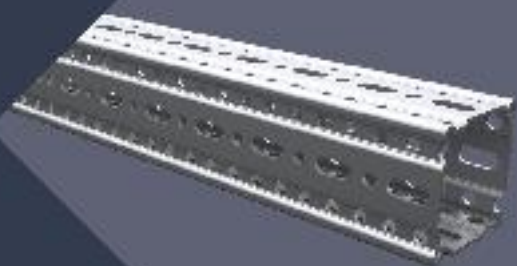


sikla



Simotec

Design and Engineering Manual

Design and Engineering Manual

Sikla GmbH

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78056 VS-Schwenningen

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Revision: 4

tt.mm.20jj

Revision History

Rev.	Date	Modification
0	25.02.2020	First Edition
1	17.06.2020	Max. Tolerance WBD chapter #5 added
2	28.10.2020	Chapter "Products" and "Installation Guideline" added
3	29.04.2021	Update of new Joining Plates Update of Joining Plate with TKO Axile Stop added Double Axile Stop added Design Idea short U post modified and extended
4	tt.mm.jjjj	Tightening Torque and Loads for connections to web side of H-beams added Note to use HV150 or HV200 pipe shoes in case of insulated pipelines

Changes and improvements in regard to design are subject to change. Our terms and conditions of sale, delivery and payment can be found in the current Sikla price list.

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1. Products and Static

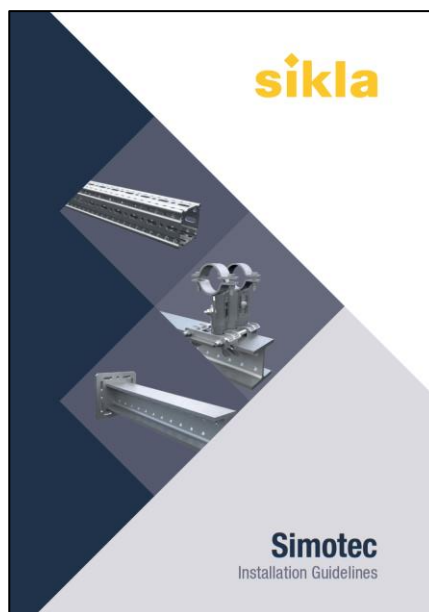


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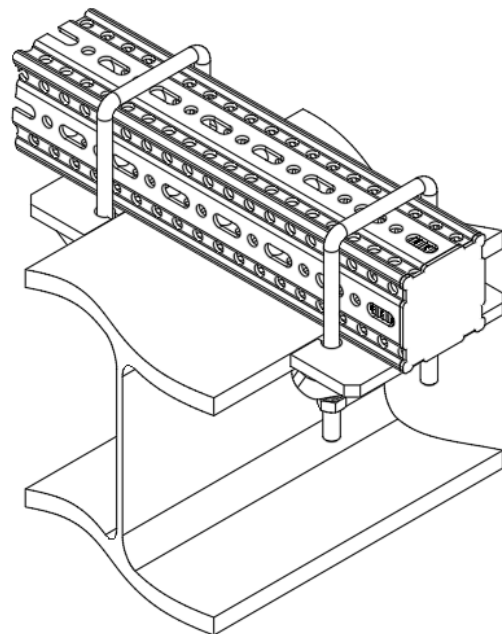
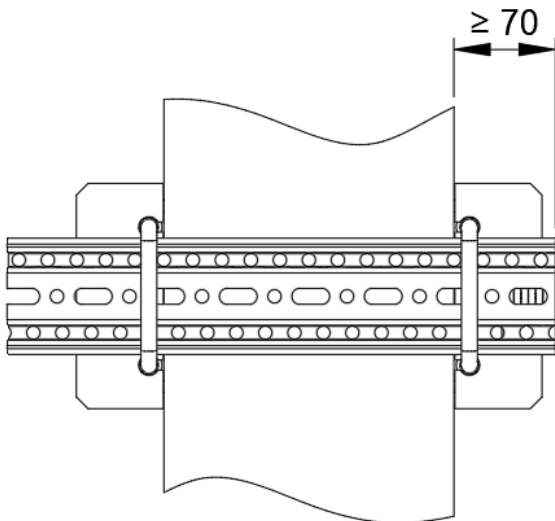
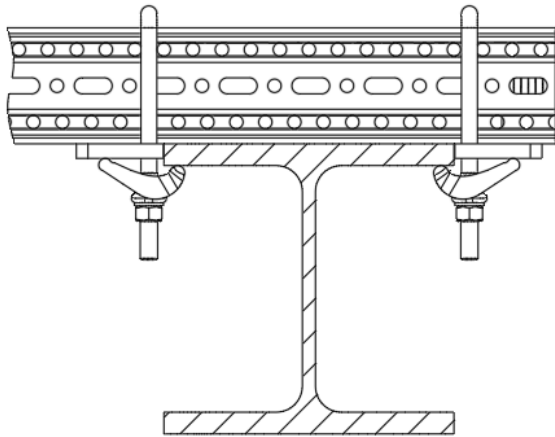
2. Notes and Foreword

The design information in this manual only apply for a manual workflow.

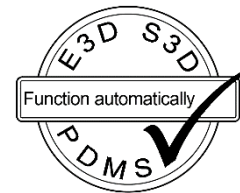
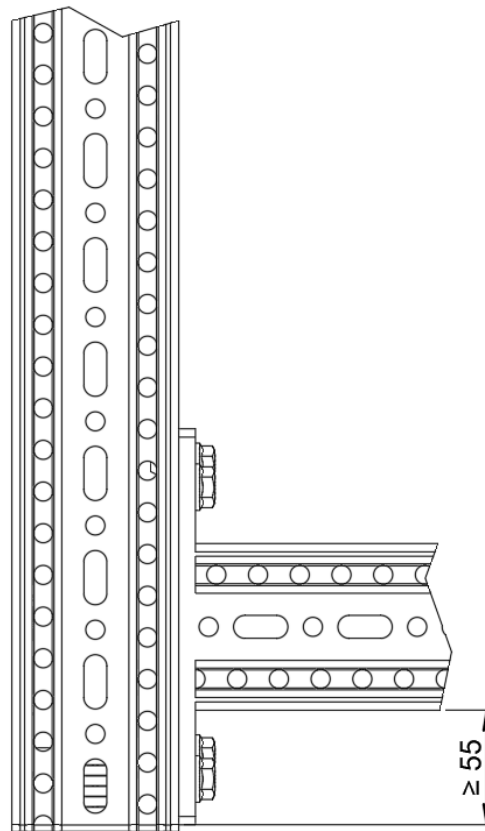
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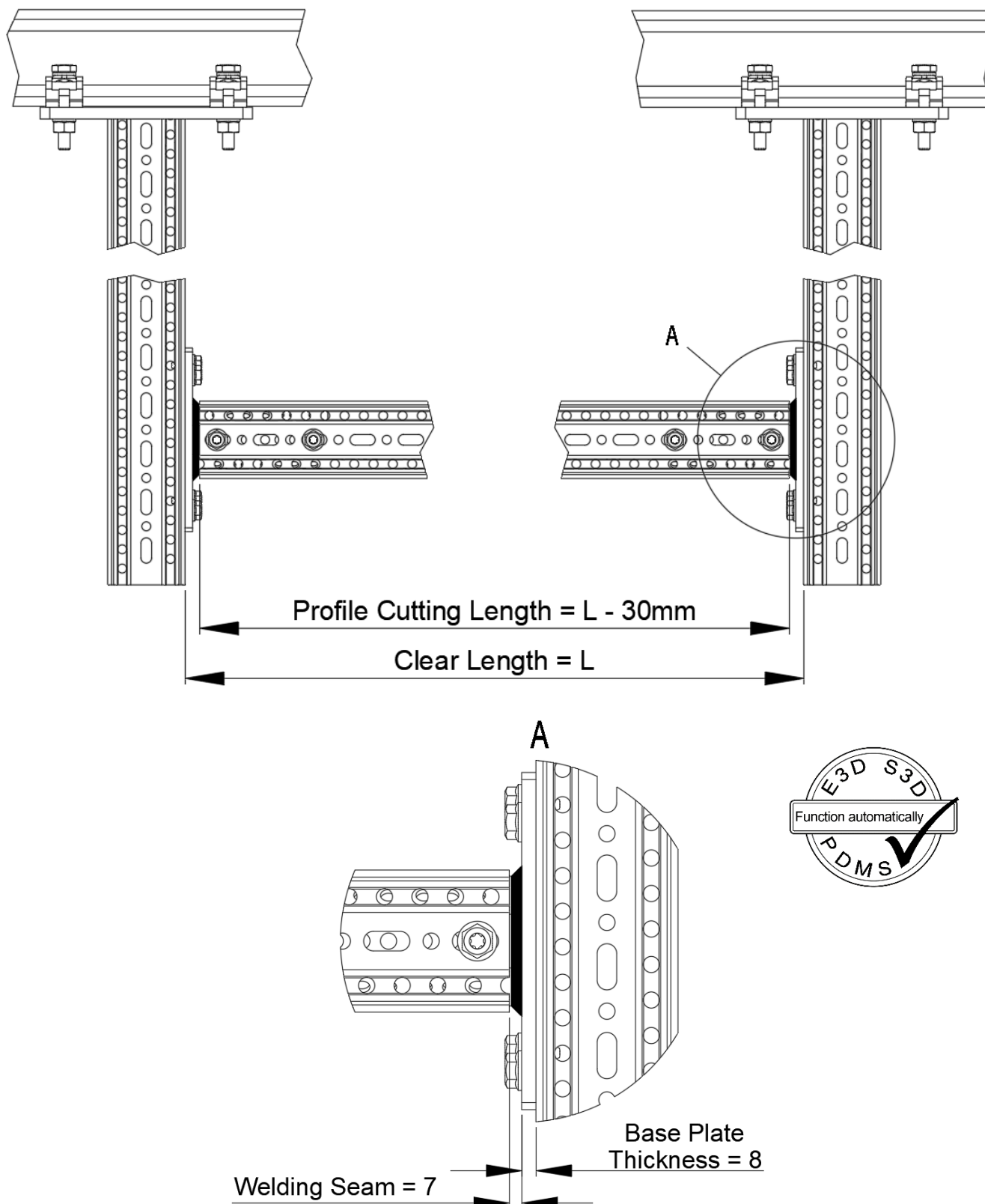
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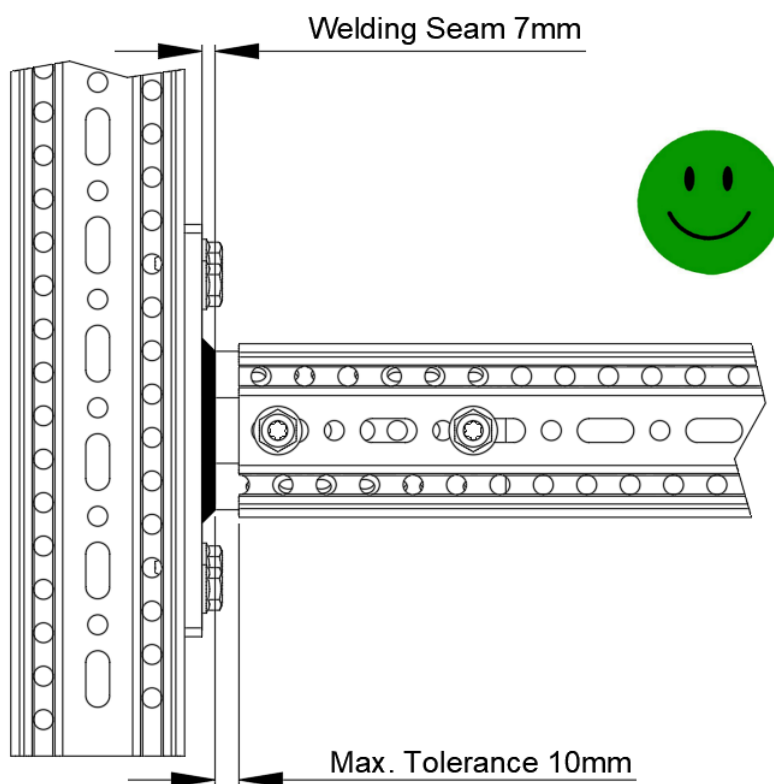
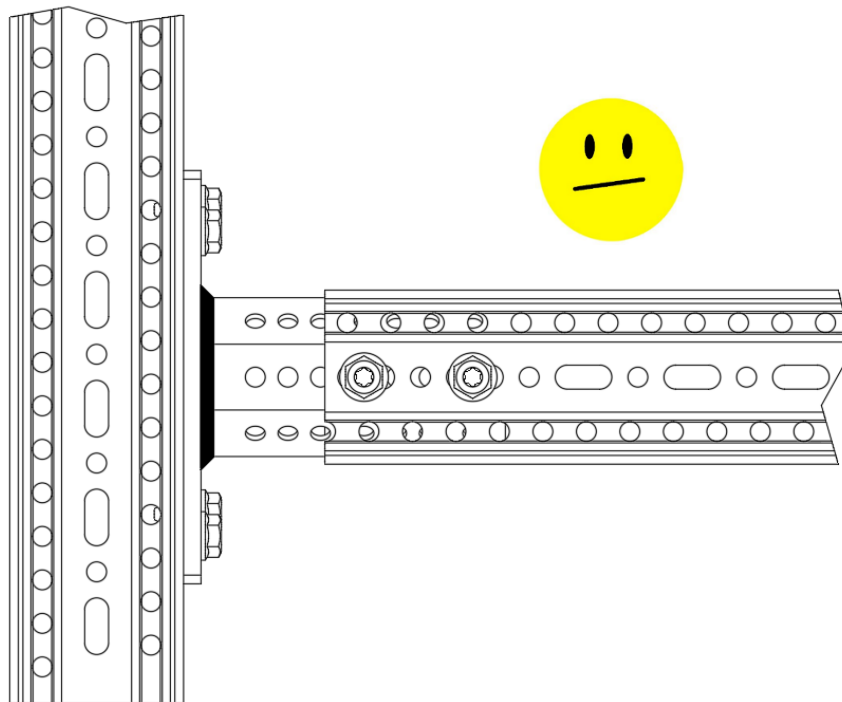
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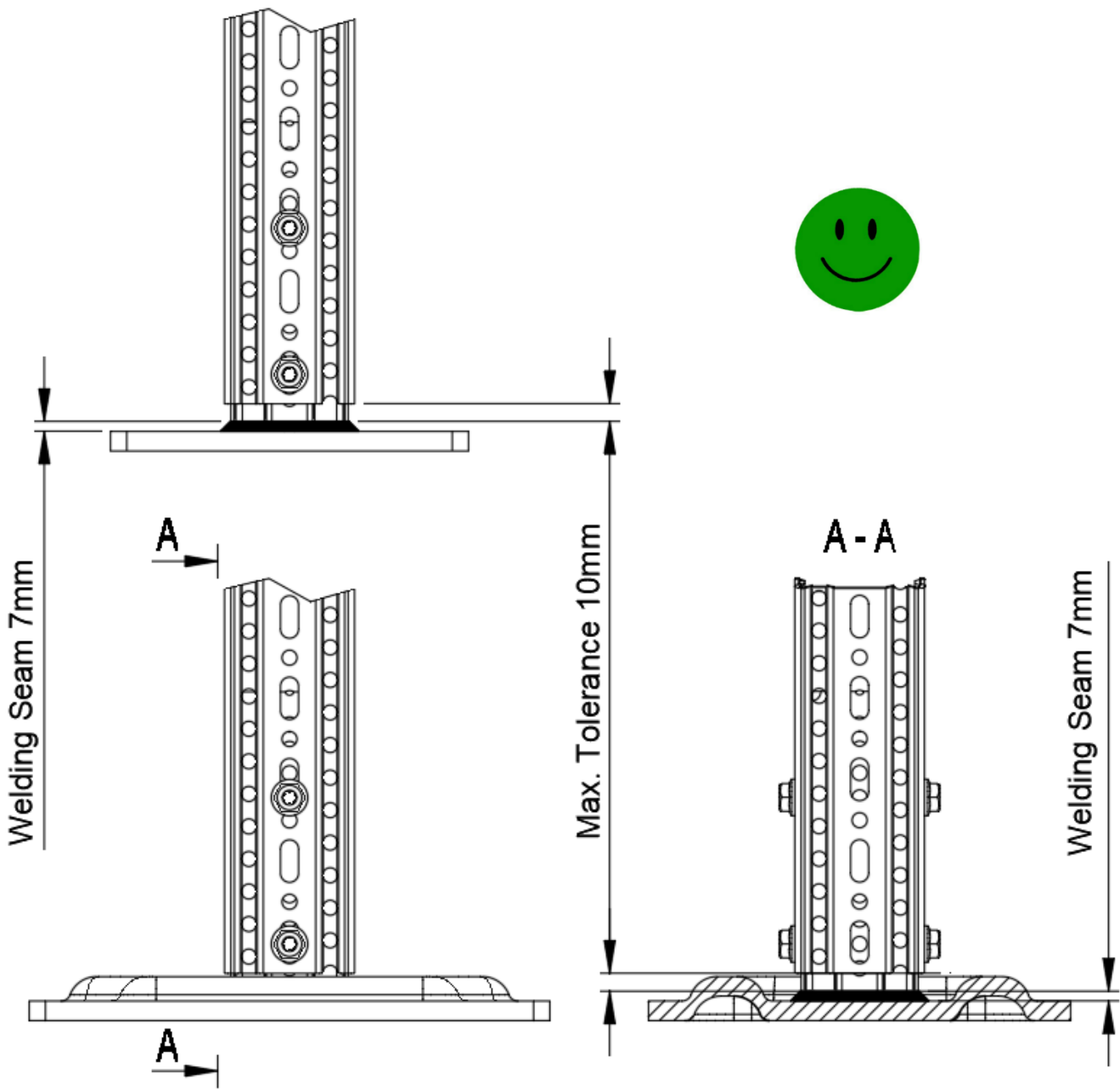


