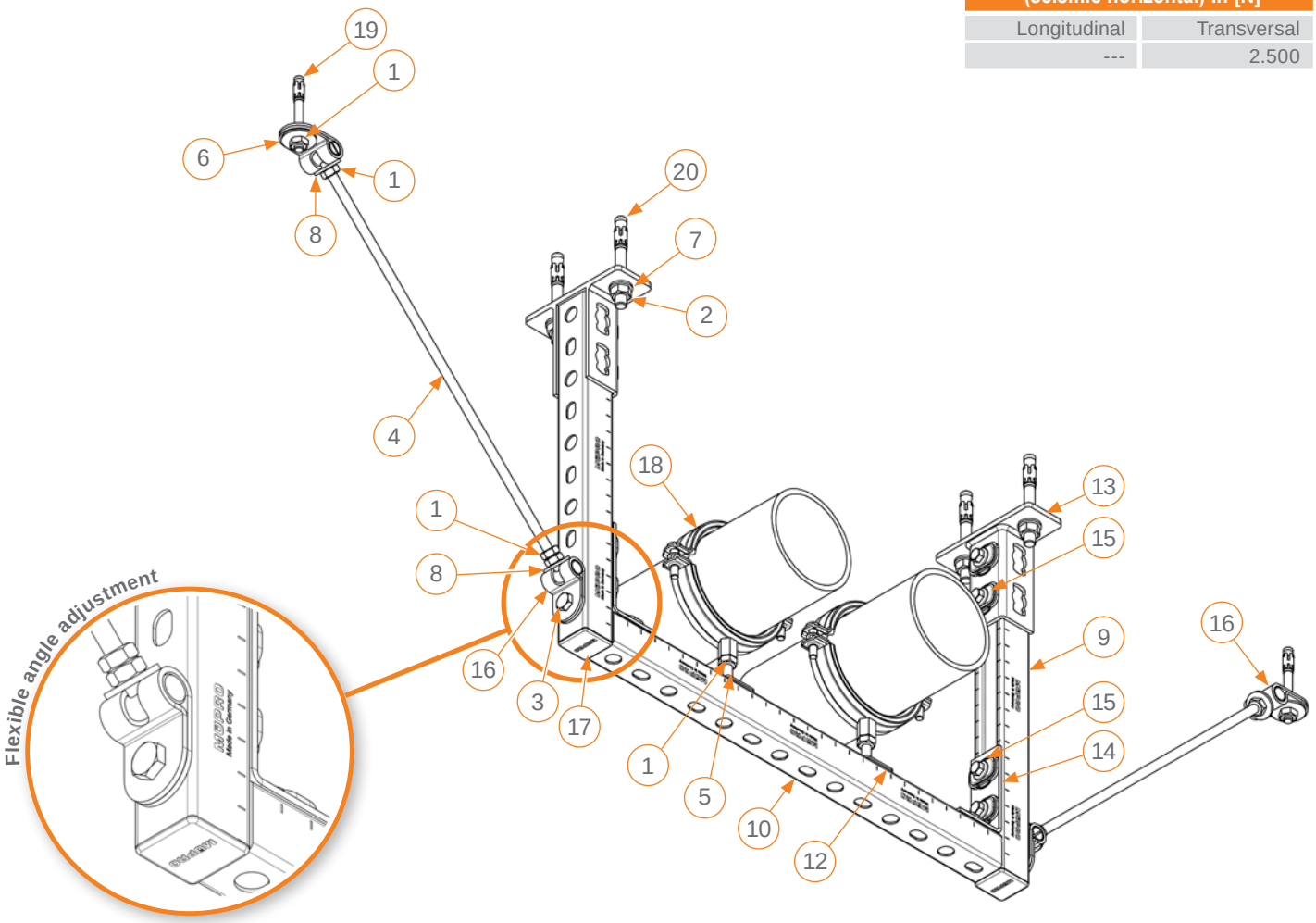


Pos.	Quantity	Part no.	Product description
1	6	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
3	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4/5	4	113467	Threaded rods, M10, 1.000 mm, galvanised
6	1	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
7	6	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
8	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
9/10	3	151189	DÄMMGULAST® Channel section for MPR-Support channels, for profiles 41/21-41/124
11	2	165673	MPR-Slide nuts Typ S+, M10, for profiles 41/21-41/124, galvanised
12	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
13	4	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
14	4		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500

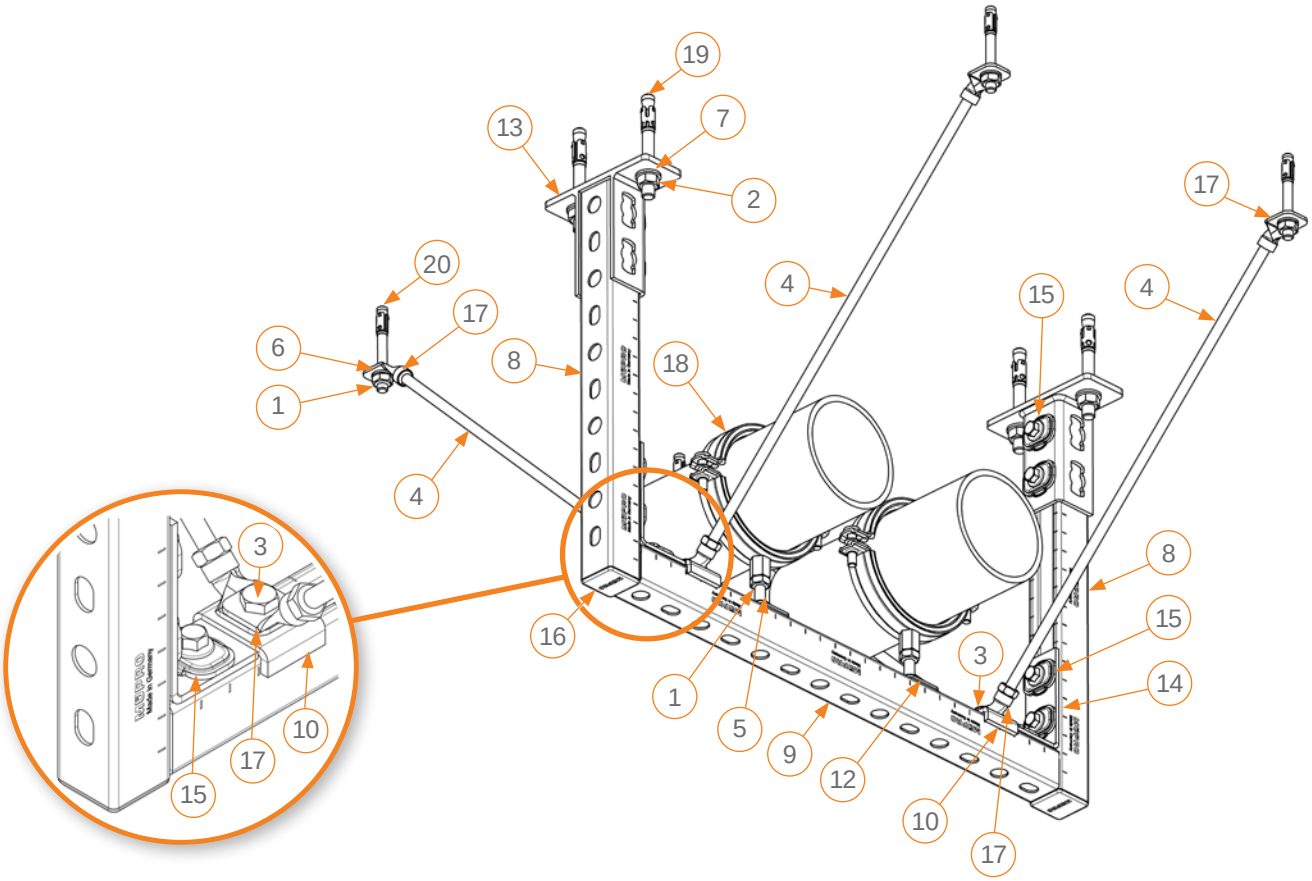


Pos.	Quantity	Part no.	Product description
1	6	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105565	Hexagon head bolts, DIN 933, M10 x 25 mm, galvanised
4	2	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	113825	Threaded pins, M10 x 55 mm, galvanised
6	2	127121	Washers, 10,5 x 36 x 2 mm, galvanised
7	4	127286	Washers, DIN 125, M12, galvanised
8	4	140876	Washers, 10,5 x 30 x 3 mm, galvanised
9/10	3	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
11	2	151053	MPR-Threaded plates, M10 for profiles 41/21/2,0 bis 41/124/2,5
12	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
13	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
14	2	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
15	10	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
16	4	170452	VARIO-Bolt joint M10, galvanised, assambled
17	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
18	2		Single bossed clamp
19/20	2		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