5. Cutting Length U-Post

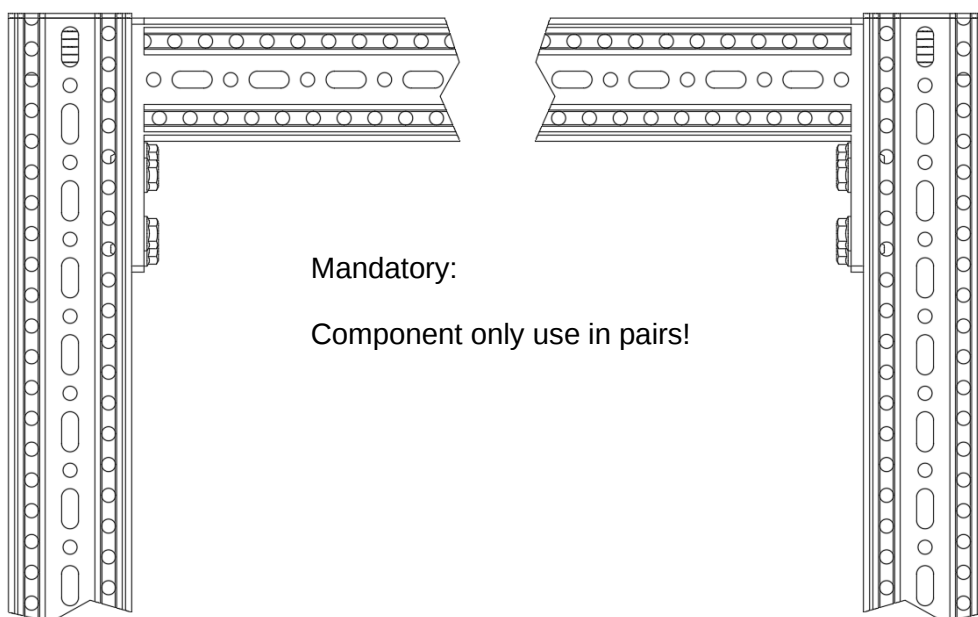
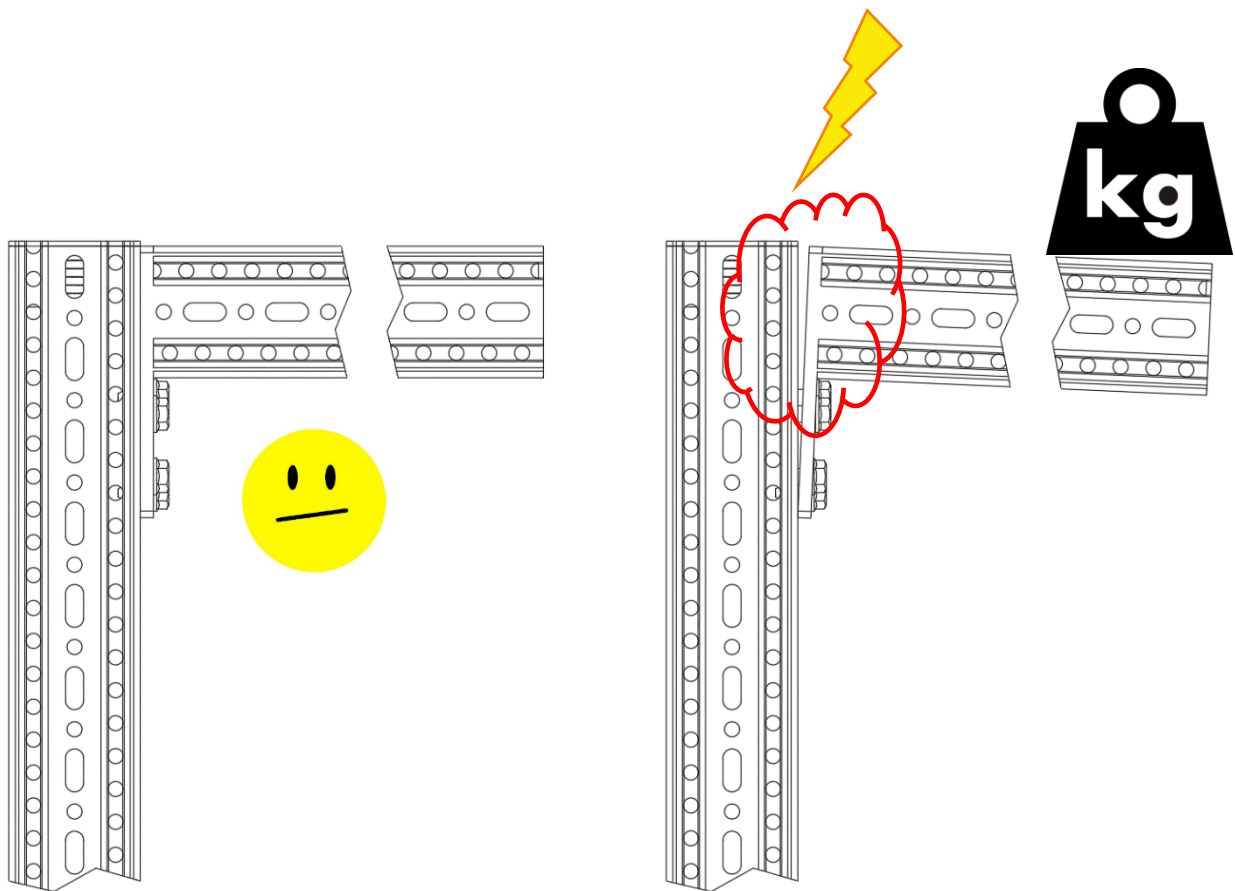


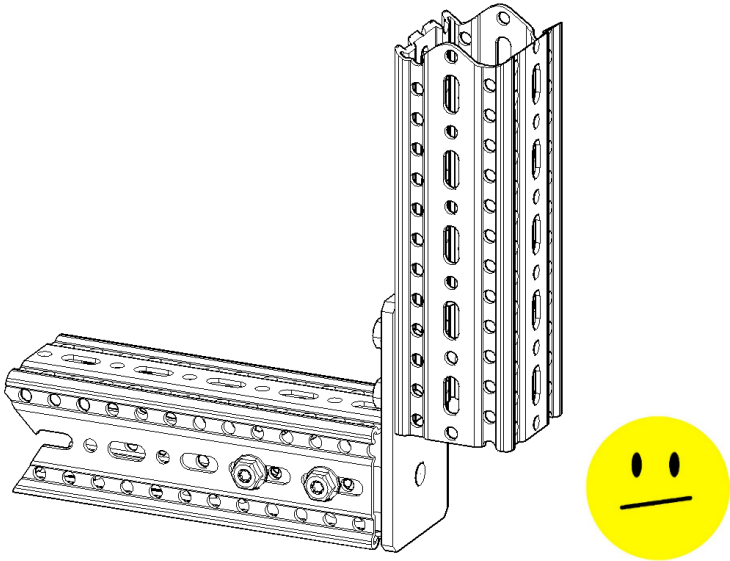
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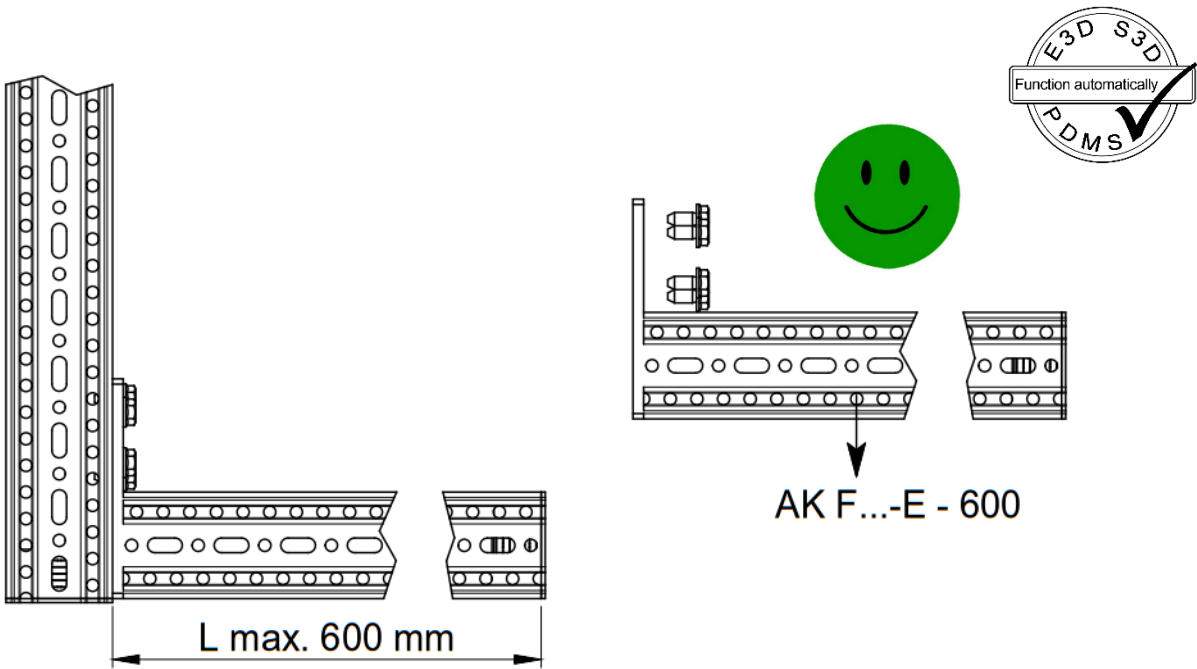
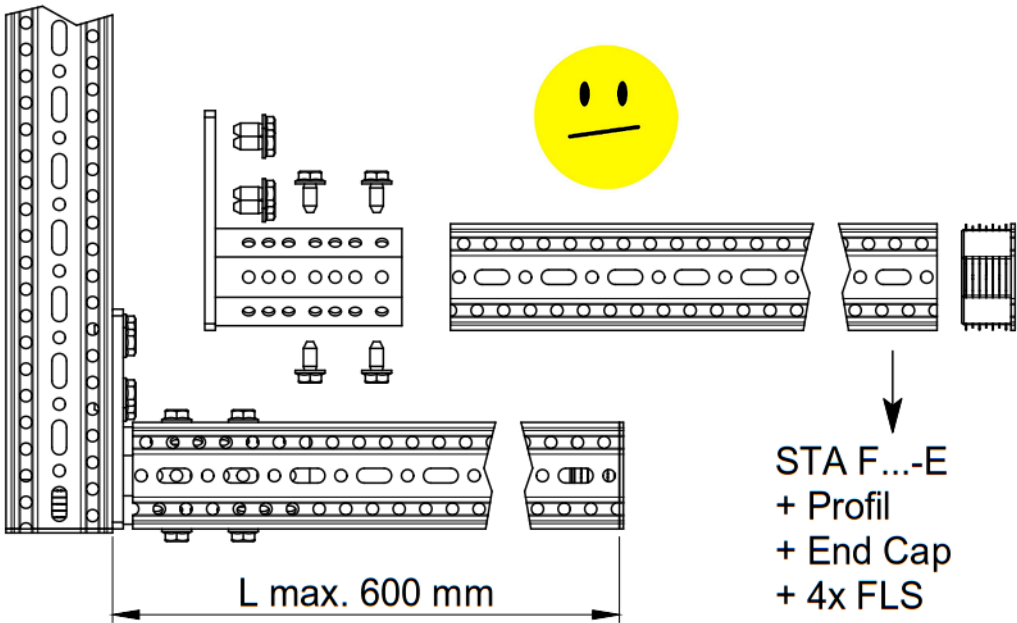


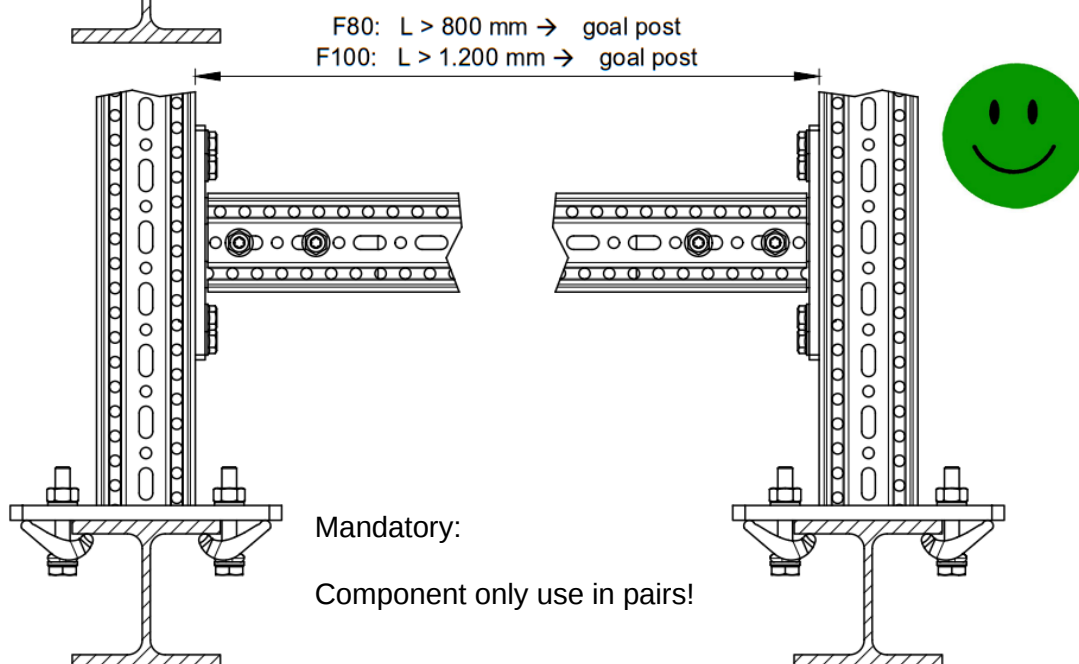
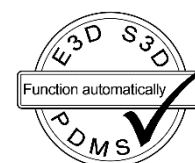
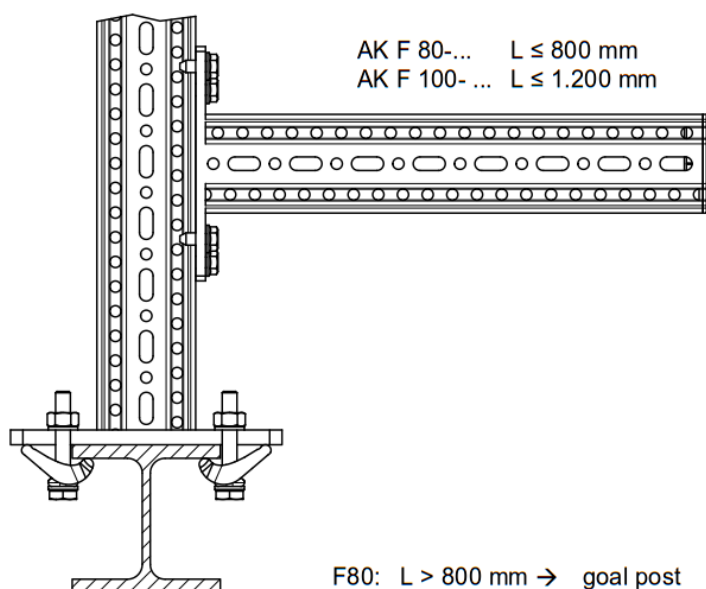
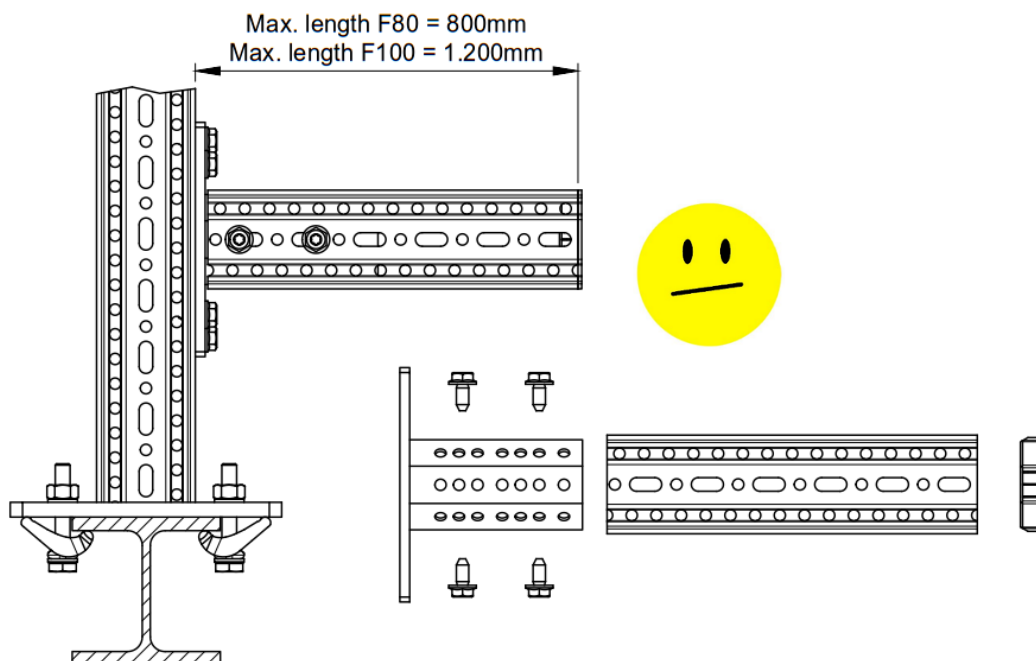