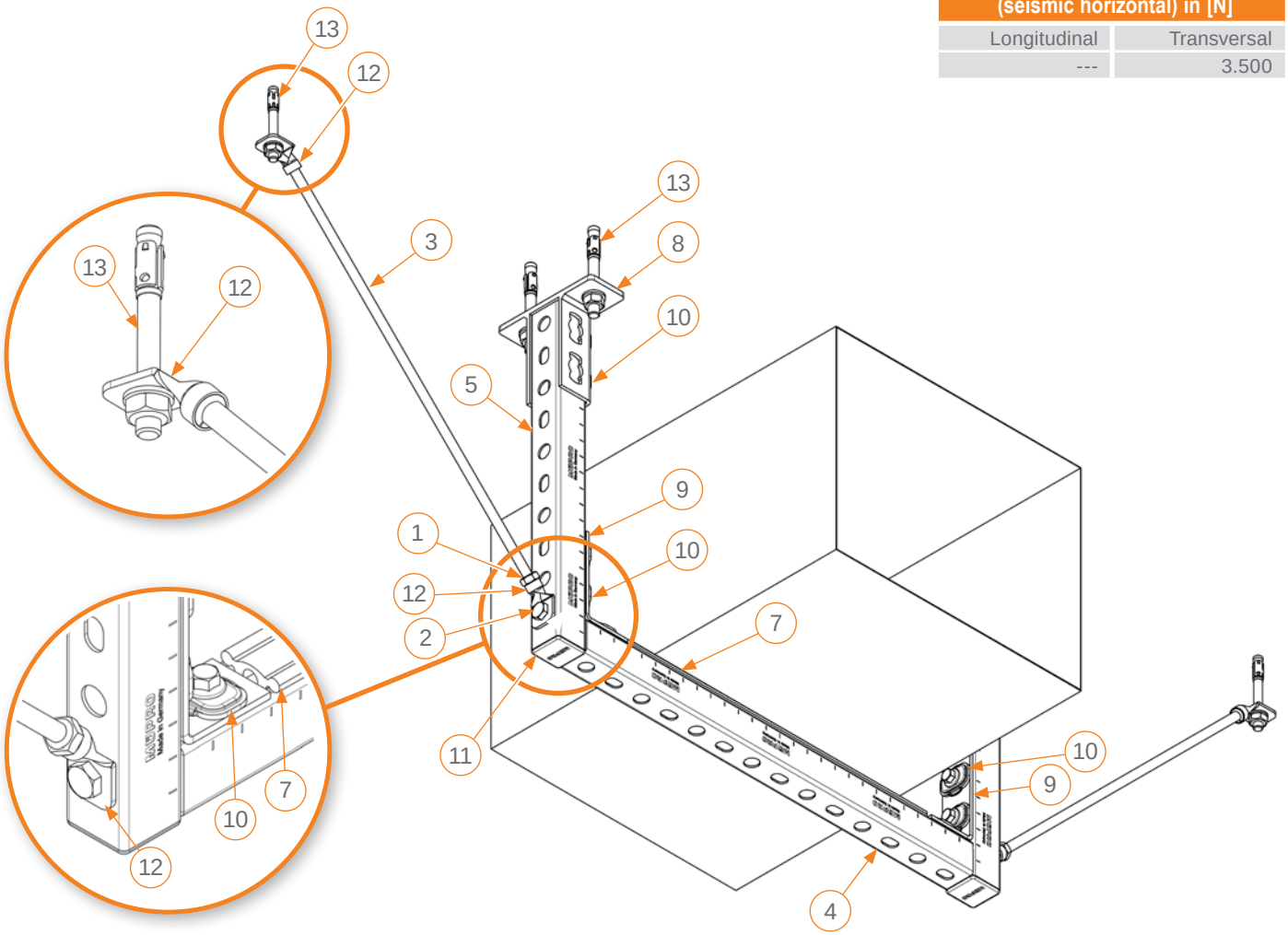


Pos.	Quantity	Part no.	Product description
1	8	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105585	Hexagon head bolts, DIN 933, M10 x 35 mm, galvanised
4	4	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	113825	Threaded pins, M10 x 55 mm, galvanised
6	4	127277	Washers, DIN 125, M10, galvanised
7	4	127286	Washers, DIN 125, M12, galvanised
8/9	3	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
10	2	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
11	2	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
12	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
13	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
14	2	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
15	10	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
16	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
17	8	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
18	2		Single bossed clamp
19/20	8		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with threaded rods for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	3.500



Pos.	Quantity	Part no.	Product description
1	2	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105565	Hexagon head bolts, DIN 933, M10 x 25 mm, galvanised
3	2	113467	Threaded rods, M10, 1.000 mm, galvanised
4/5	3	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
6	2	151053	MPR-Threaded plates, M10 for profiles 41/21/2,0 to 41/124/2,5
7	1	151189	DÄMMGULAST® Channel section for MPR-Support channels, for profiles 41/21-41/124
8	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
9	2	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
10	10	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
11	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
12	4	174424	Hanger sockets with reinforcement ring, M10, 45° angeled, hole diameter 10,5 mm, galvanised
13/14	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