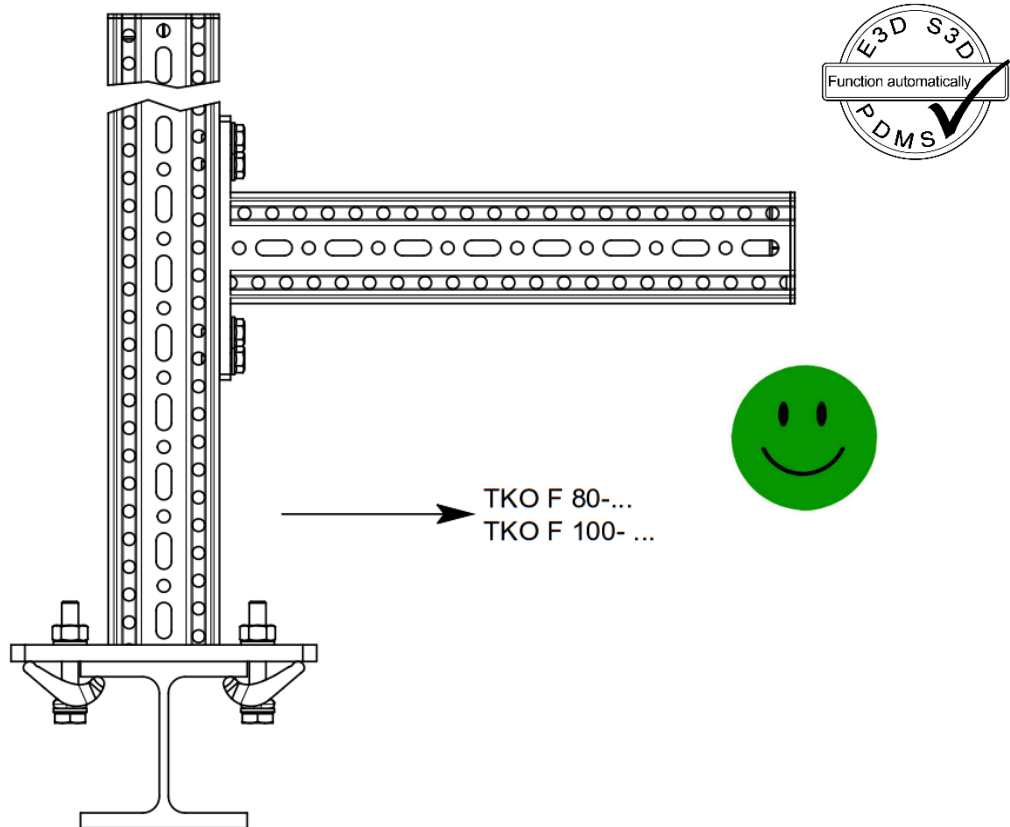
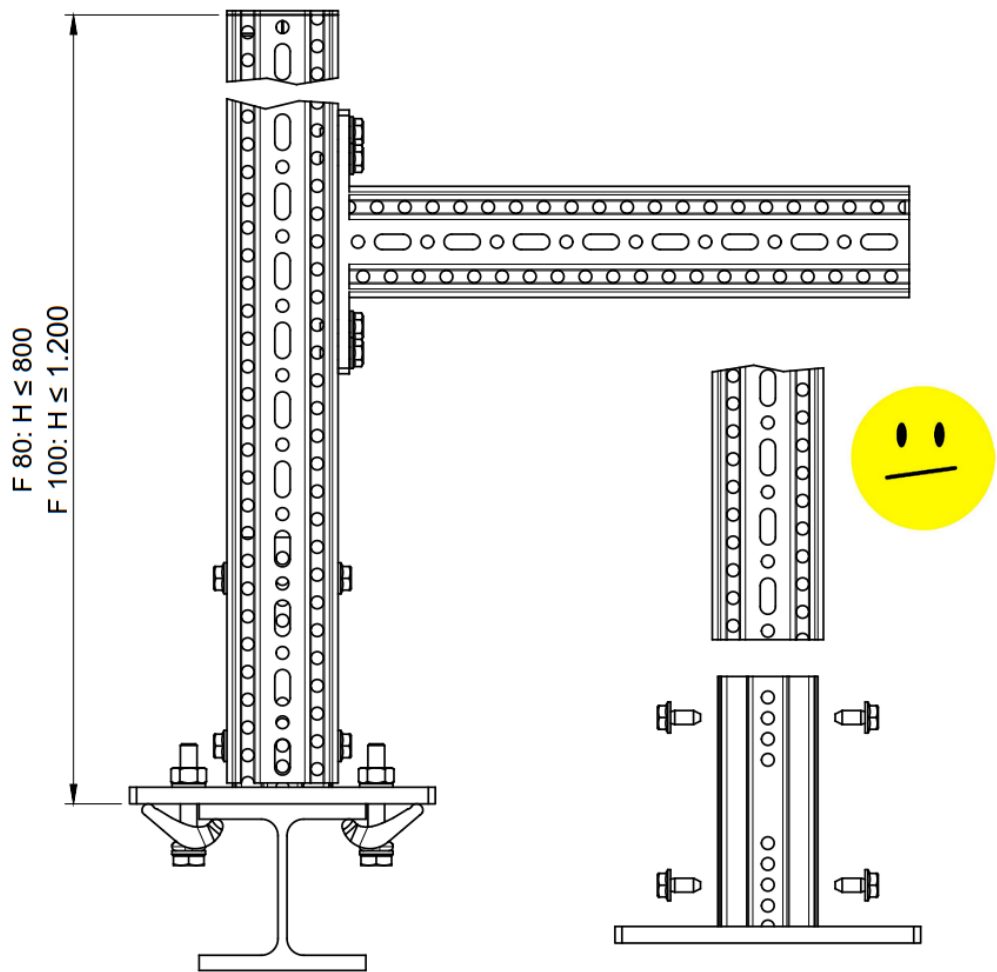
7. Cantilever Bracket "E" Installation Orientation

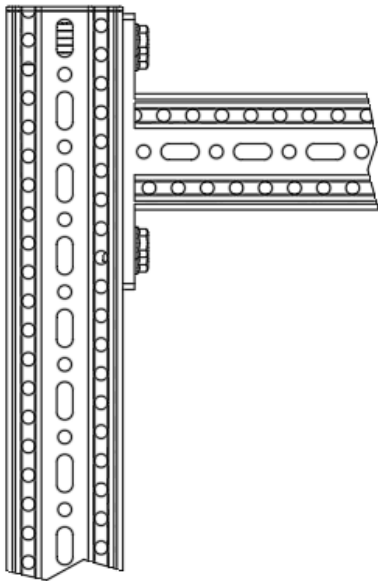
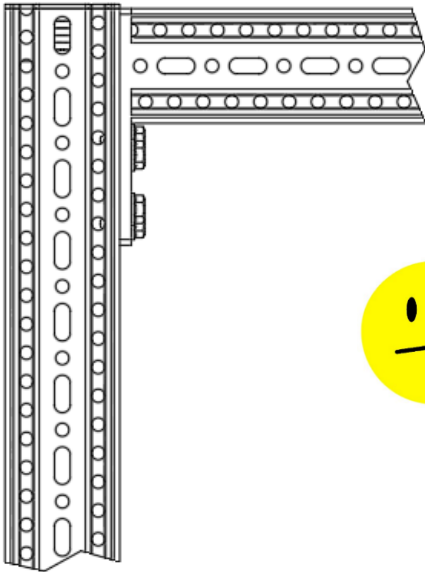




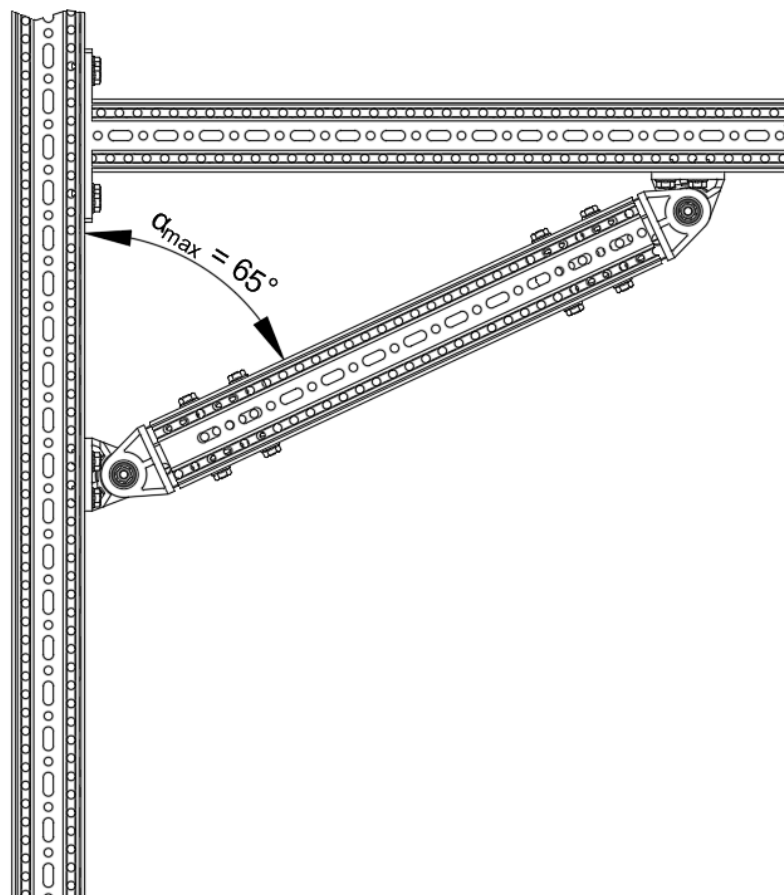
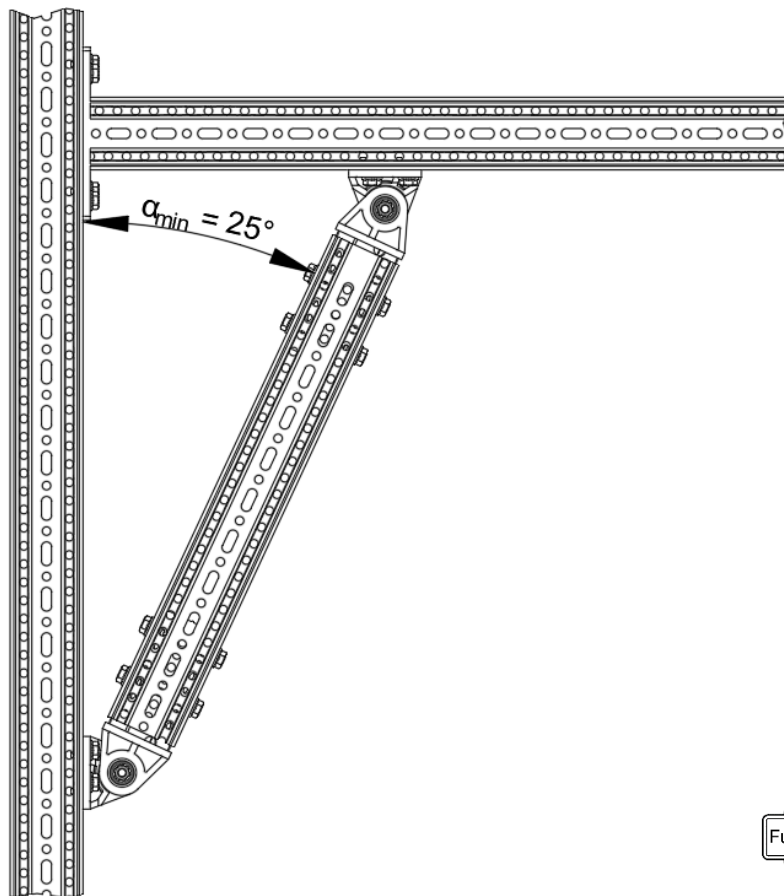




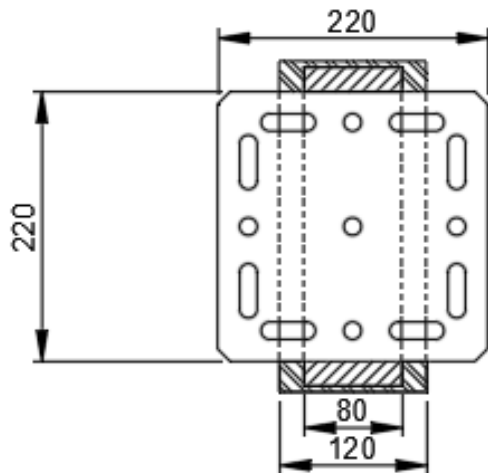
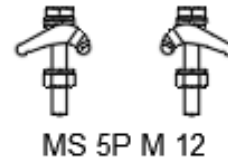




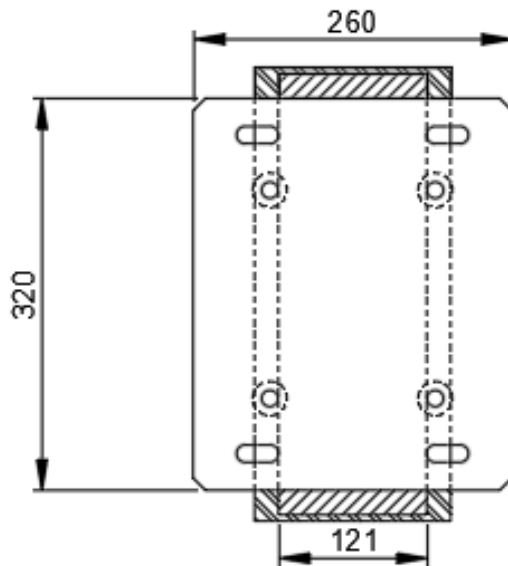
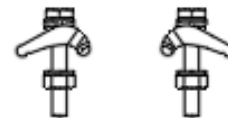
8. Angle of Joints



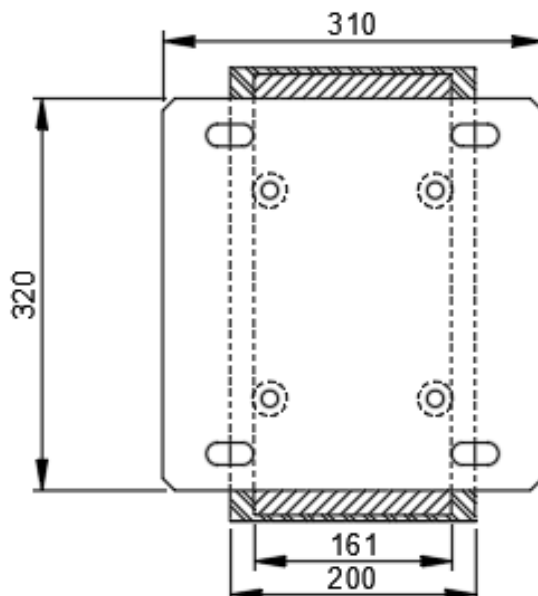
9. Joining Plate Dimensions and Beam Width Correlation

Joining plate for beams between
80 and 120 mm width

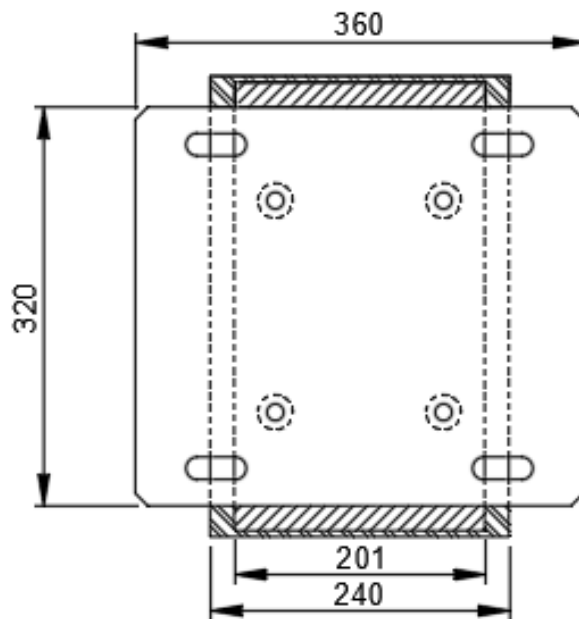
MS 5P M 12

Joining plate for beams between
121 and 160 mm width

MS 5P M 12

Joining plate for beams between
161 and 200 mm width

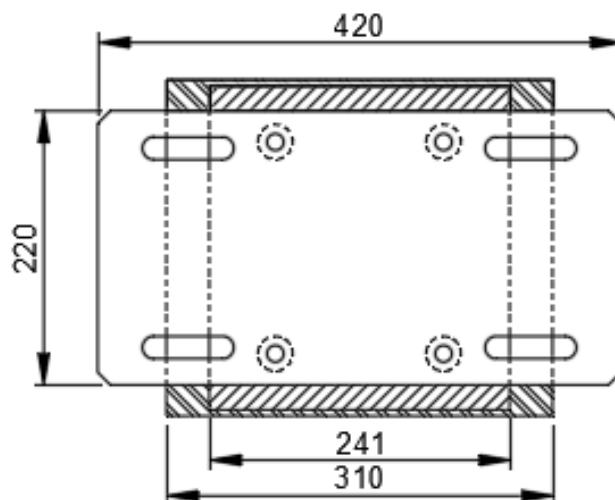
MS 5P M 16



Joining plate for beams between
201 and 240 mm width



MS 5P M 16

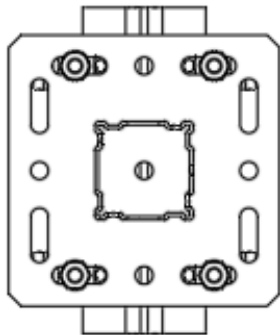
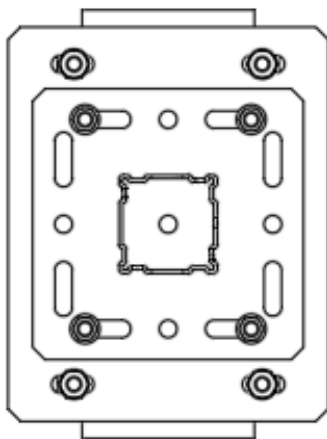
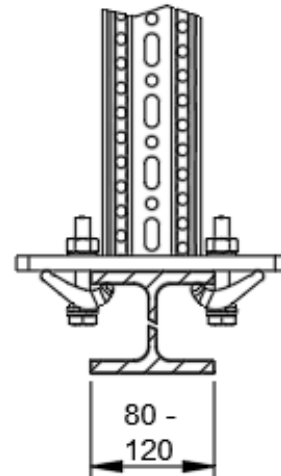
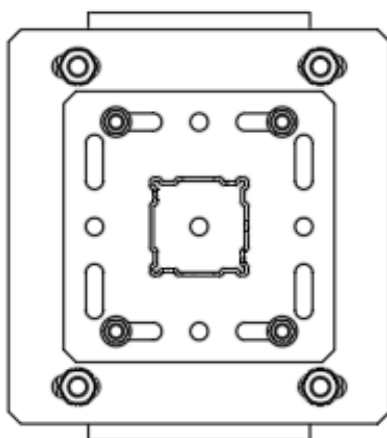
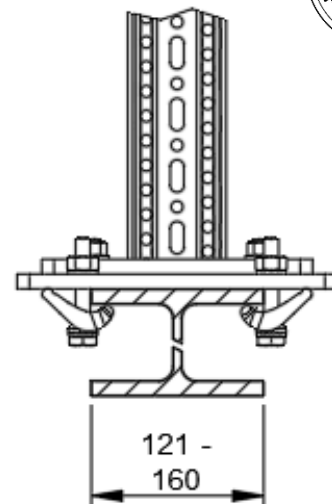
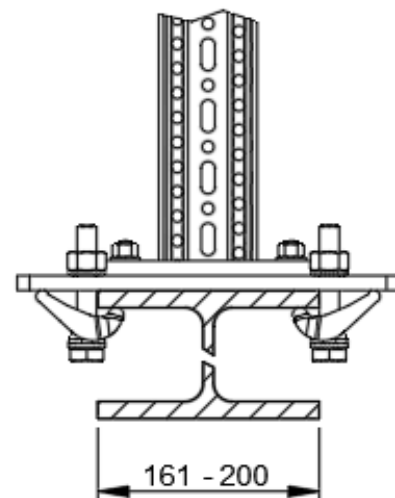