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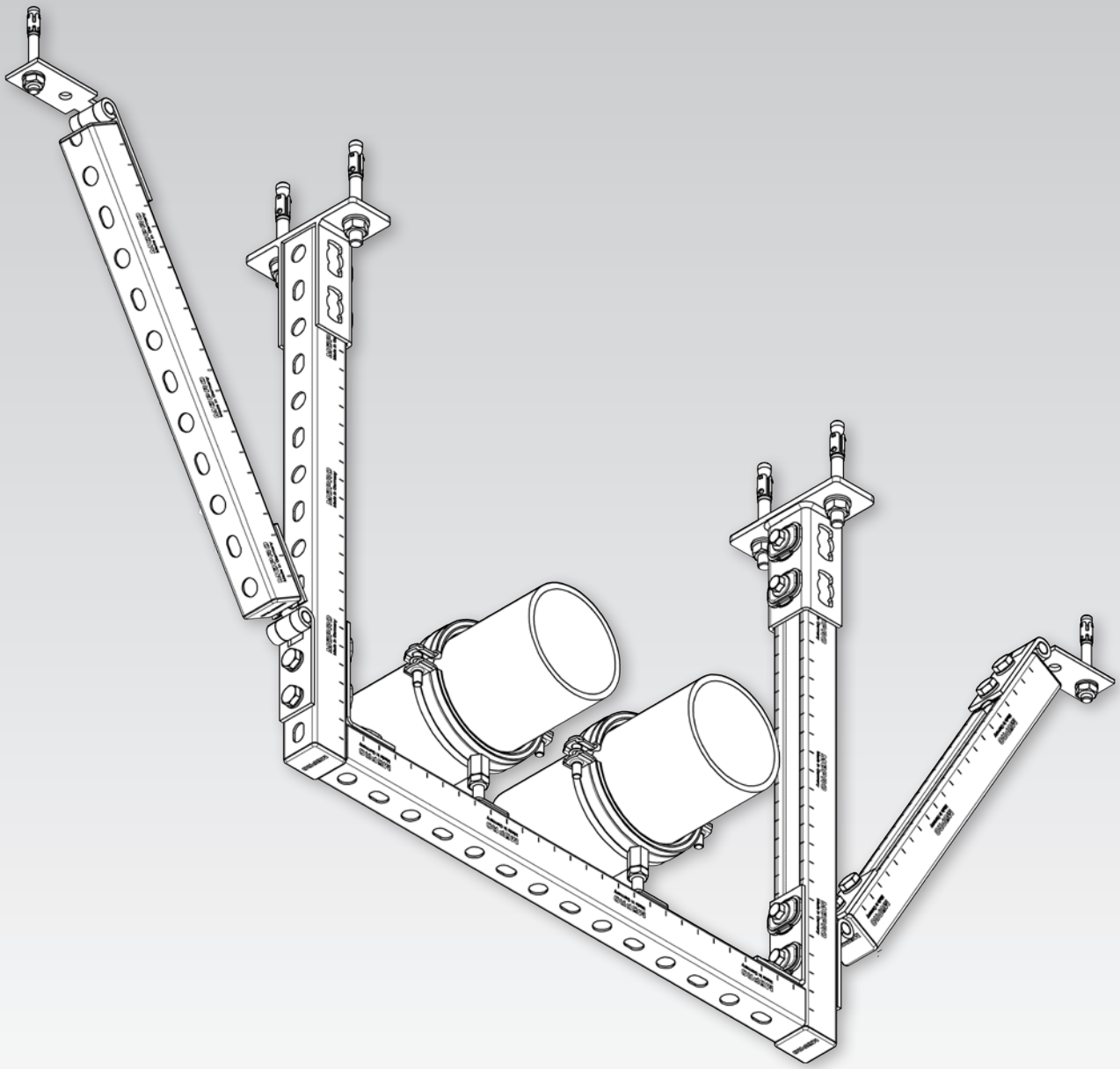
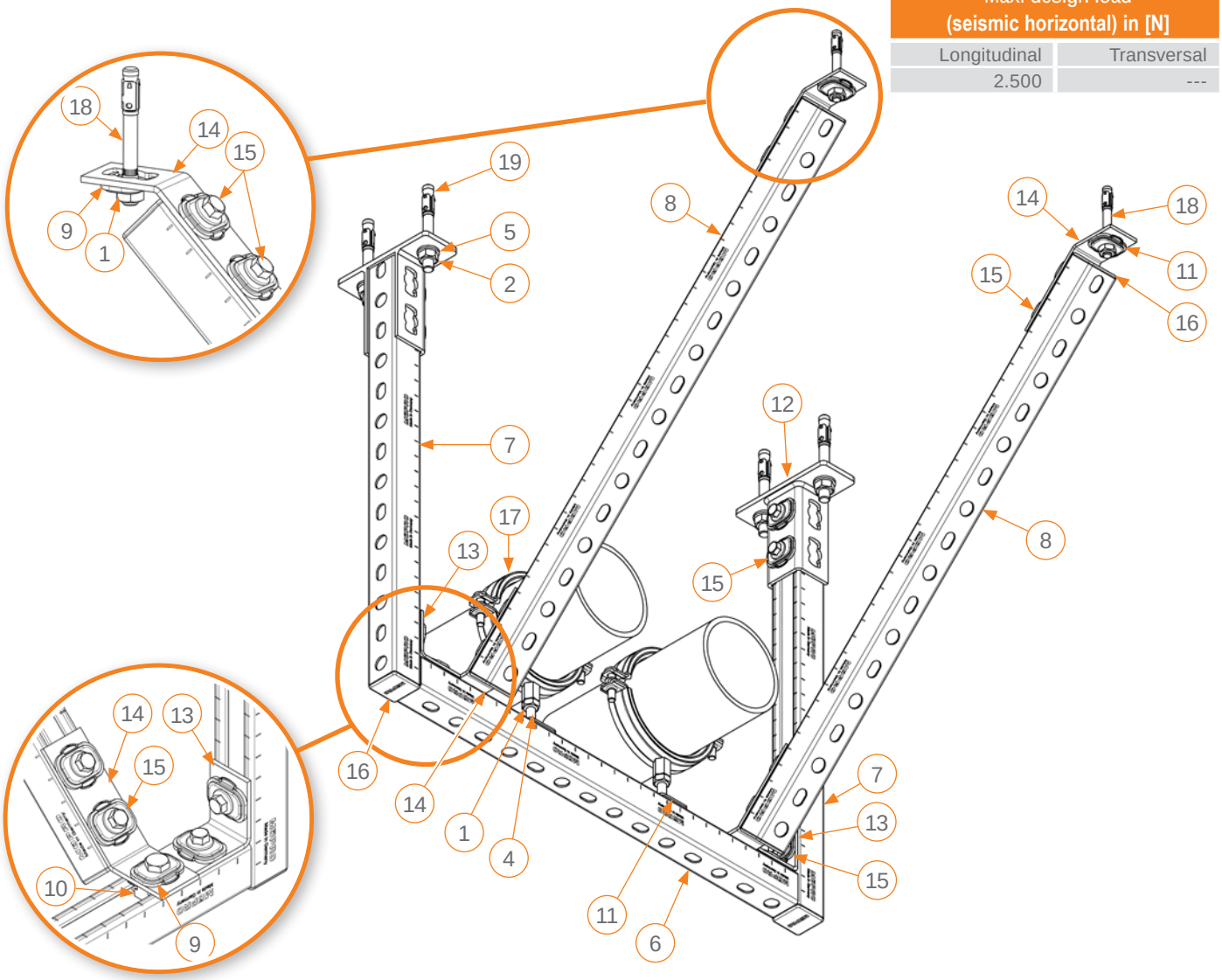


Installation on trapeze

Bracing with installation rails

Bracing in the longitudinal direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