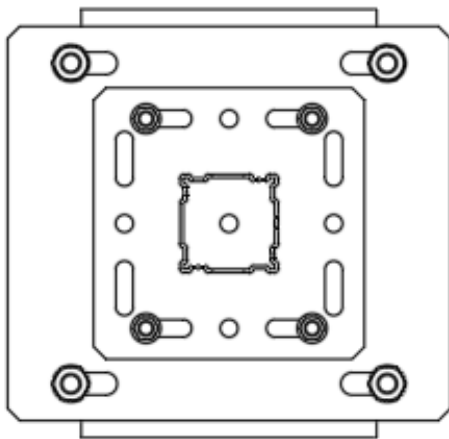
Joining plate for beams between
241 and 310 mm width



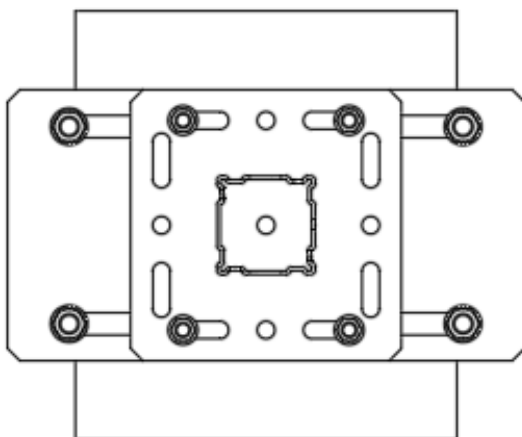
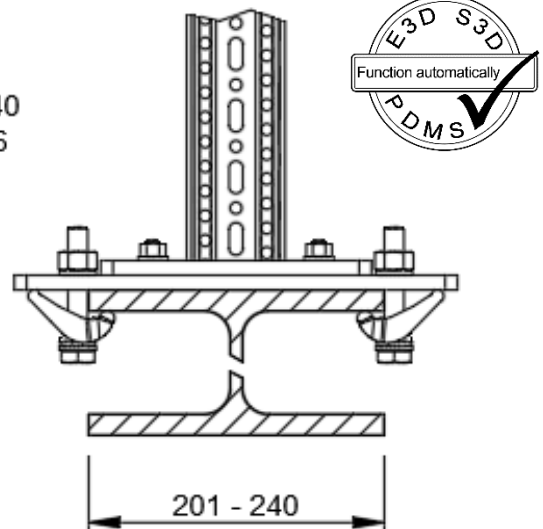
MS 5P M 16

10. Joining Plate Use with TKO

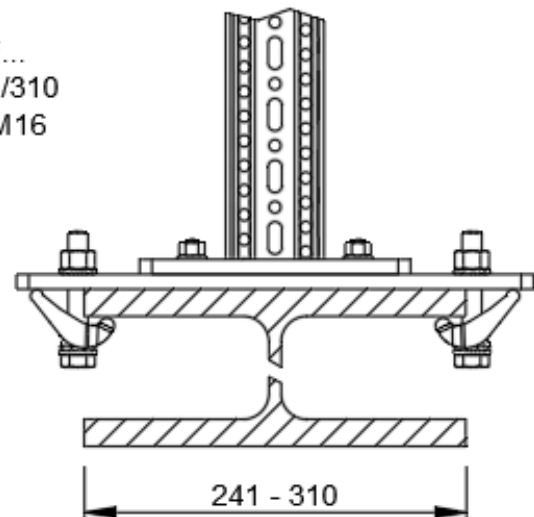
TKO F...
MS 5P M12TKO F...
+ AP- 121/160
MS 5P M12TKO F...
+ AP 161/200
MS 5P M16



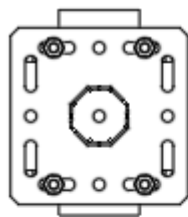
TKO F...
+ AP 201/240
MS 5P M16



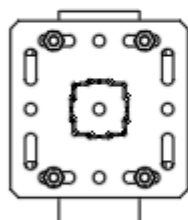
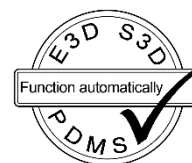
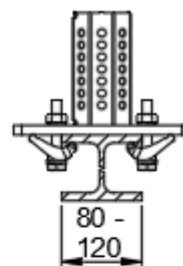
TKO F...
+ AP 241/310
MS 5P M16



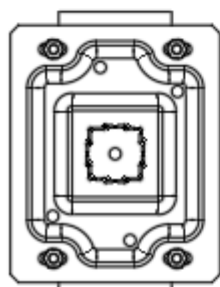
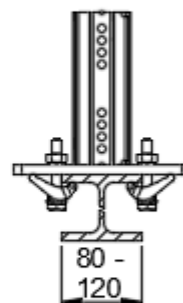
11. Overview WBDs



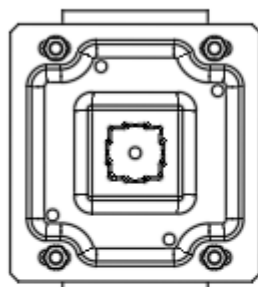
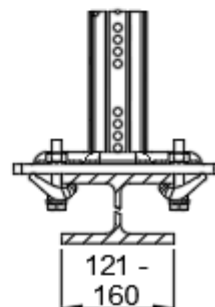
WBD F... - T - 80/120
MS 5P M12



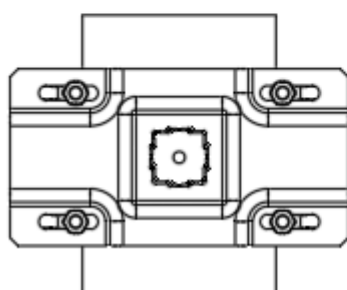
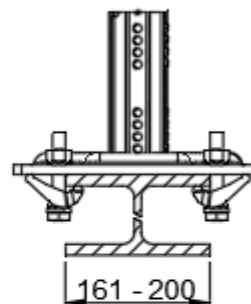
WBD F... - 80/120
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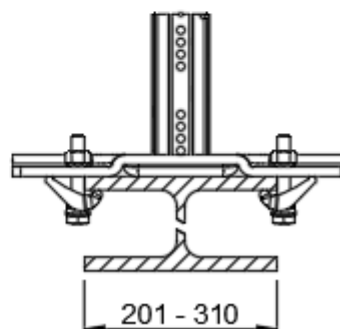
WBD F... - 121/160
MS 5P M12



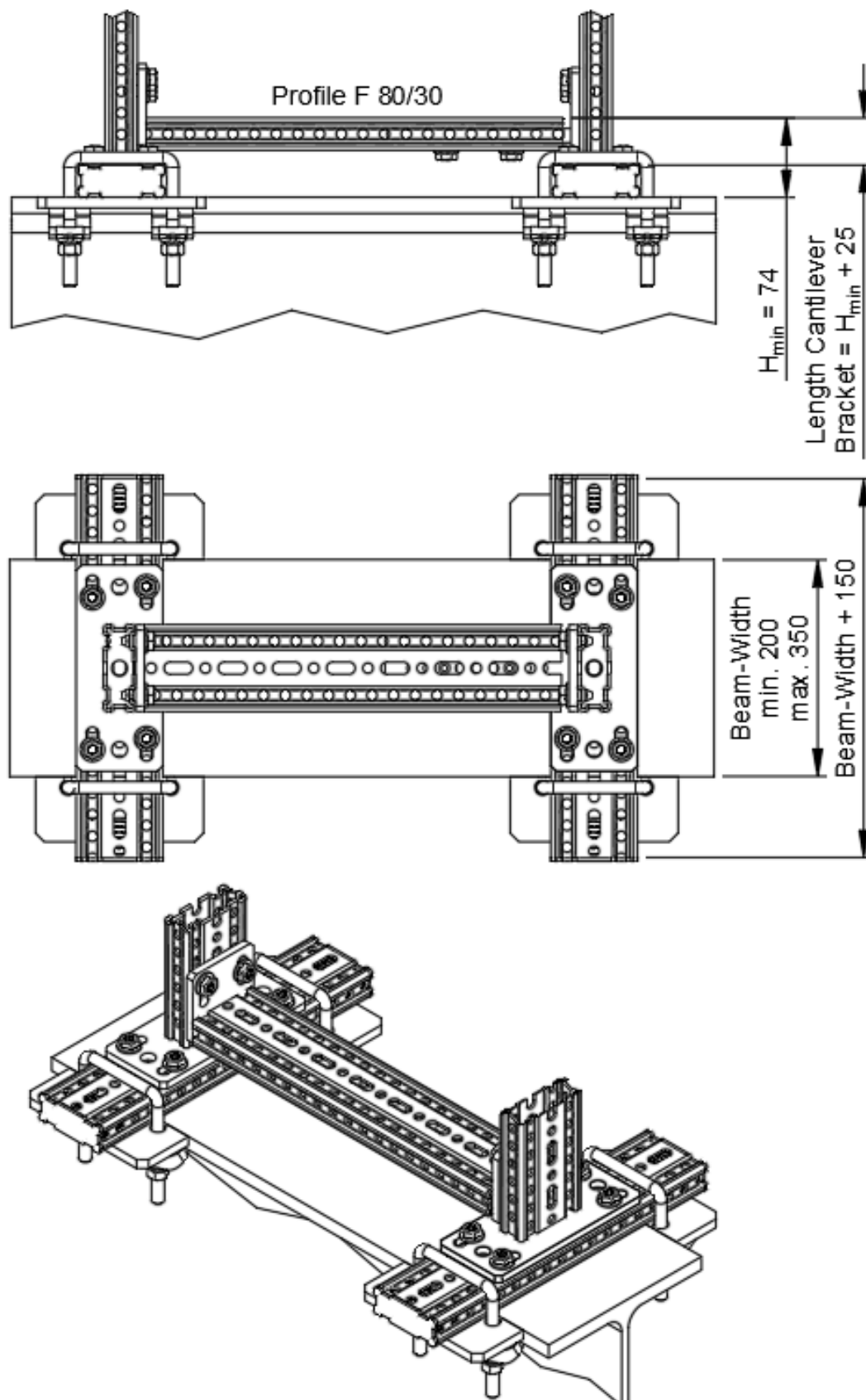
WBD F... - 161/200
MS 5P M16

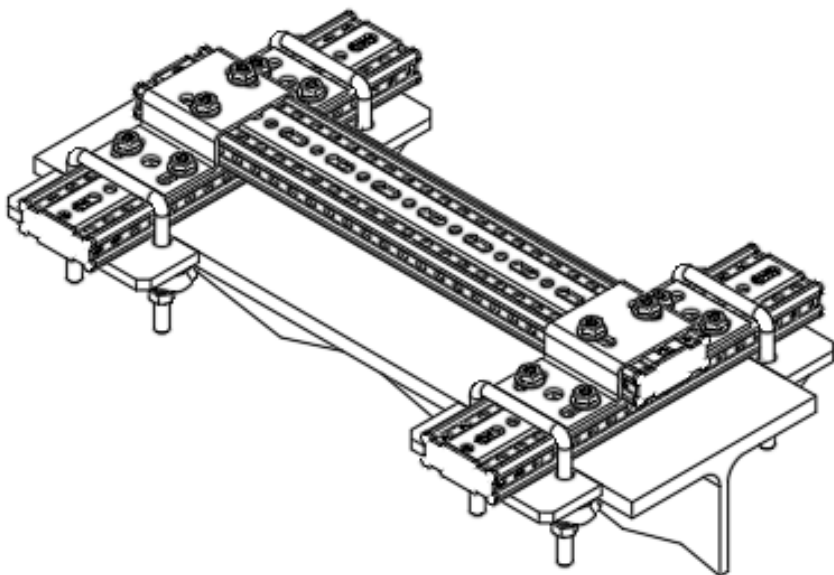
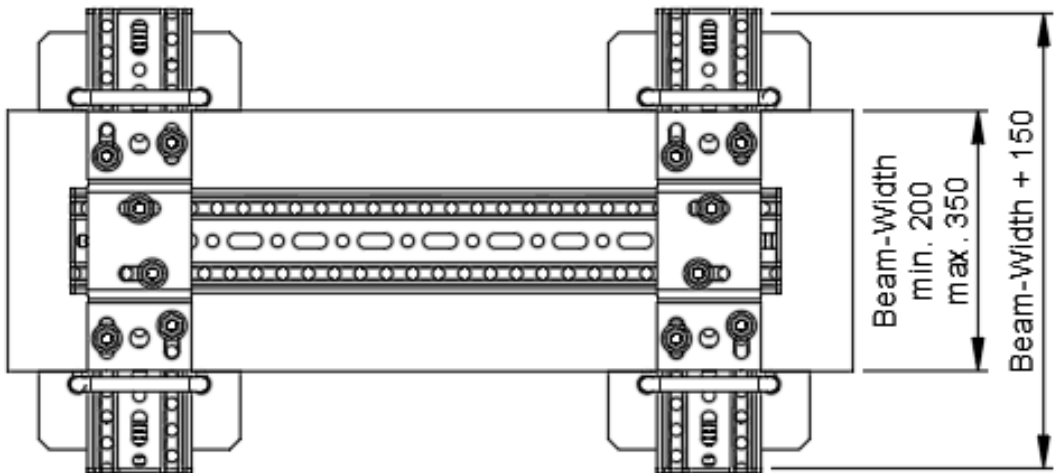
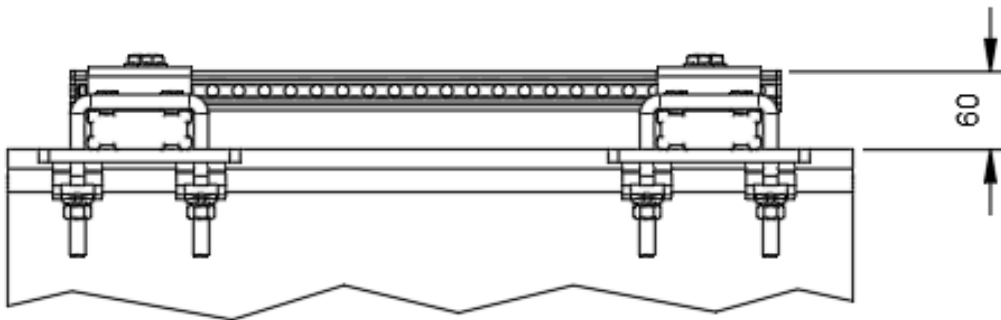


WBD F... - 201/310
MS 5P M16

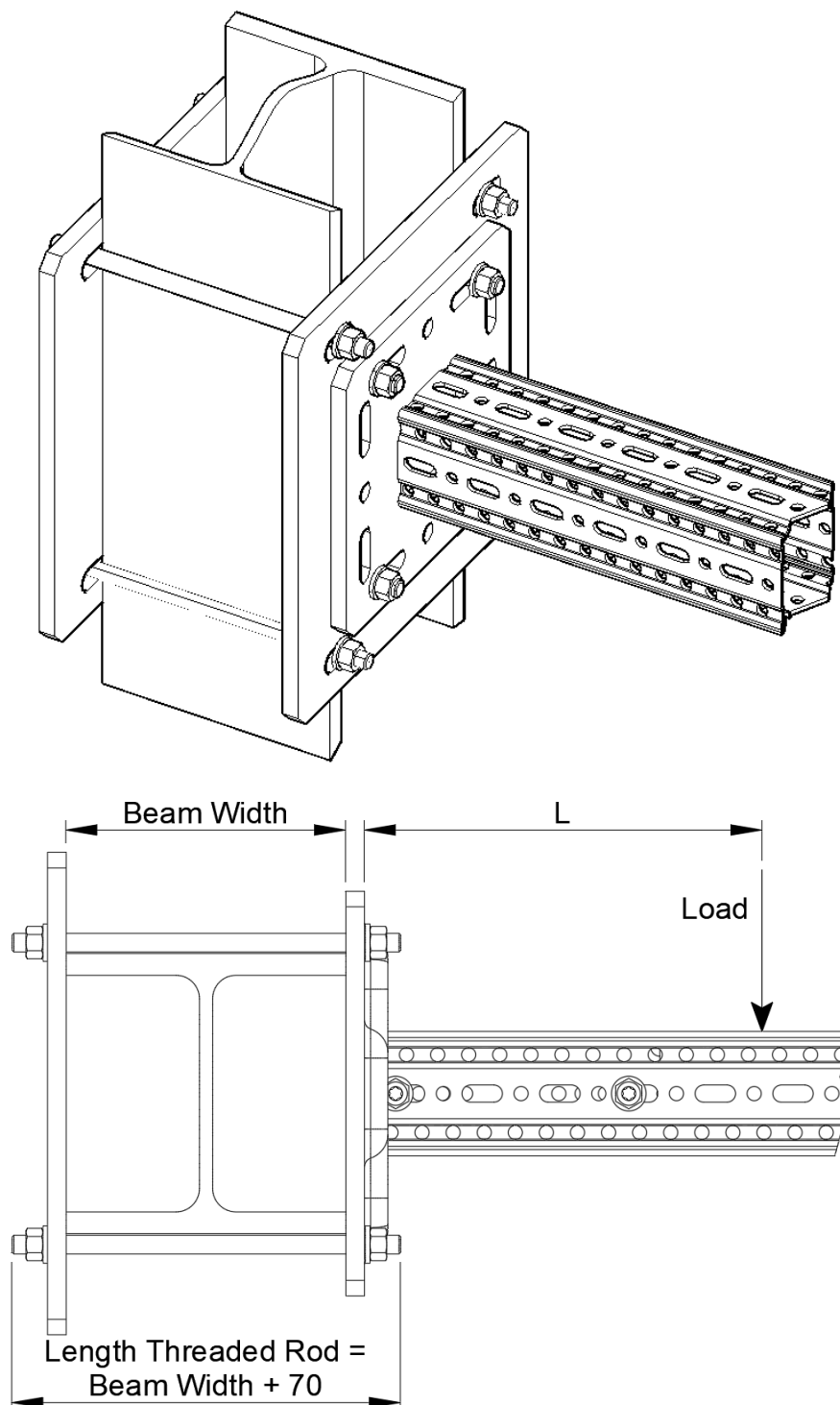


12. Design Idea Short U-Post on Steel Profile





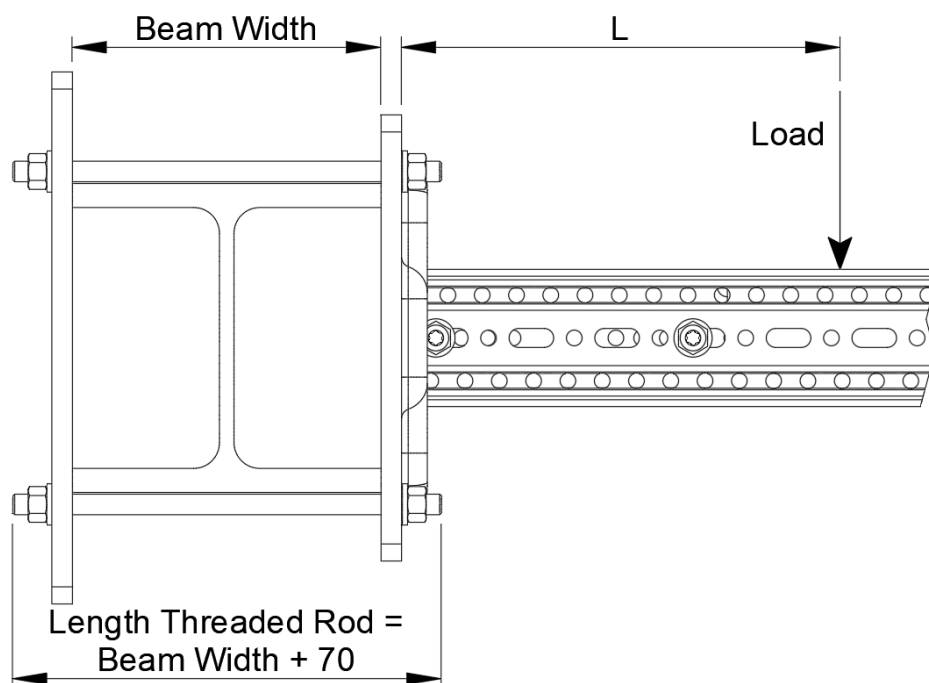
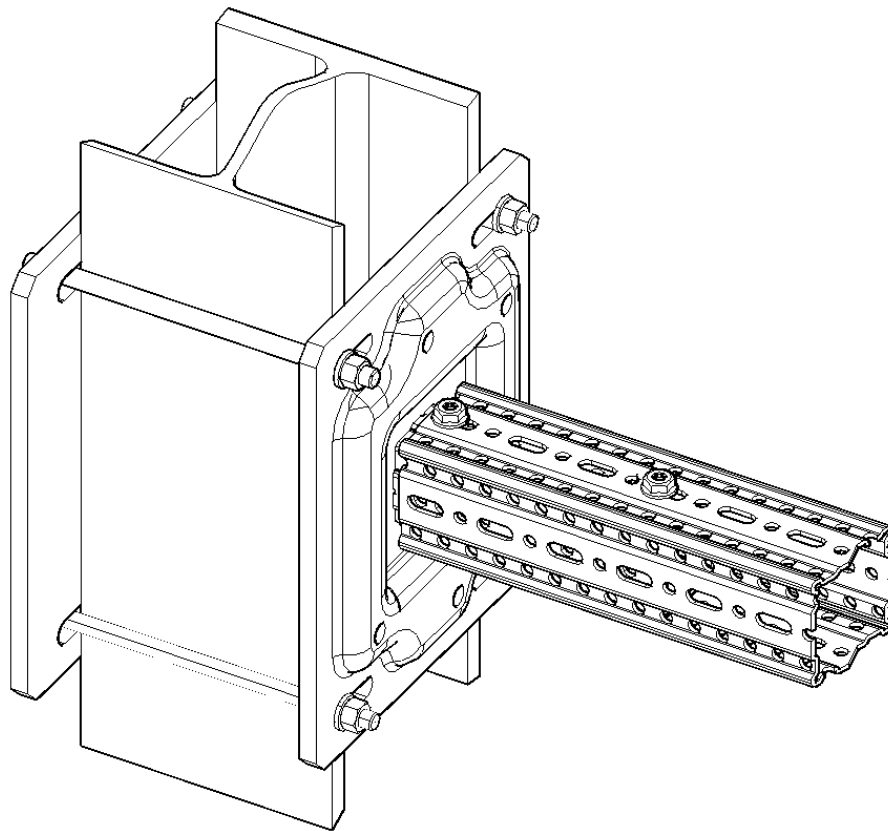
13. Design Idea Joining Plates as Counter Plate on Steel Profiles



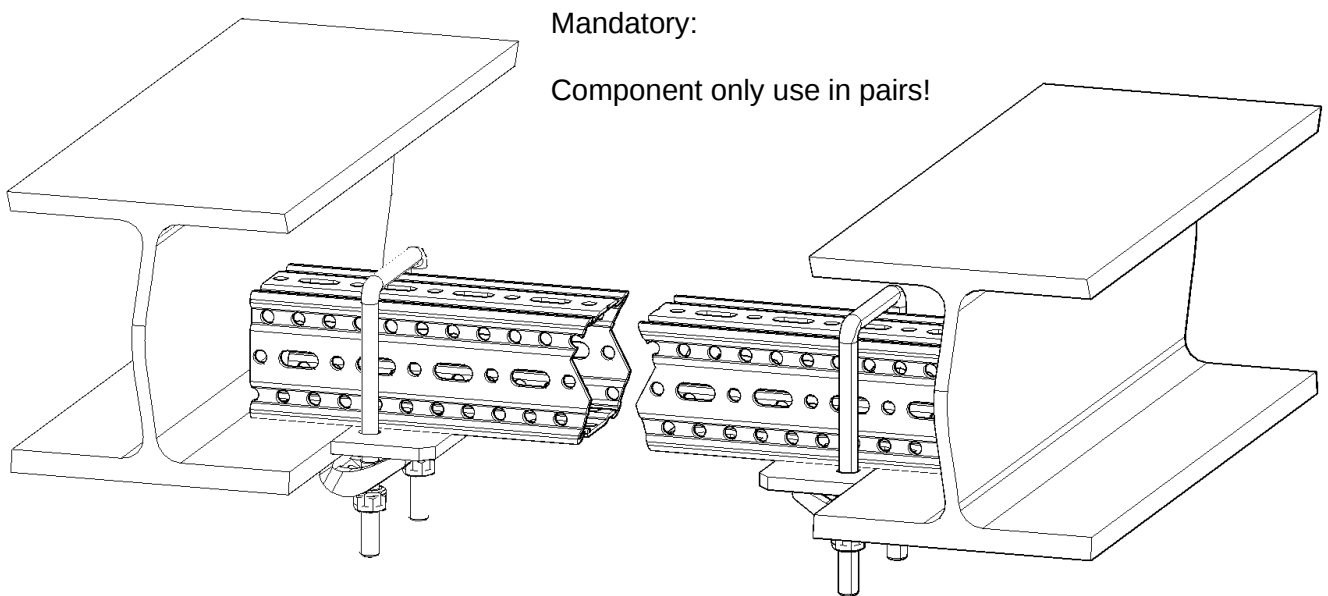
Thread	Pre Tension Force F_{VM} [kN]	Tightening Torque M [Nm]	Vertical Load F_z [kN]			
			L = 250	L = 500	L = 750	L = 1000
M12	40	80	4	2,5	1,6	1,2
M16	60	150	6	4,2	2,8	2

$$M \approx 0,17 \times F_{VM} \times d$$

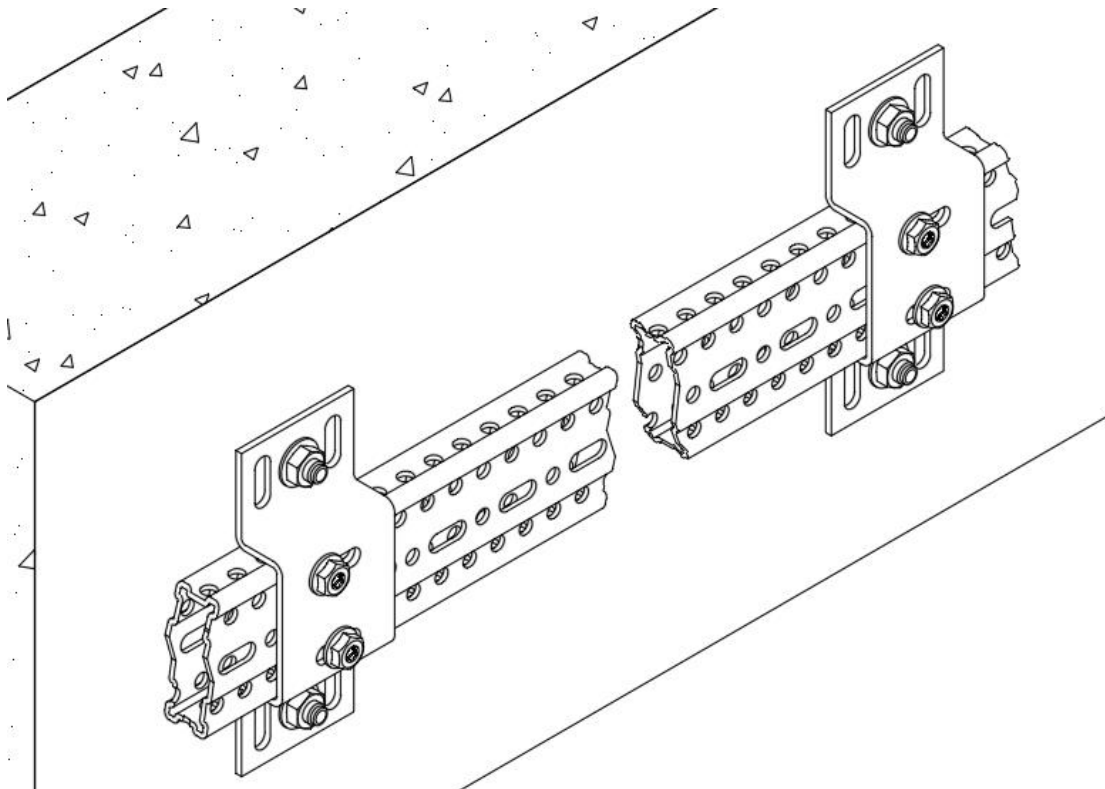
Friction value $\mu = 0,2$



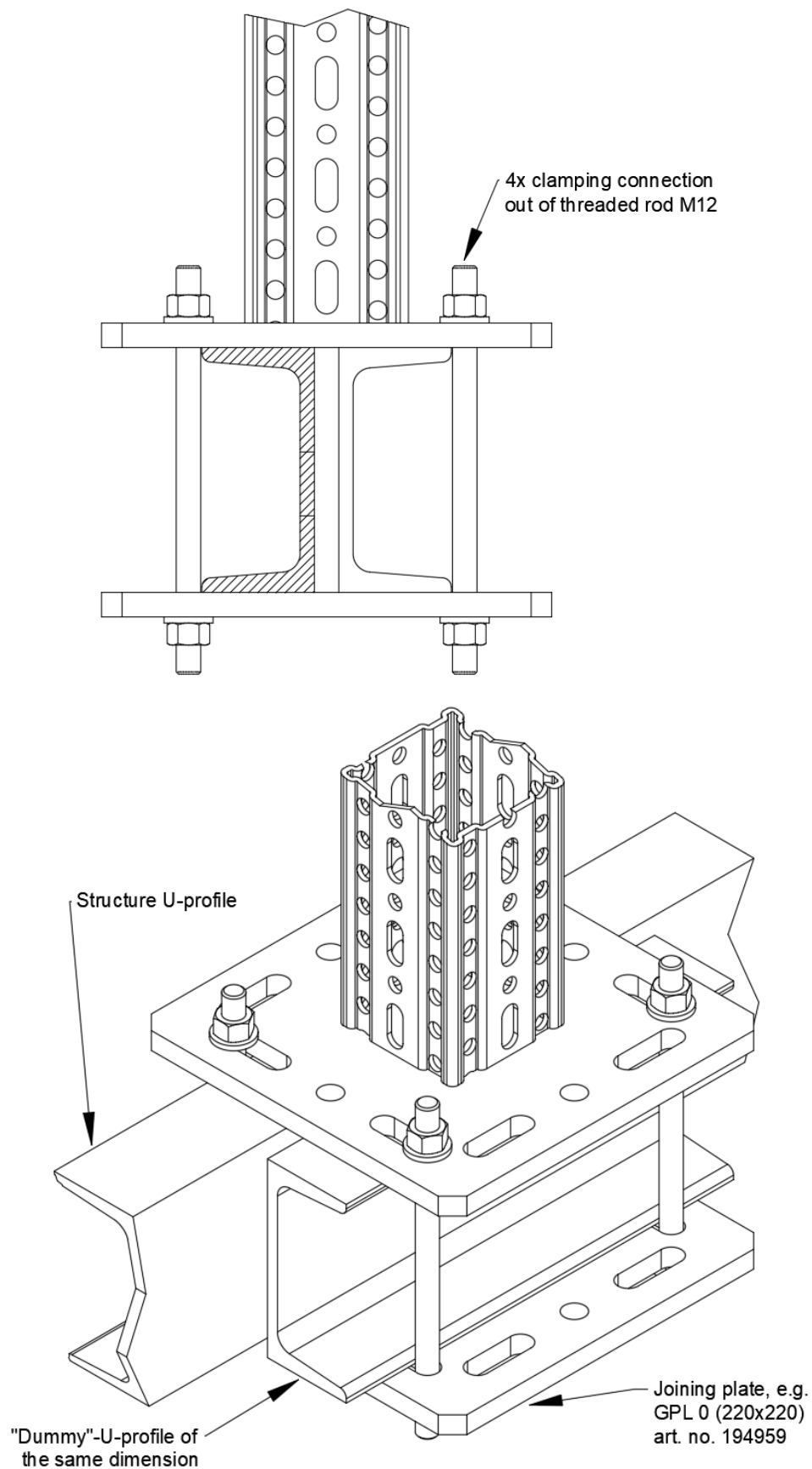
14. Design Idea siFramo in Shadow of Steel Profiles



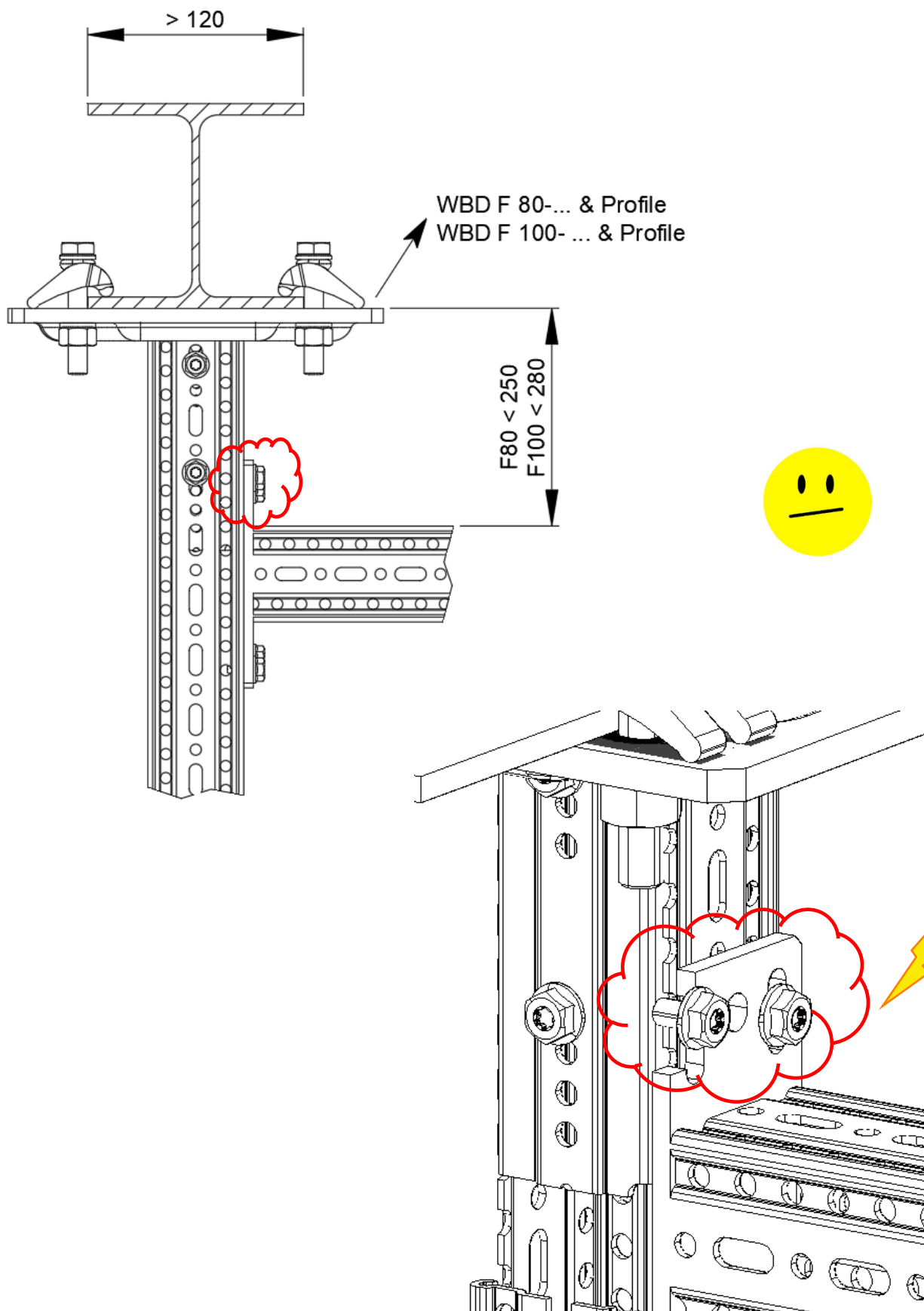
15. Design Idea Pipe Shoe Guide with 80/30 Profile on Wall