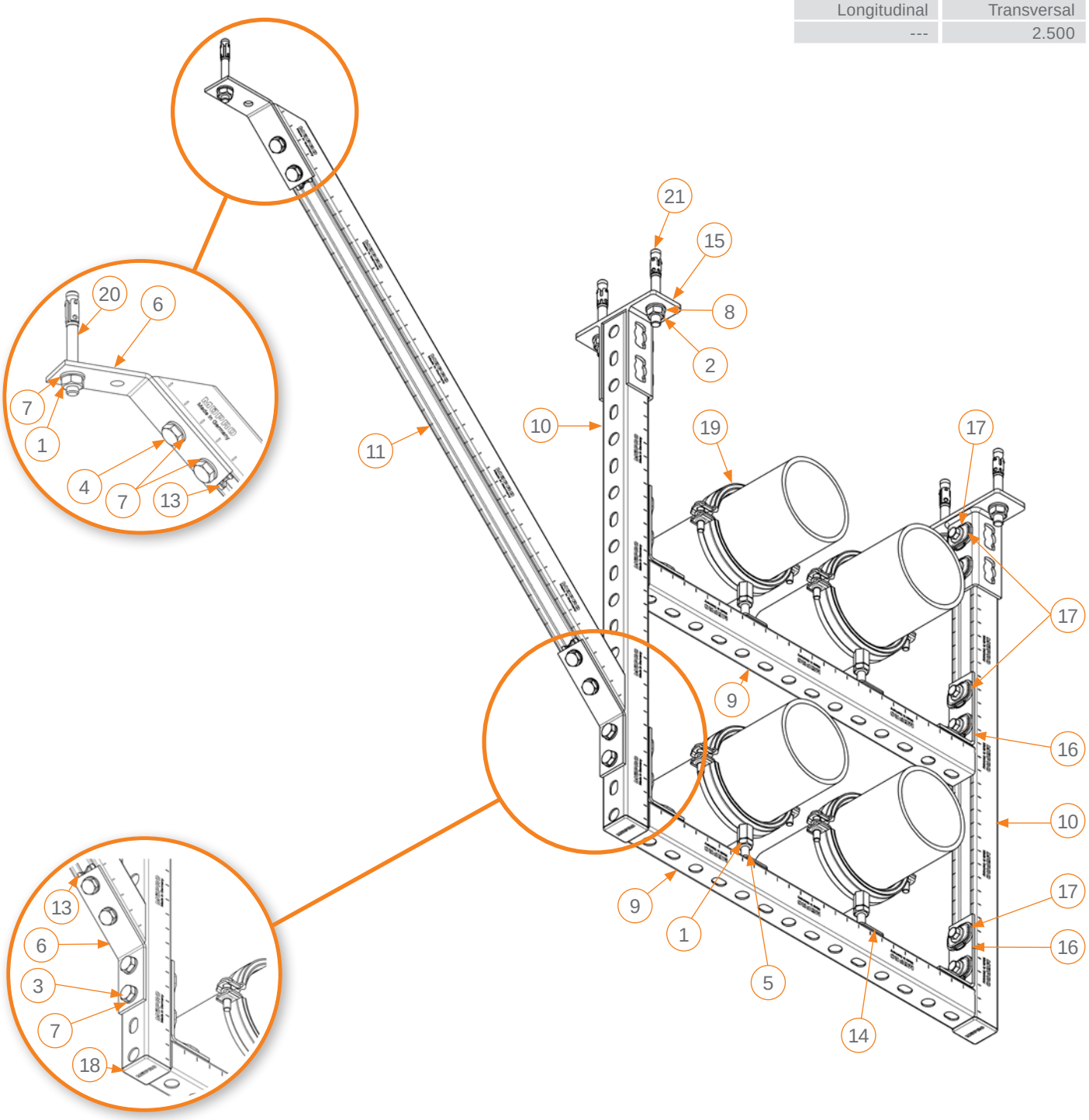


Pos.	Quantity	Part no.	Product description
1	4	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
4	2	113825	Threaded pins, M10 x 55 mm, galvanised
5	4	127286	Washers, DIN 125, M12, galvanised
6/7/8	5	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
9	4	165512	MPR-Adapter discs type S+ für M10, galvanised
10	2	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
11	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
12	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
13	2	165838	MPR-Mounting angles 90° type S+, 1+1, for profiles 41/21-41/124, galvanised
14	4	165841	MPR-Mounting angles 135° type S+, 1+2 for profiles 41/21-41/124, galvanised
15	16	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
16	6	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
17	2		Single bossed clamp
18/19	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500



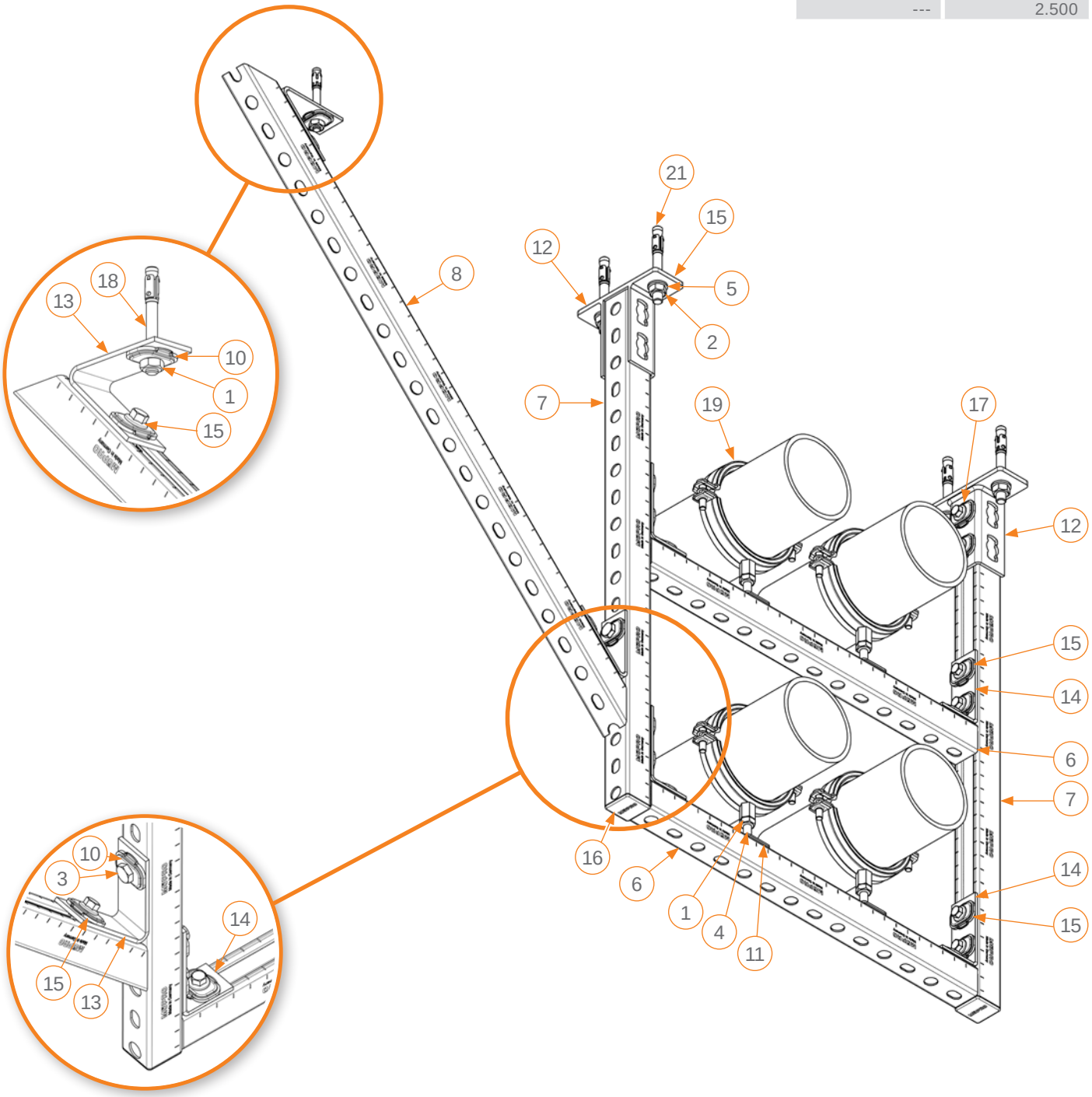
Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Pos.	Quantity	Part no.	Product description
1	8	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105560	Hexagon head bolts, DIN 933, M10 x 20 mm, galvanised
4	4	105585	Hexagon head bolts, DIN 933, M10 x 35 mm, galvanised
5	4	113825	Threaded pins, M10 x 55 mm, galvanised
6	2	118781	MPR-Mounting angles 45° for profiles 41/21-41/124, galvanised
7	7	127277	Washers, DIN 125, M10, galvanised
8	4	127286	Washers, DIN 125, M12, galvanised
9/10/11	5	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
12	2	151053	MPR-Threaded plates, M10 for profiles 41/21/2,0 bis 41/124/2,5
13	4	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
14	4	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
15	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
16	4	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
17	16	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
18	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
19	4		Single bossed clamp
20/21	5		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500