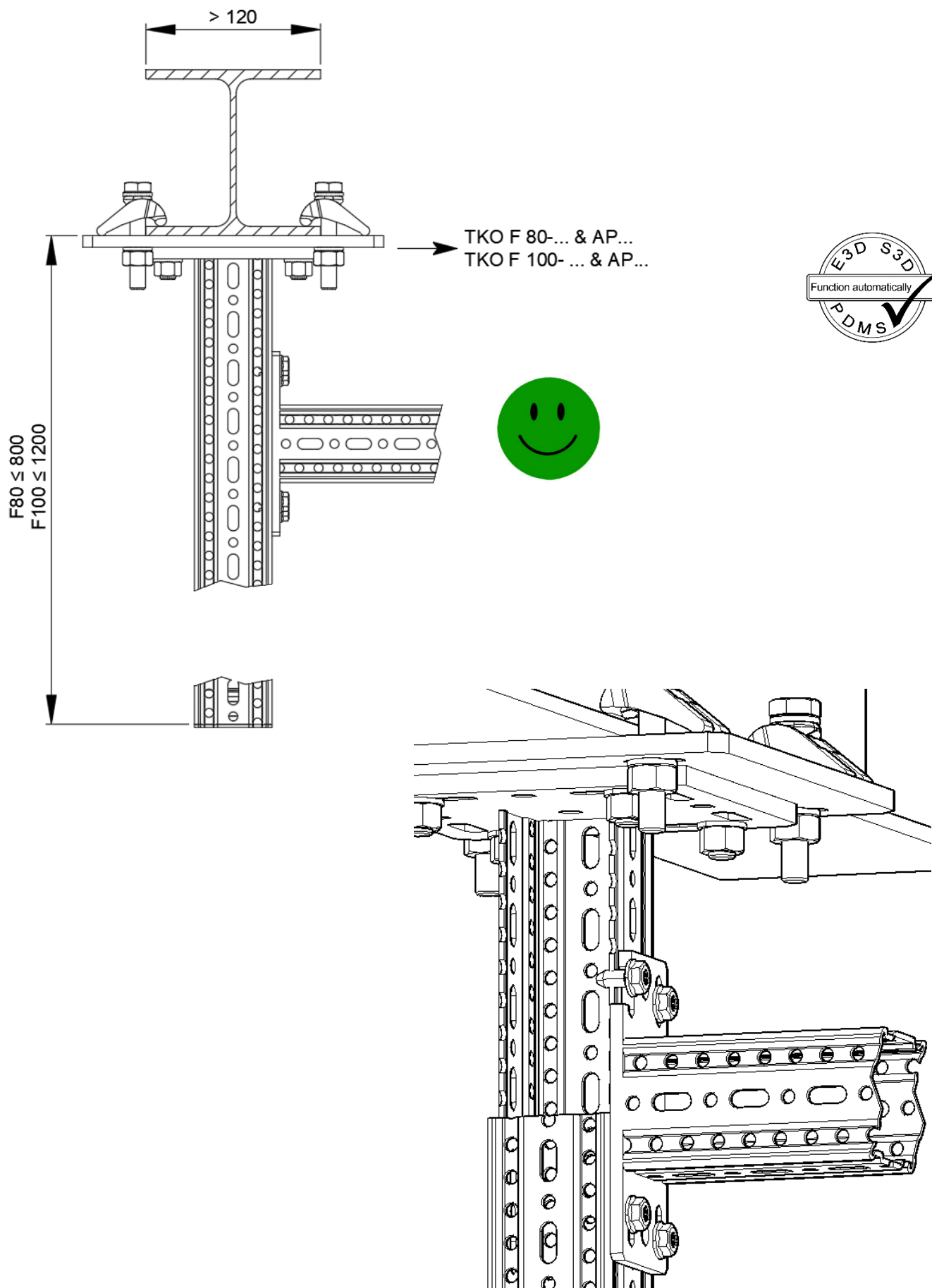


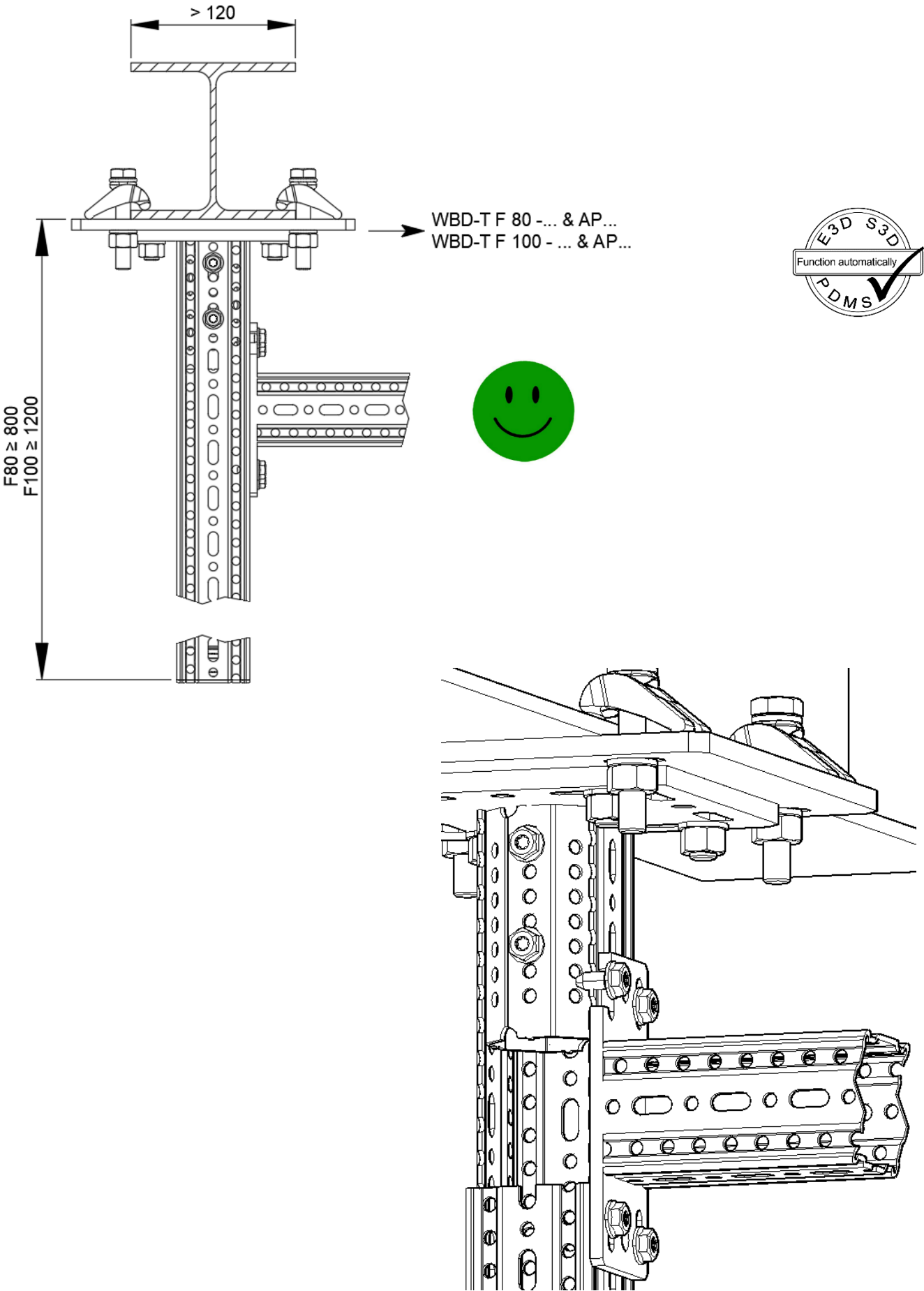
16. Design Idea connection to U-Profile



17. End Support WBD+Profile vs. Beam Bracket TKO+Joining Plate AP

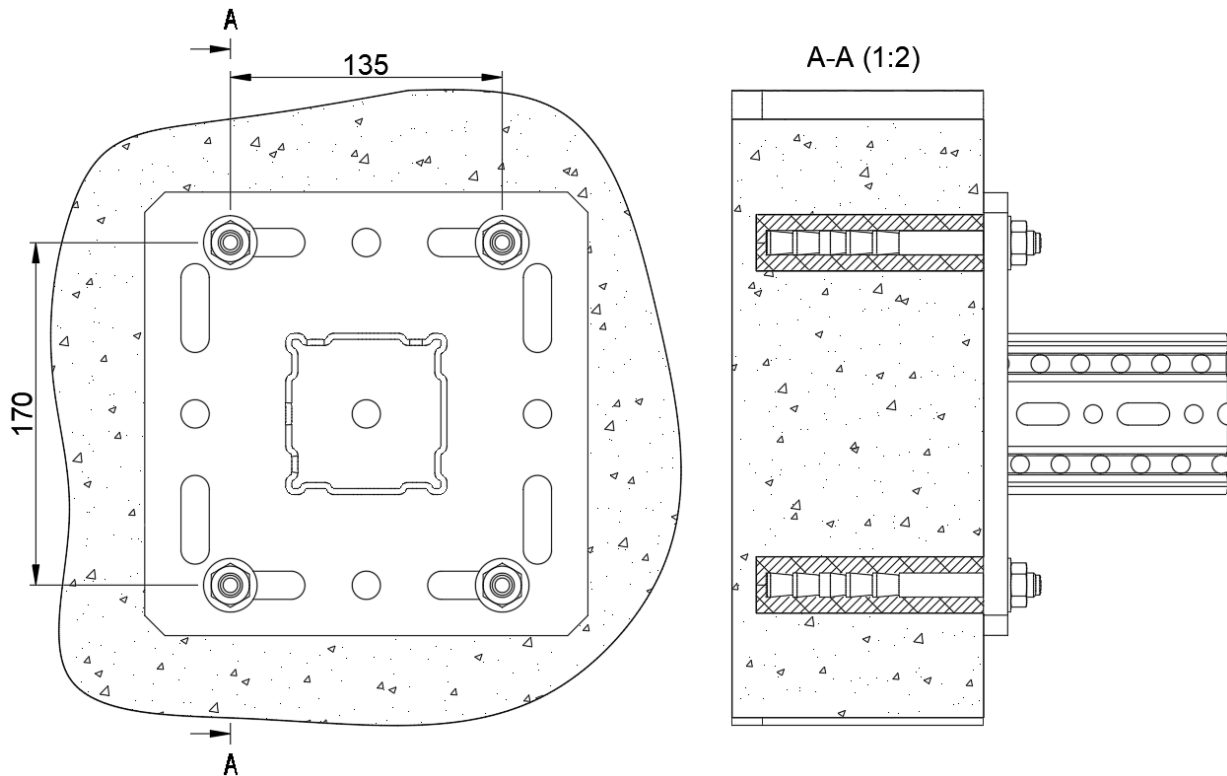






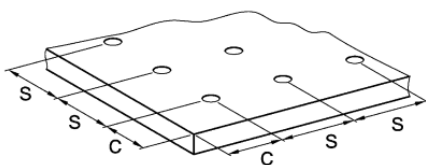
18. Arrangement VMZ Plugs Wall Connection

Base plate size for concrete connections mandatory 220 x 220 mm, anchors M12.

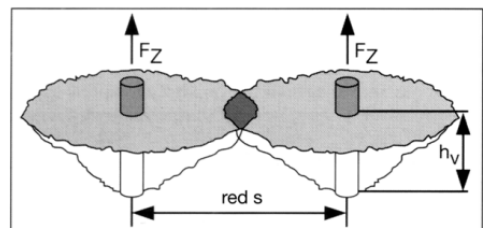
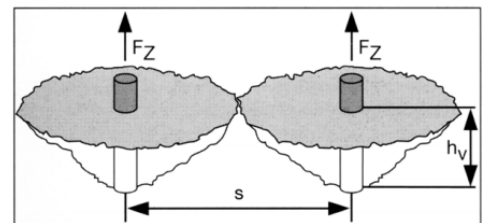
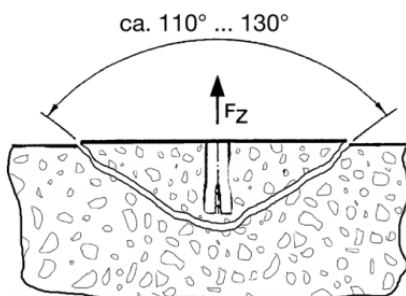


19. Basics for heavy Duty Fixings

Axial spacing, edge distance, pull-out cone

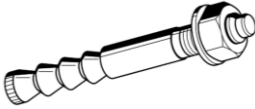
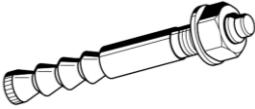
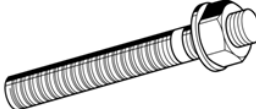
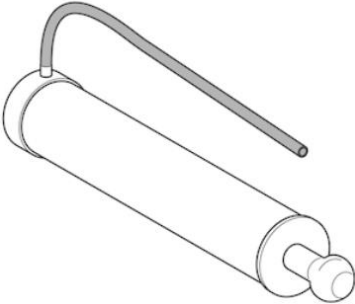
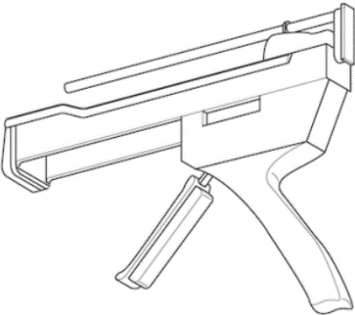
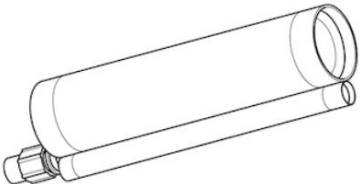


- s = Axial spacing > red s = reduced axial spacing (in case of partial overlap of theoretical pull-out cones)
- c = Edge distance
- h = Component thickness
- F_z = permissible loading (also N = normal force)



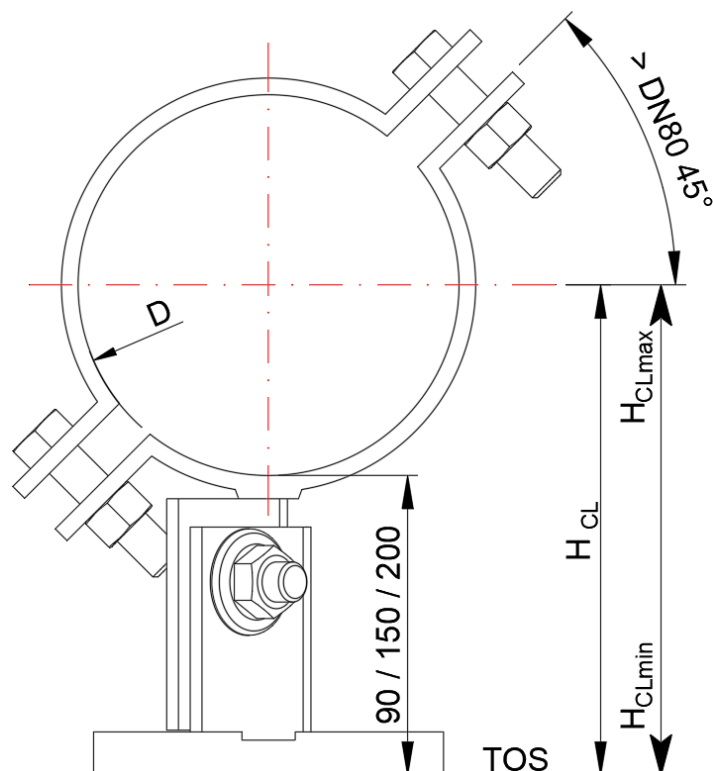
In the event of "concrete cone failure", a symmetrical cone of the concrete breaks away. The anchor depth h_v is therefore a determining factor in the load capacity.

20. Additional required Products for chemical Anchors

	Wall VMZ	Bottom	
		VMZ	VMU
			
Steel Brush 	190838 for M8 190847 for M10 190856 for M12 190865 for M16		
Blow out Pump 	190883		
Dispenser 	190874		
Injection Resin 	190811		114176
Mixing Nozzle 	190829		

Components not part of the MTO, must be added manually!