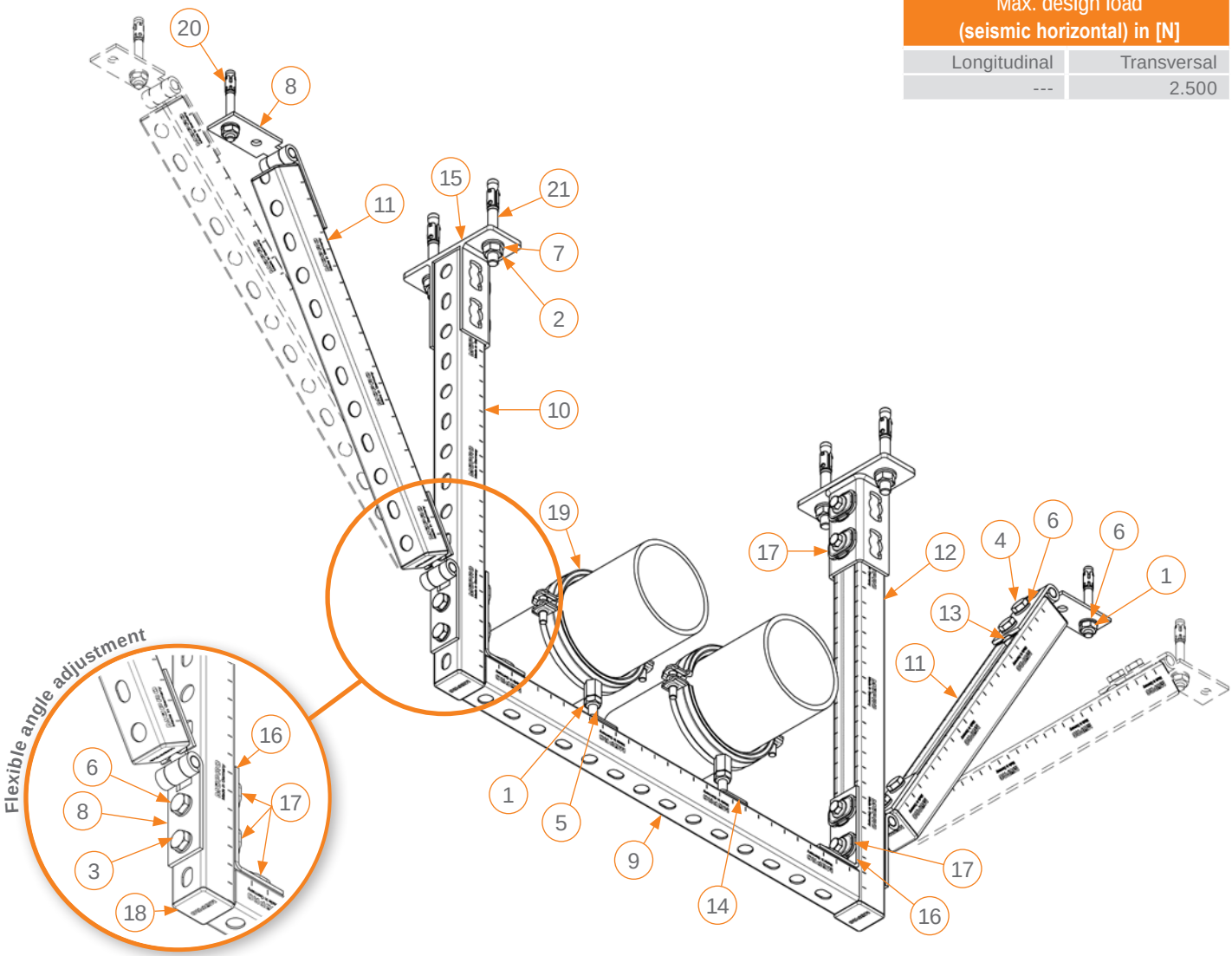
Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Pos.	Quantity	Part no.	Product description
1	8	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	1	105560	Hexagon head bolts, DIN 933, M10 x 20 mm, galvanised
4	4	113825	Threaded pins, M10 x 55 mm, galvanised
5	4	127286	Washers, DIN 125, M12, galvanised
6/7/8	5	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
9	1	151053	MPR-Threaded plates, M10 for profiles 41/21/2,0 bis 41/124/2,5
10	2	165512	MPR-Adapter discs type S+ für M10, galvanised
11	4	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
12	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
13	2	165830	MPR-Angle connector 45° type S+, 1+1, for profiles 41/21-41/124, galvanised
14	4	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
15	18	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
16	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
17	4		Single bossed clamp
18/19	5		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500