21. Pipe Shoe Heights TOS - CL

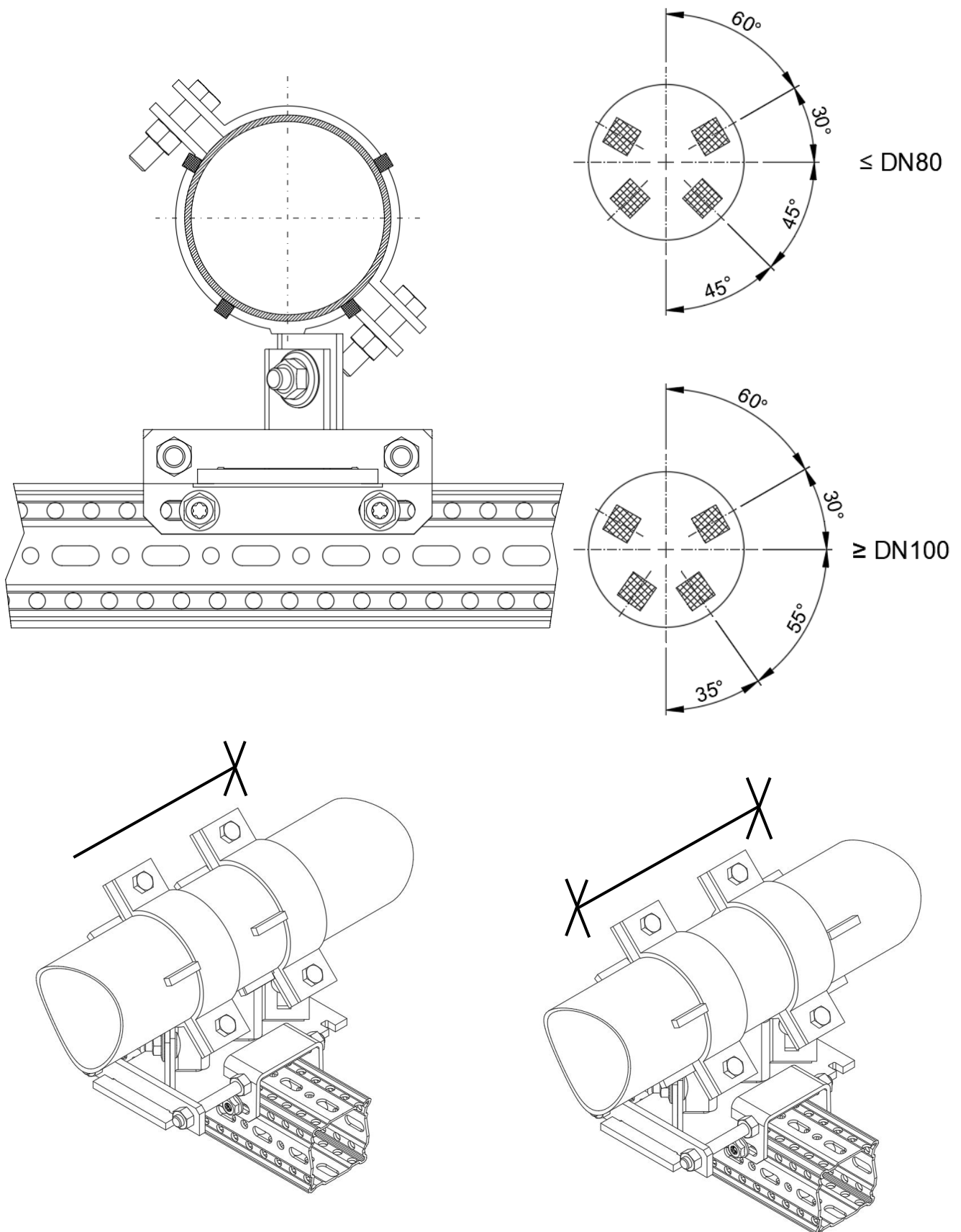


D (Pipe) [mm]		...HV 90			...HV 150			...HV 200		
		HCL [mm]	H _{CL min} [mm]	H _{CL max} [mm]	HCL [mm]	H _{CL min} [mm]	H _{CL max} [mm]	HCL [mm]	H _{CL min} [mm]	H _{CL max} [mm]
DN 15	21,3	100,7	99,2	124,2	160,7	126,7	179,2	210,7	181,7	234,2
DN 20	26,9	103,5	102,0	127,0	163,5	129,5	182,0	213,5	184,5	237,0
DN 25	33,7	106,9	105,4	130,4	166,9	132,9	185,4	216,9	187,9	240,4
DN 32	42,4	111,2	109,7	134,7	171,2	137,2	189,7	221,2	192,2	244,7
DN 40	48,3	114,2	112,7	137,7	174,2	140,2	192,7	224,2	195,2	247,7
DN 50	60,3	120,2	118,7	143,7	180,2	146,2	198,7	230,2	201,2	253,7
DN 65	76,1	128,1	126,6	151,6	188,1	154,1	206,6	238,1	209,1	261,6
DN 80	88,9	134,5	133,0	158,0	194,5	160,5	213,0	244,5	215,5	268,0
DN 100	114,3	147,2	145,7	170,7	207,2	173,2	225,7	257,2	228,2	280,7
DN 125	139,7	159,9	158,4	183,4	219,9	185,9	238,4	269,9	240,9	293,4
DN 150	168,3	174,2	172,7	197,7	234,2	200,2	252,7	284,2	255,2	307,7
DN 200	219,1	199,6	198,1	223,1	259,6	225,6	278,1	309,6	280,6	333,1
DN 250	273,0	226,5	225,0	250,0	286,5	252,5	305,0	336,5	307,5	360,0
DN 300	323,9	252,0	250,5	275,5	312,0	278,0	330,5	362,0	333,0	385,5
DN 350	355,6	267,8	266,3	291,3	327,8	293,8	346,3	377,8	348,8	401,3
DN 400	406,1	293,1	291,6	316,6	353,1	319,1	371,6	403,1	374,1	426,6
DN 500	508,0	344,0	342,5	367,5	404,0	370,0	422,5	454,0	425,0	477,5
DN 600	610,0	395,0	393,5	418,5	455,0	421,0	473,5	505,0	476,0	528,5

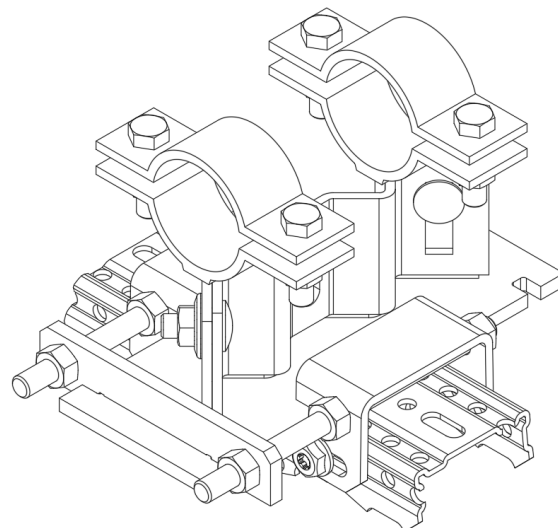
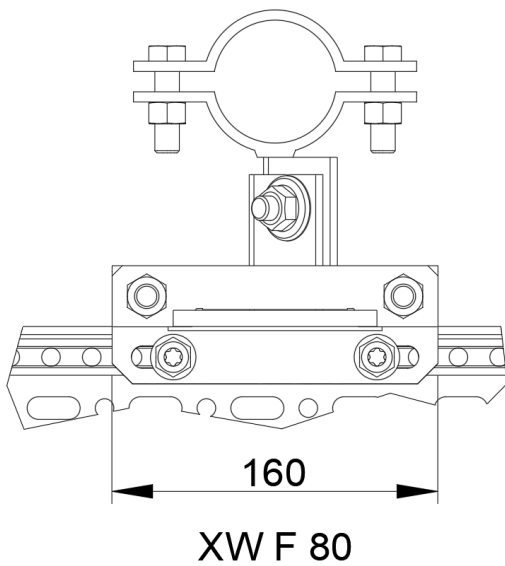
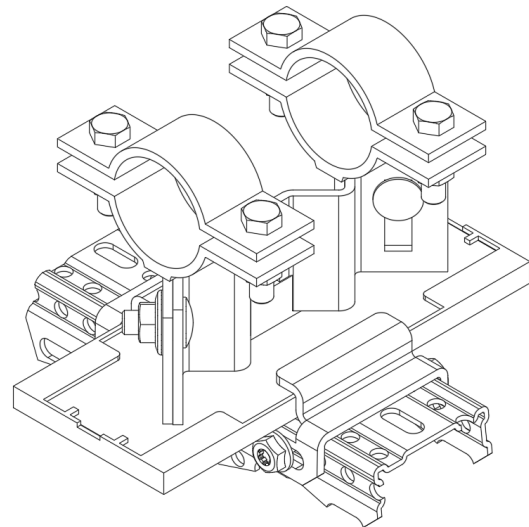
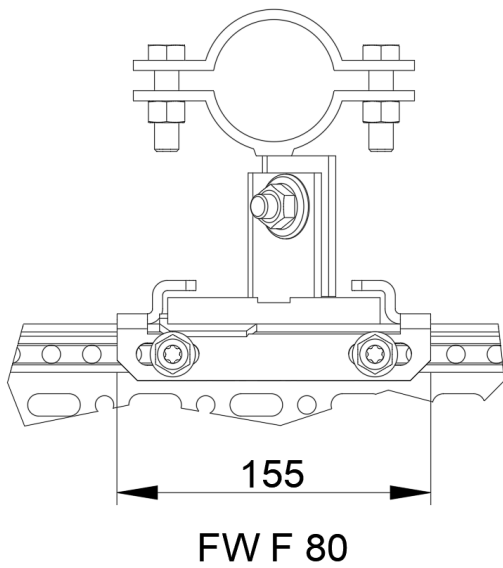
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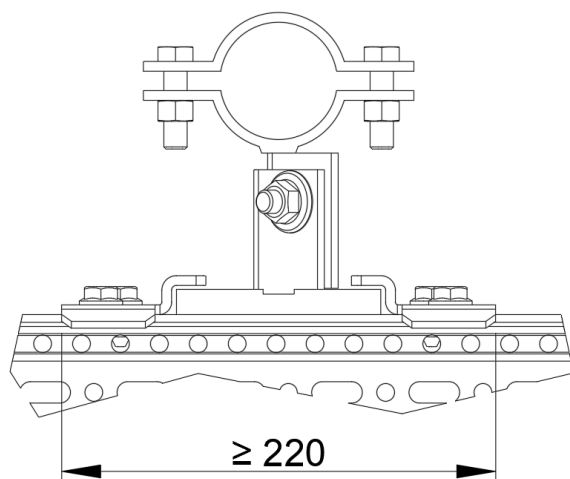
For insulated pipelines Sikla recommends the use of HV150 or HV200 pipe shoes.

22. Lug Orientation for Pipe Shoe Fix Points

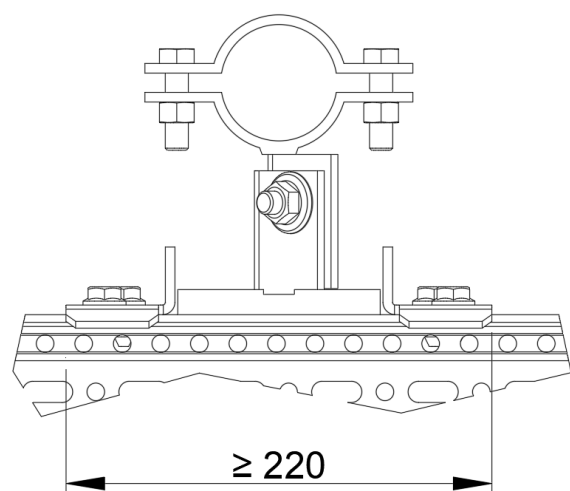
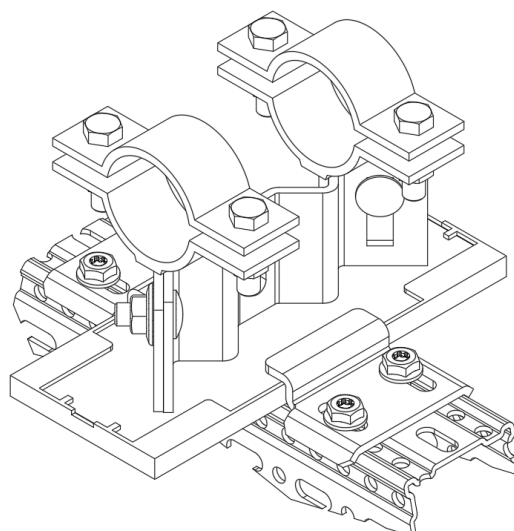


23. Line Spacing Pipe Shoe Arrangement

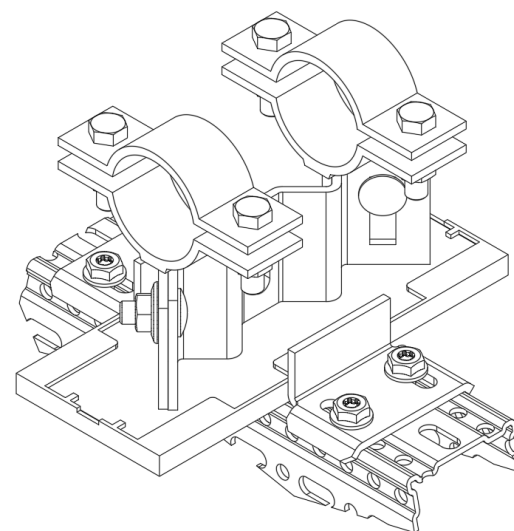


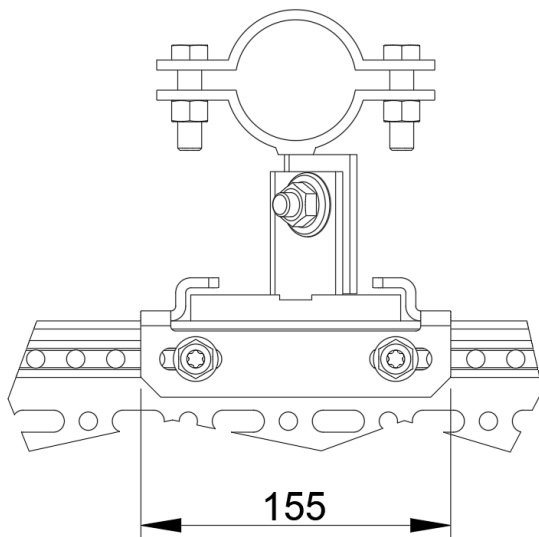


FW F 80 Typ Z...
FW F 100 Typ Z...

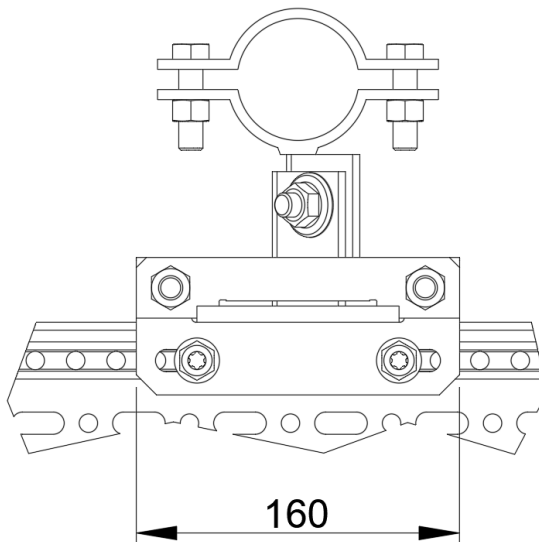
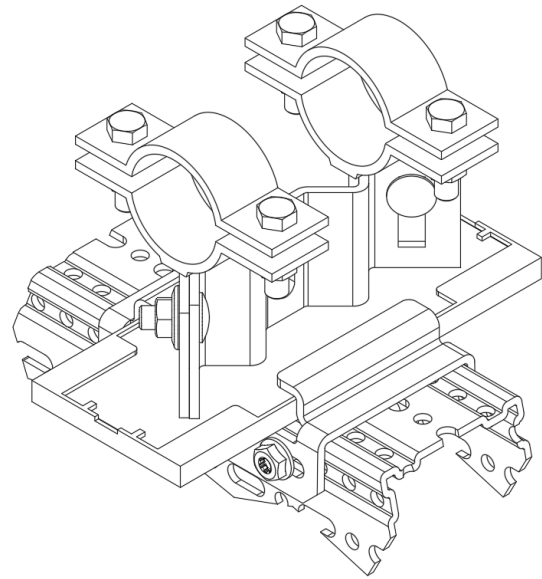


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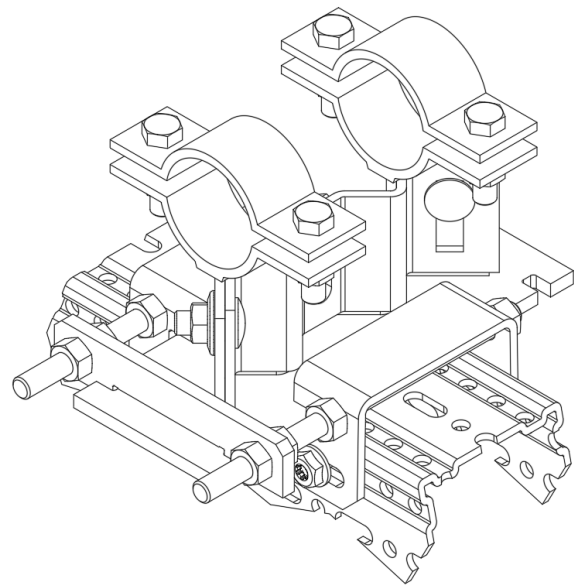