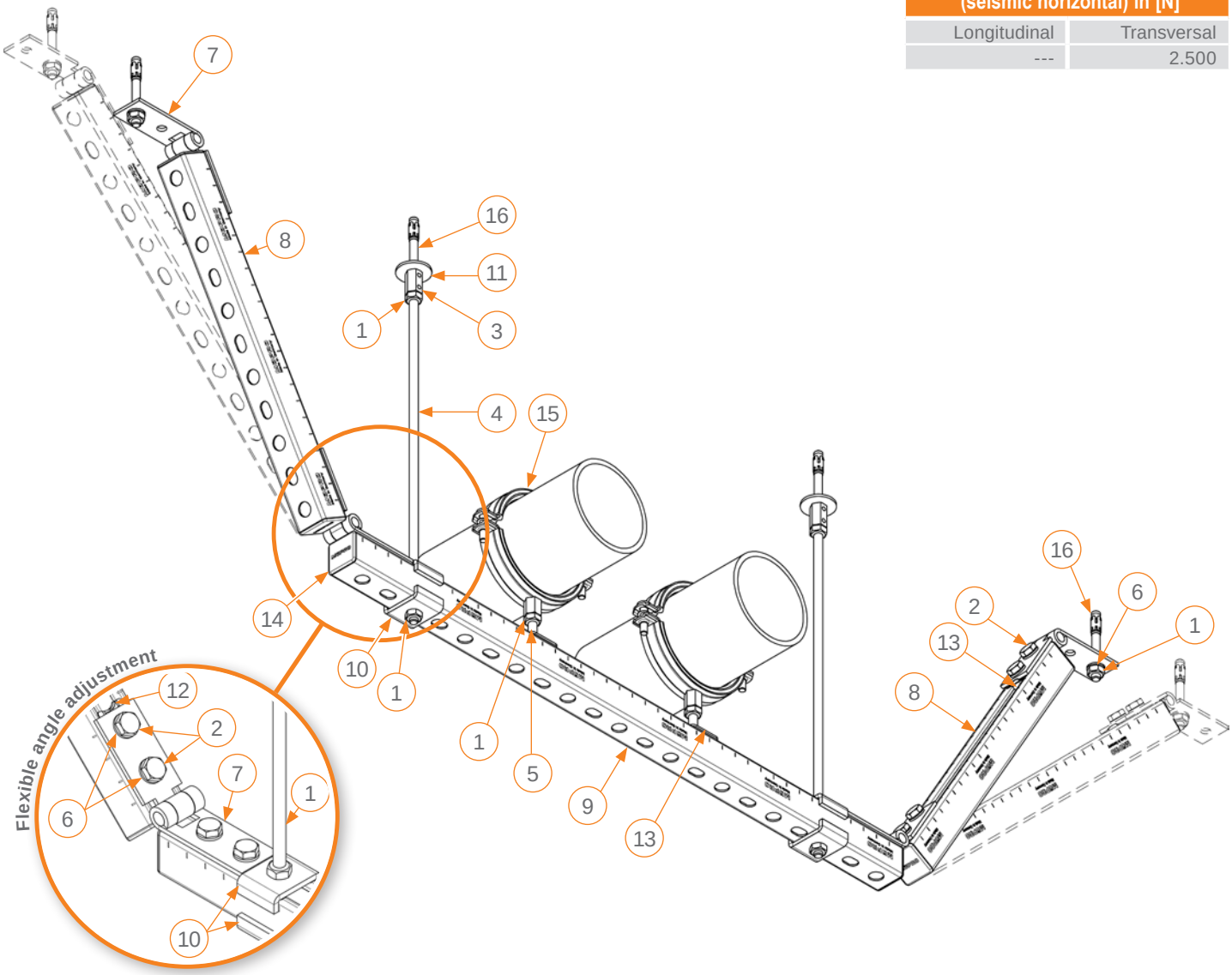


Pos.	Quantity	Part no.	Product description
1	4	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	4	105560	Hexagon head bolts, DIN 933, M10 x 20 mm, galvanised
4	8	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
5	2	113825	Threaded pins, M10 x 55 mm, galvanised
6	14	127277	Washers, DIN 125, M10, galvanised
7	4	127286	Washers, DIN 125, M12, galvanised
8	4	139746	MPC-VARIO joint for channel support, for profiles 38/24-40/120, zinc-nickel
9/10/11	5	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
12	4	151053	MPR-Threaded plates, M10 for profiles 41/21/2,0 bis 41/124/2,5
13	8	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
14	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
15	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
16	2	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
17	10	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
18	6	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
19	2		Single bossed clamp
20/21	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the transverse direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
---	2.500

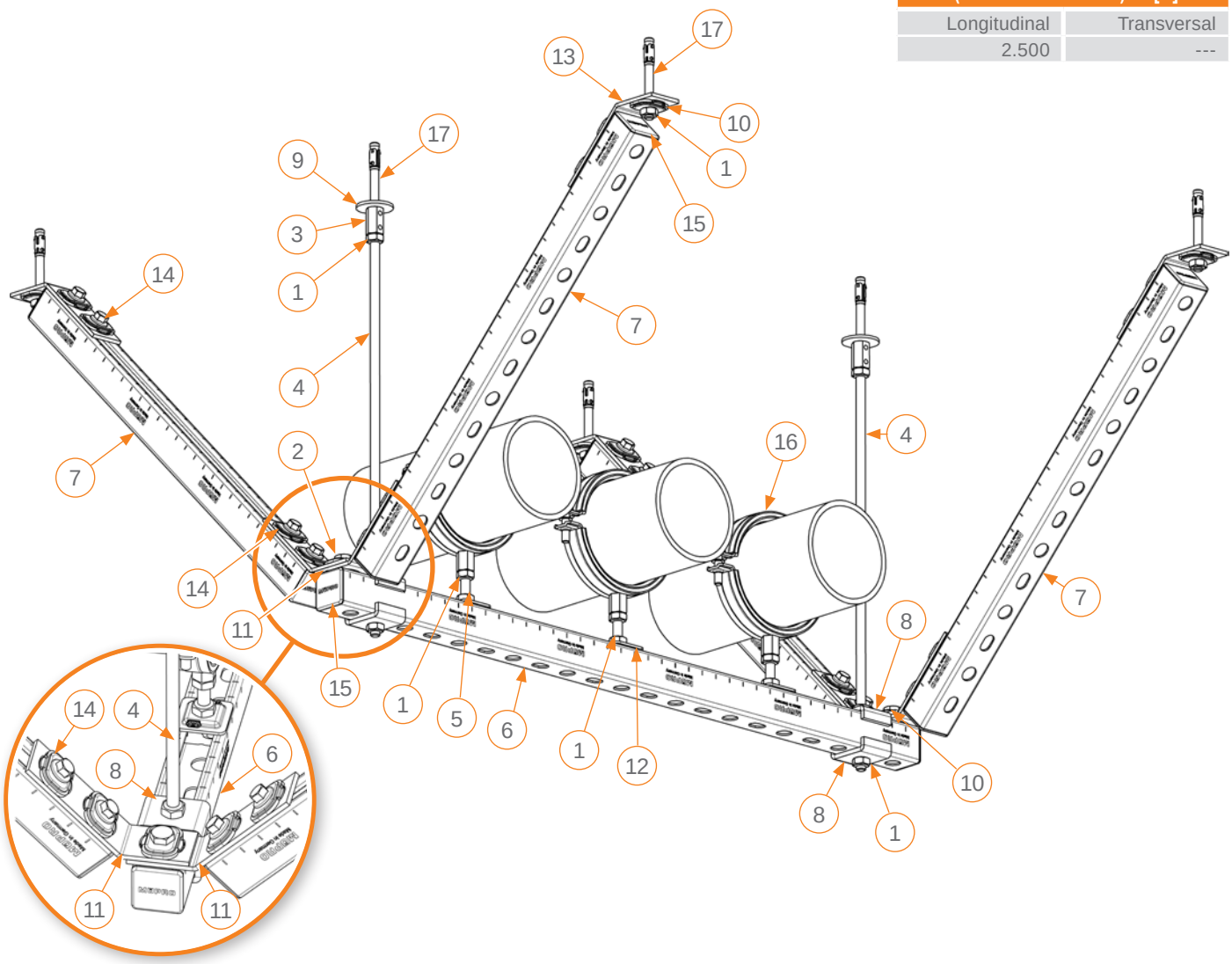


Pos.	Quantity	Part no.	Product description
1	8	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	12	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
3	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4	2	113467	Threaded rods, M10, 1.000 mm, galvanised
5	2	113825	Threaded pins, M10 x 55 mm, galvanised
6	14	127277	Washers, DIN 125, M10, galvanised
7	4	139746	MPC-VARIO joint for channel support, for profiles 38/24-40/120, Zinc-nickel
8/9	3	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
10	4	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
11	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
12	12	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
13	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
14	6	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
15	2		Single bossed clamp
16	4		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

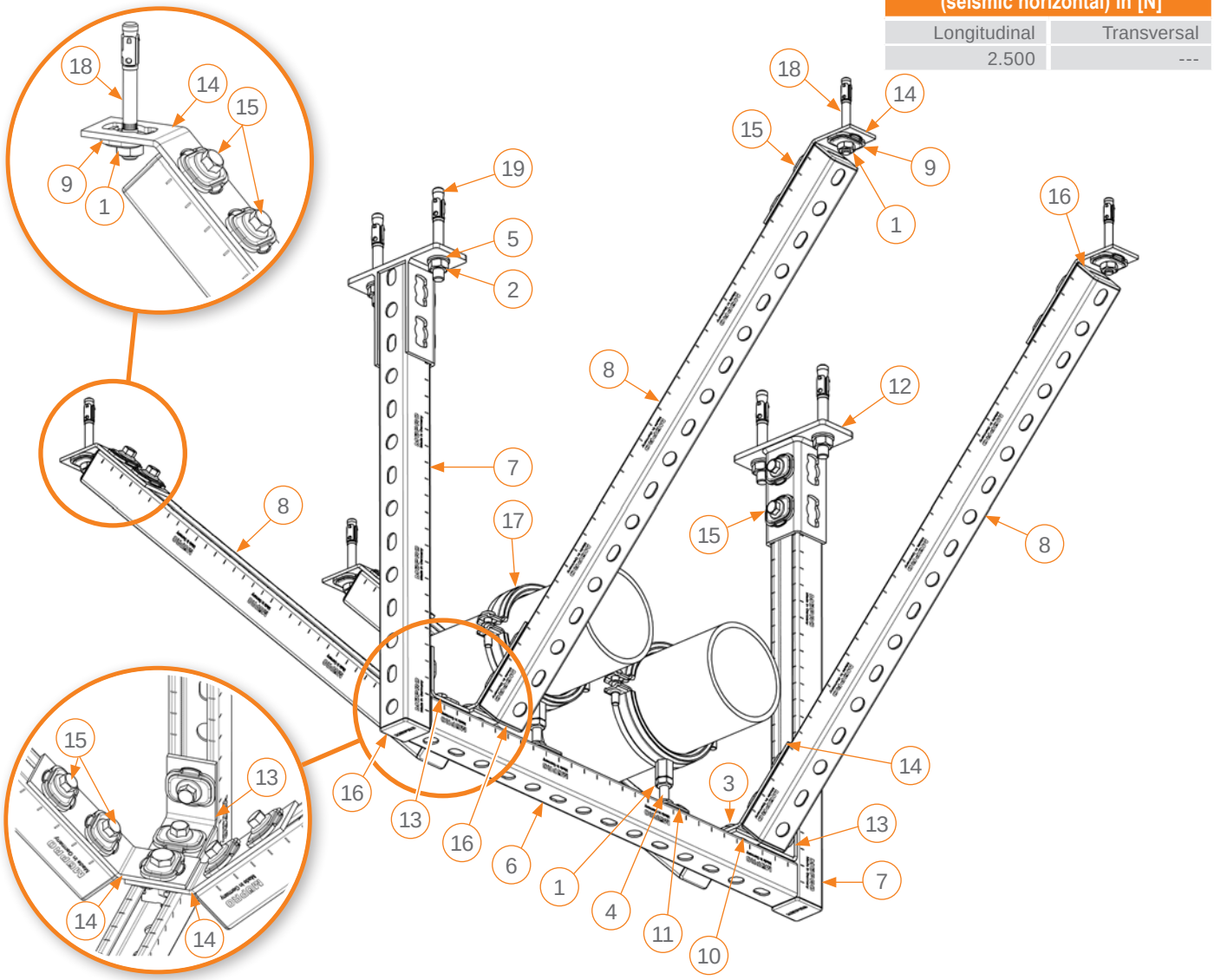


Pos.	Quantity	Part no.	Product description
1	10	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	2	105585	Hexagon head bolts, DIN 933, M10 x 35 mm, galvanised
3	2	113322	Hex connectors SW 17, M10 x 30 mm, galvanised
4	2	113467	Threaded rods, M10, 1.000 mm, galvanised
5	3	113825	Threaded pins, M10 x 55 mm, galvanised
6/7	5	150933	MPR-Support channels 41/41/2,0, length: 2.000 mm, sendzimir galvanised
8	4	151098	MPR-Clamp brackets, heavy-duty type, M10 for profiles 41/21-41/124, galvanised
9	2	151102	Washers, 10,5 x 40 x 3 mm, galvanised
10	6	165512	MPR-Adapter discs type S+ für M10, galvanised
11	2	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
12	3	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
13	8	165841	MPR-Mounting angles 135° Typ S+, 1+2 for profiles 41/21-41/124, galvanised
14	16	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
15	10	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
16	3		Single bossed clamp
17	6		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

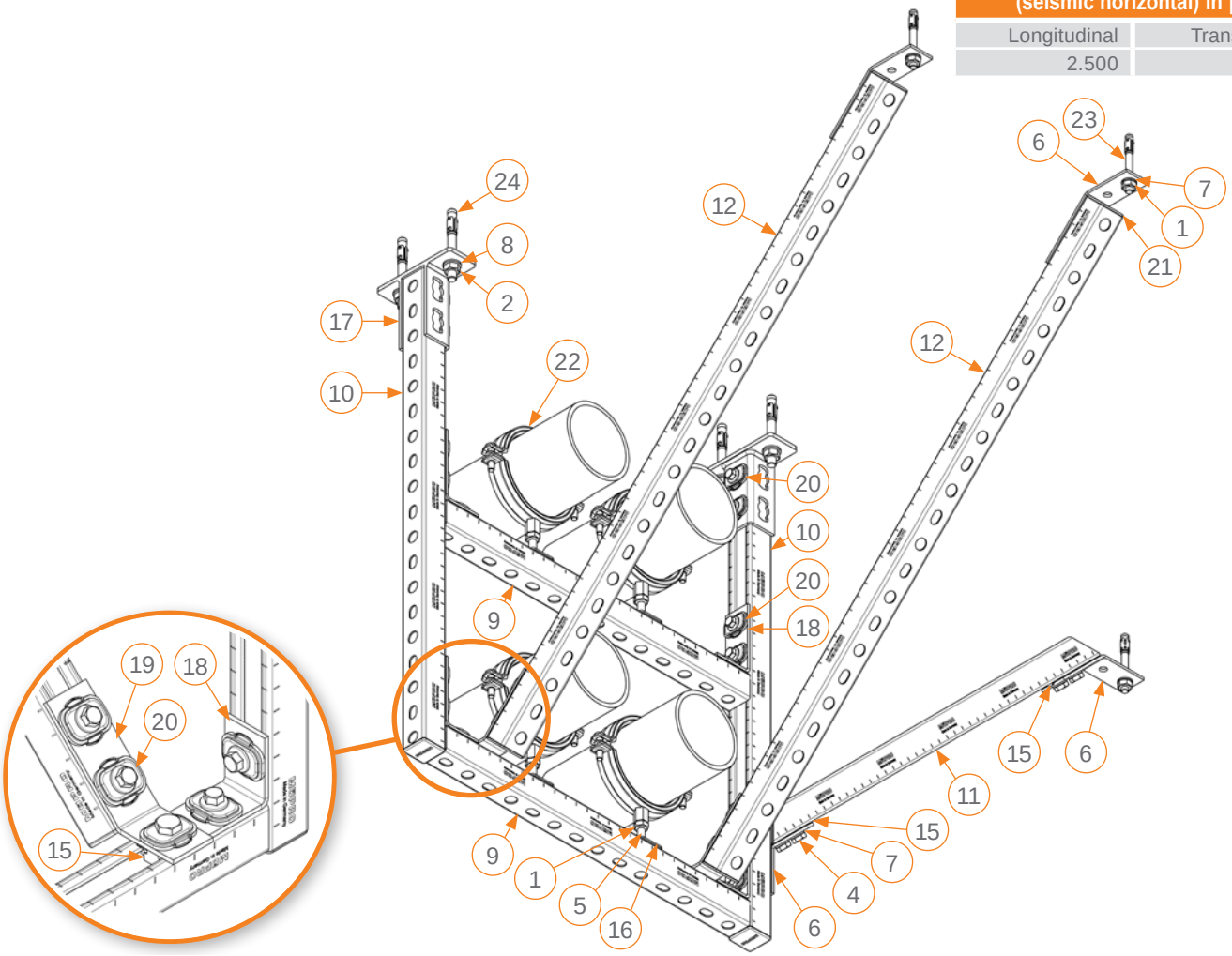


Pos.	Quantity	Part no.	Product description
1	4	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
4	2	113825	Threaded pins, M10 x 55 mm, galvanised
5	4	127286	Washers, DIN 125, M12, galvanised
6/7/8	7	150933	MPR-Support channels 41/41/2,0, Length: 2.000 mm, sendzimir galvanised
9	6	165512	MPR-Adapter discs Typ S+ für M10, galvanised
10	2	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
11	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
12	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
13	2	165838	MPR-Mounting angles 90° type S+, 1+1, for profiles 41/21-41/124, galvanised
14	8	165841	MPR-Mounting angles 135° type S+, 1+2 for profiles 41/21-41/124, galvanised
15	24	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
16	10	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
17	2		Single bossed clamp
18/19	8		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal and traverse direction with channels for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---

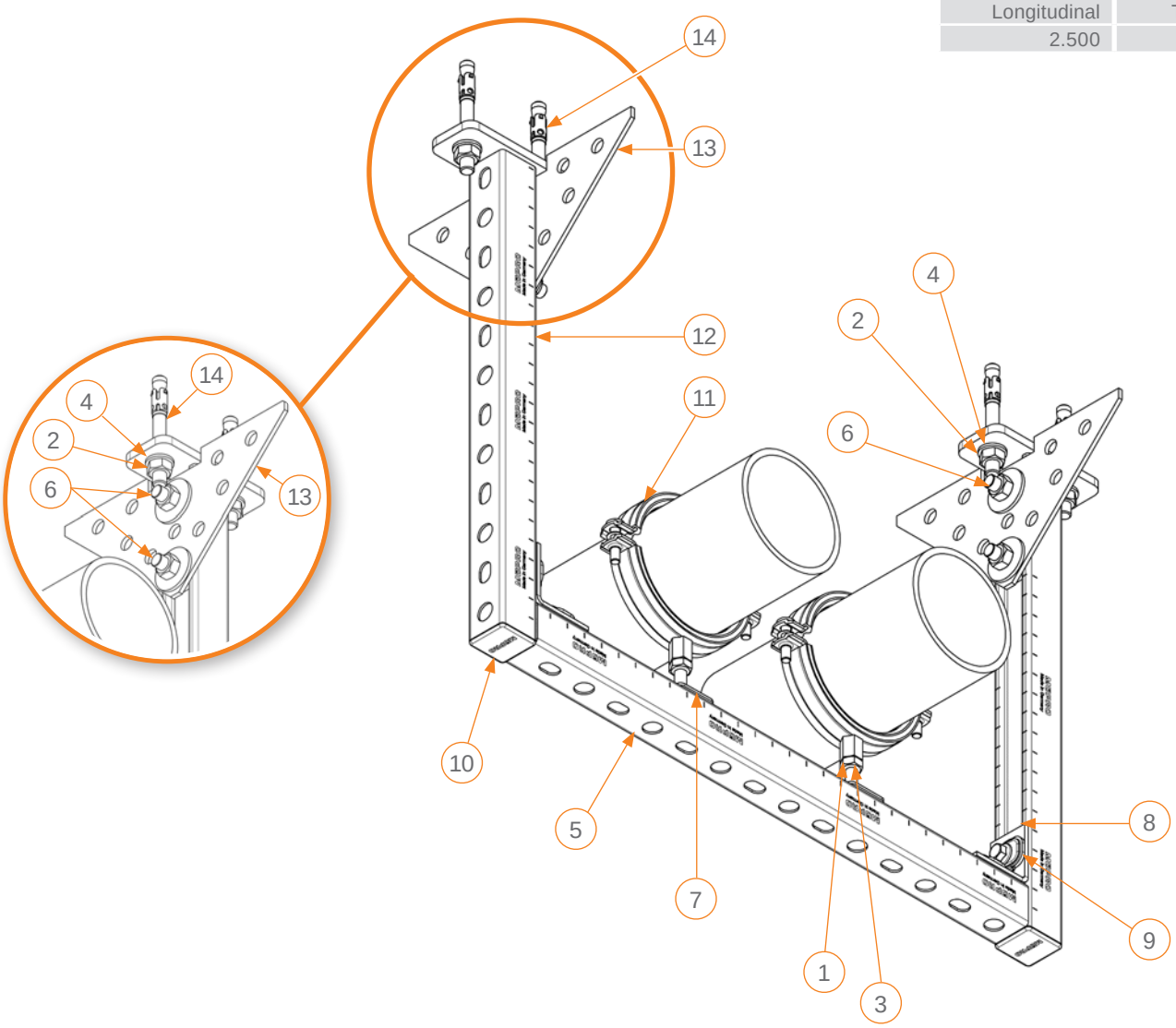


Pos.	Quantity	Part no.	Product description
1	8	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	105560	Hexagon head bolts, DIN 933, M10 x 20 mm, galvanised
4	10	105575	Hexagon head bolts, DIN 933, M10 x 30 mm, galvanised
5	4	113825	Threaded pins, M10 x 55 mm, galvanised
6	4	118781	MPR-Mounting angles 45° for profiles 41/21-41/124, galvanised
7	13	127277	Washers, DIN 125, M10, galvanised
8	4	127286	Washers, DIN 125, M12, galvanised
9/10/11/12	7	150933	MPR-Support channels 41/41/2,0, Length: 2.000 mm, sendzimir galvanised
13	2	151053	MPR-Threaded plates, M10 for profiles 41/21/2,0 bis 41/124/2,5
14	2	165512	MPR-Adapter discs type S+ für M10, galvanised
15	10	165673	MPR-Slide nuts type S+, M10, for profiles 41/21-41/124, galvanised
16	4	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
17	2	165825	MPR-Saddle support crosswise, type S+, for profiles 41/21 - 41/124, galvanised
18	4	165839	MPR-Mounting angles 90° type S+, 1+2, for profiles 41/21-41/124, galvanised
19	2	165841	MPR-Mounting angles 135° type S+, 1+2 for profiles 41/21-41/124, galvanised
20	20	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
21	6	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
22	4		Single bossed clamp
23/24	7		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

Bracing in the longitudinal direction with reinforcement angle for installation on trapeze

Max. design load (seismic horizontal) in [N]	
Longitudinal	Transversal
2.500	---



Pos.	Quantity	Part no.	Product description
1	4	105433	Hexagonal nuts, DIN 934, M10, galvanised
2	4	105447	Hexagonal nuts, DIN 934, M12, galvanised
3	2	113825	Threaded pins, M10 x 55 mm, galvanised
4	4	127286	Washers, DIN 125, M12, galvanised
5	1	150933	MPR-Support channels 41/41/2,0, Length: 2.000 mm, sendzimir galvanised
6	4	151069	MPR-Hammer head fasteners, M12 x 40 mm for profiles 41/21/2,0, 41/41/2,0, 41/82/2,0, 41/41/2,5, 41/62/2,5, 41/124/2,5, galvanised
7	2	165679	MPR-Quick fasteners type S+ M10, for profiles 41/21-41/124, galvanised
8	2	165838	MPR-Mounting angles 90° Typ S+, 1+1, for profiles 41/21-41/124, galvanised
9	4	169020	MPR-Connection lock type S+, for profiles 41/21-41/124, galvanised
10	2	170508	MPR-Protection caps for profiles 41/41, 41/82, orange
11	2	151441	Single bossed clamp DÄMMGULAST® yellow, M10/M12, 4"" (112-118 mm), galvanised
12	2	156771	MPR-Wall hanger brackets 41/41/2,0, length: 480 mm, galvanised
13	2	159436	MPC/MPR-Reinforcement angles for profiles 38/24-40/120, 41/21-41/124, galvanised
14	4		Anchors must be approved for earthquake loads (*)

Note:
Conceptual depiction according to Eurocode 8. All exposures on the supporting structure must be calculated on a project-specific basis. For project-specific seismic design and calculation please contact our Applications Engineering Department.
Recommended pipe clamps: single bossed clamp or heavy-duty single bossed clamp. If heavy-duty single bossed clamp is selected: M8 x 45 (ref. 125789) / M10 x 55 (ref. 105600) anchor recommended.
To select the correct anchor according to the performance categories C1/C2, please contact our application engineering department: anwendungstechnik@muepro.de .

MÜPRO

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