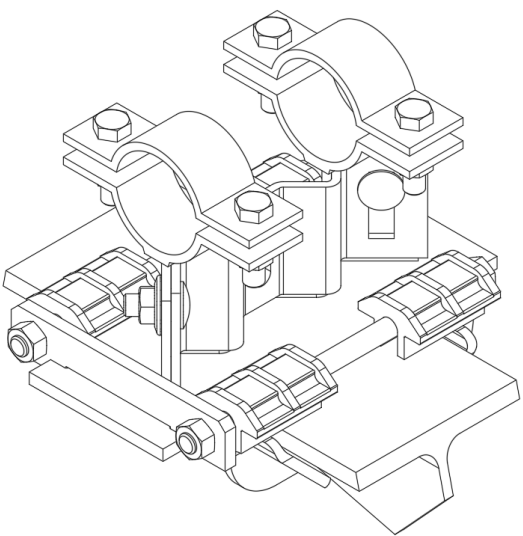
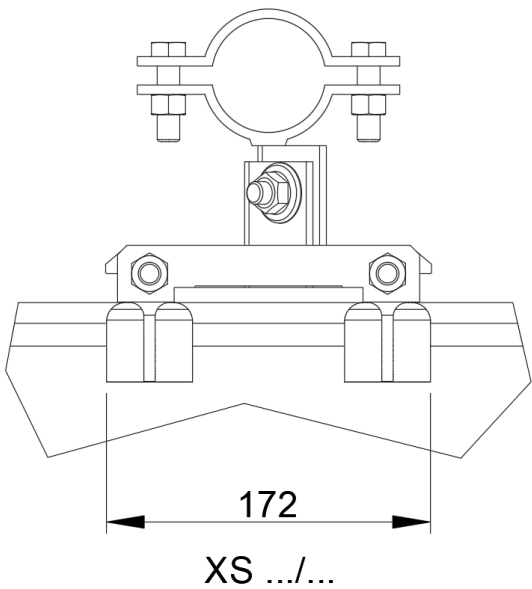
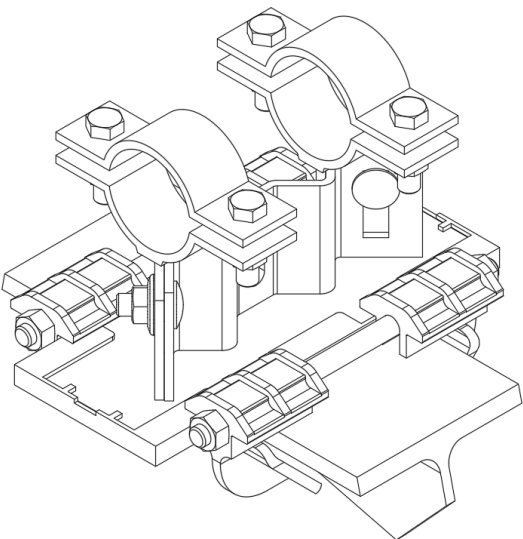
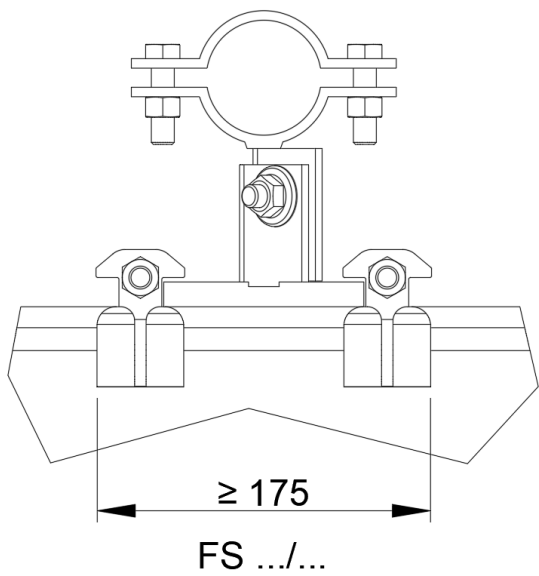


FW F 100



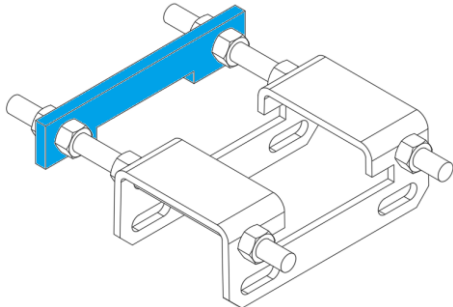
XW F 100



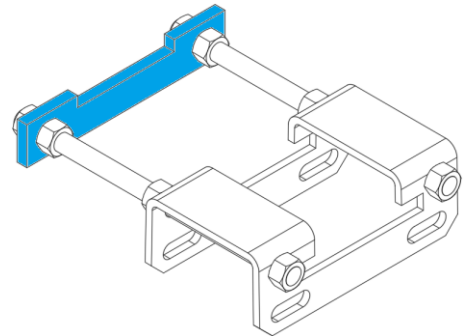


24. Axile Stop

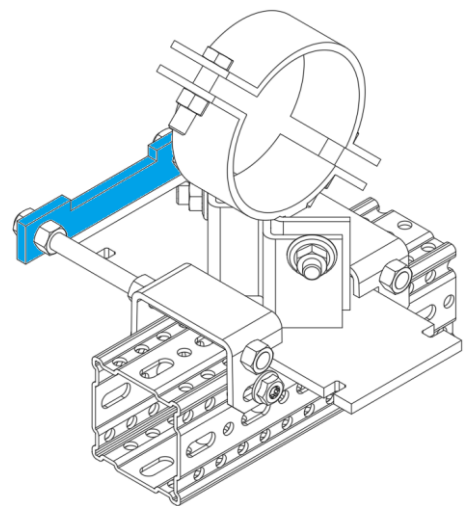
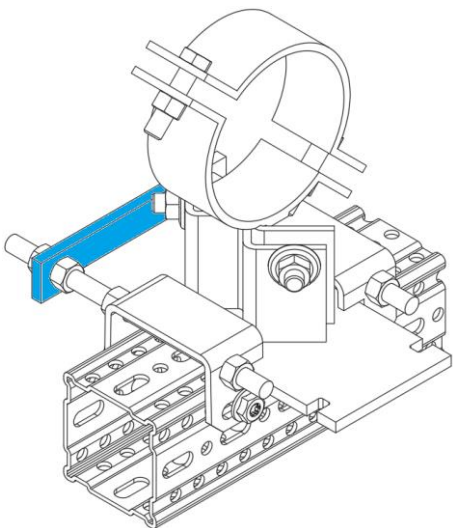
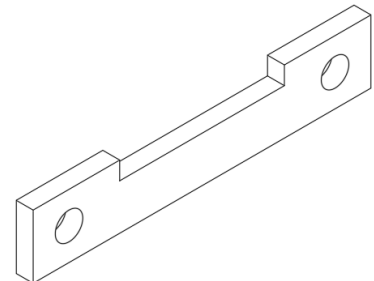
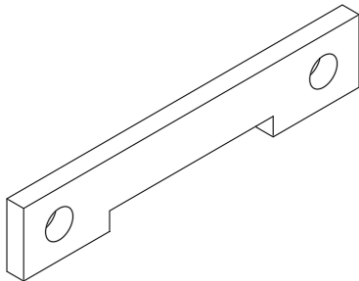
siFramo



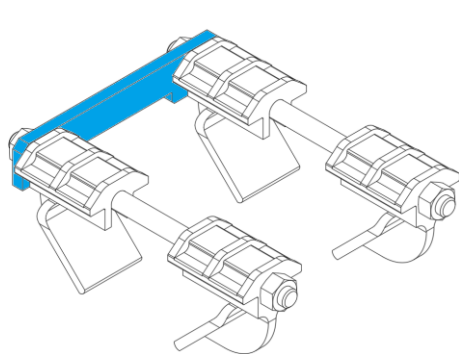
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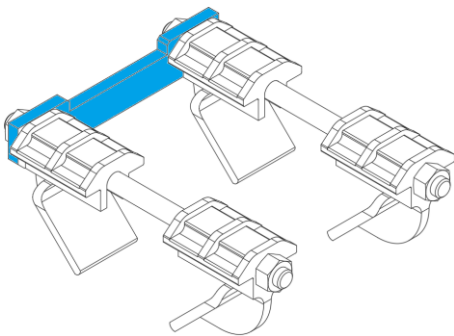
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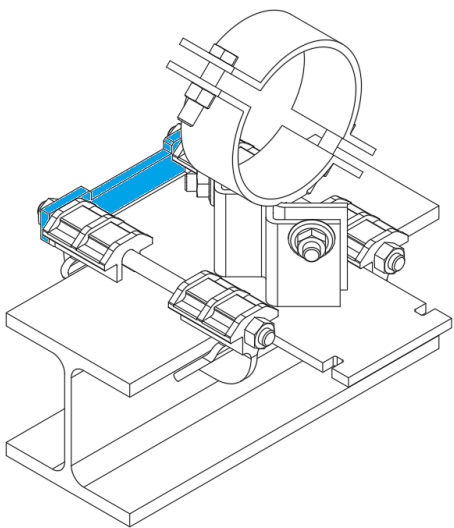
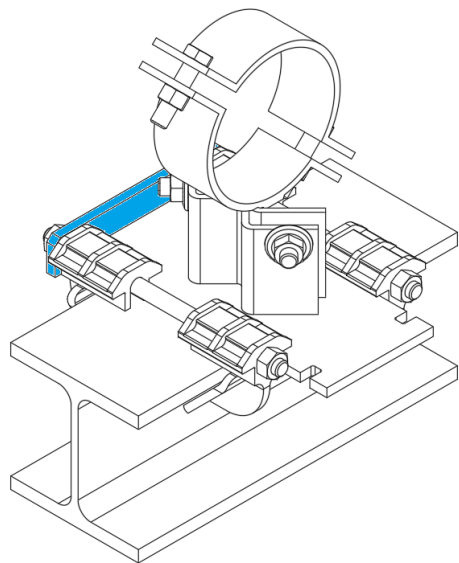
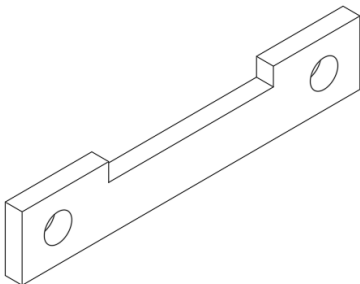
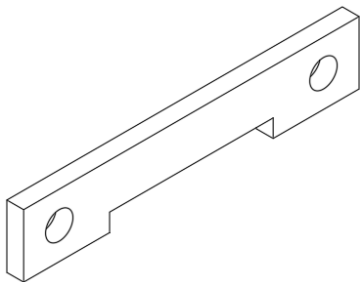
Primary steel structure



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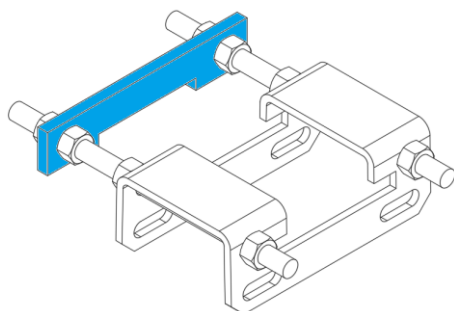


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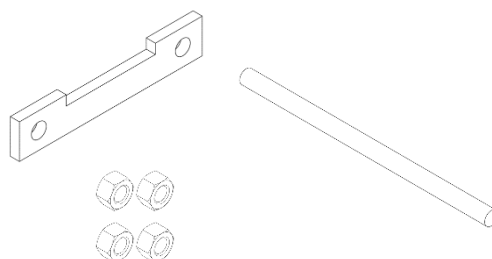


25. Double Axle Stop

siFramo

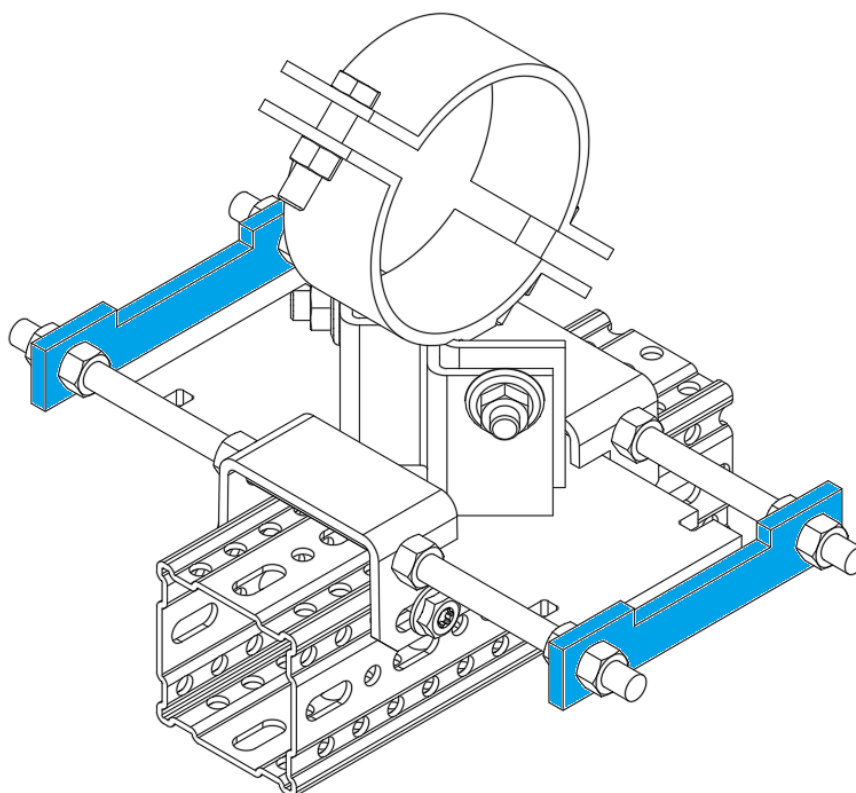
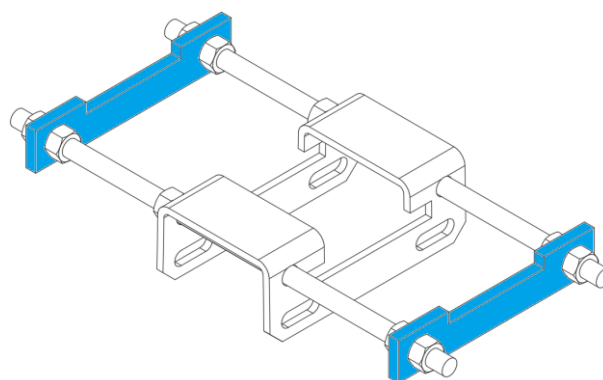
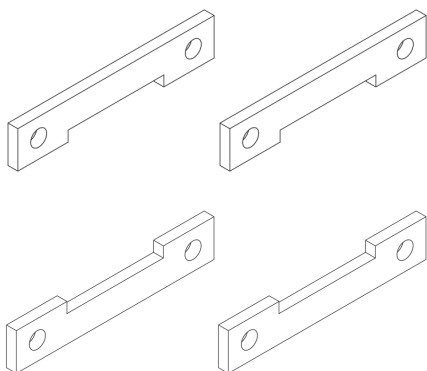


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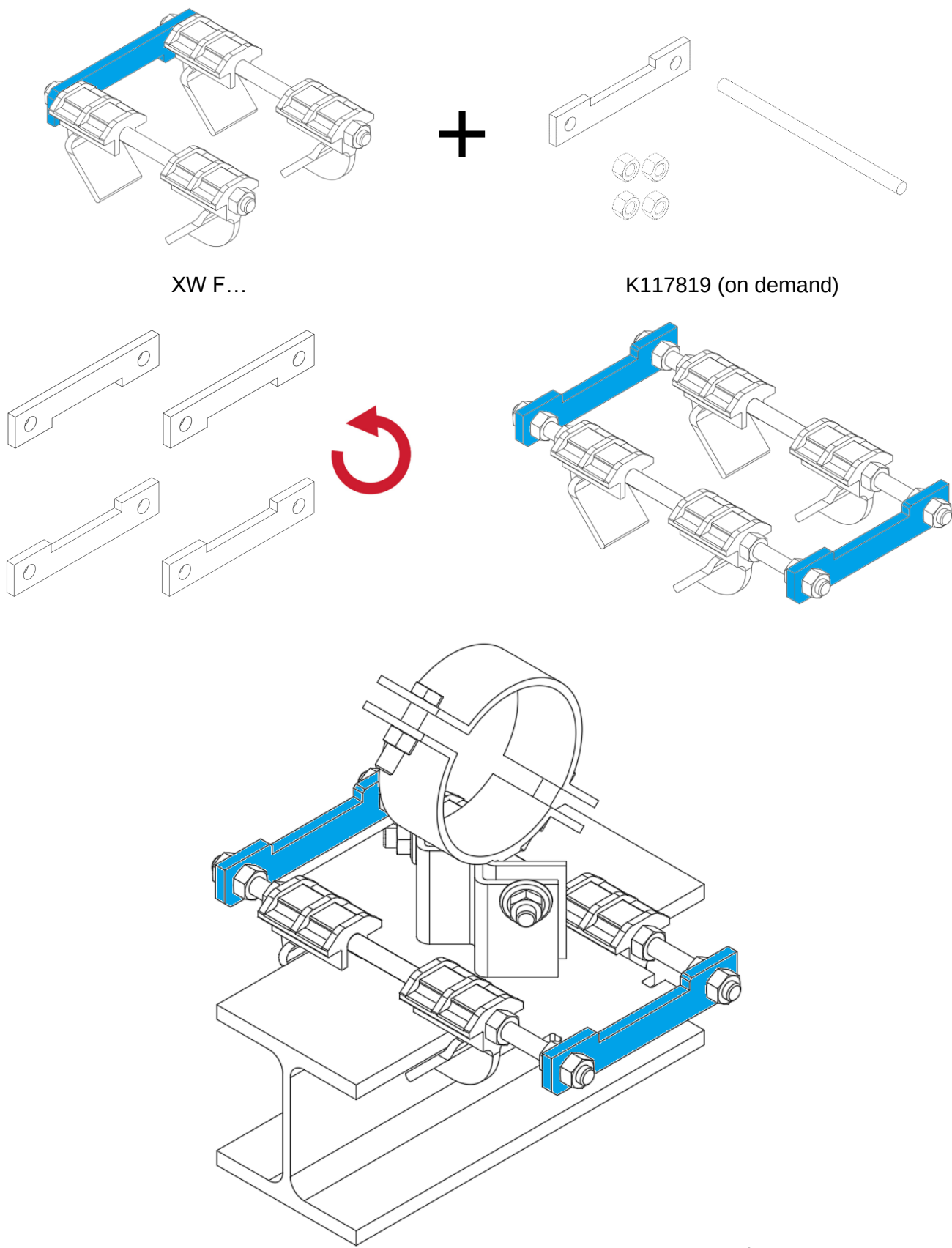


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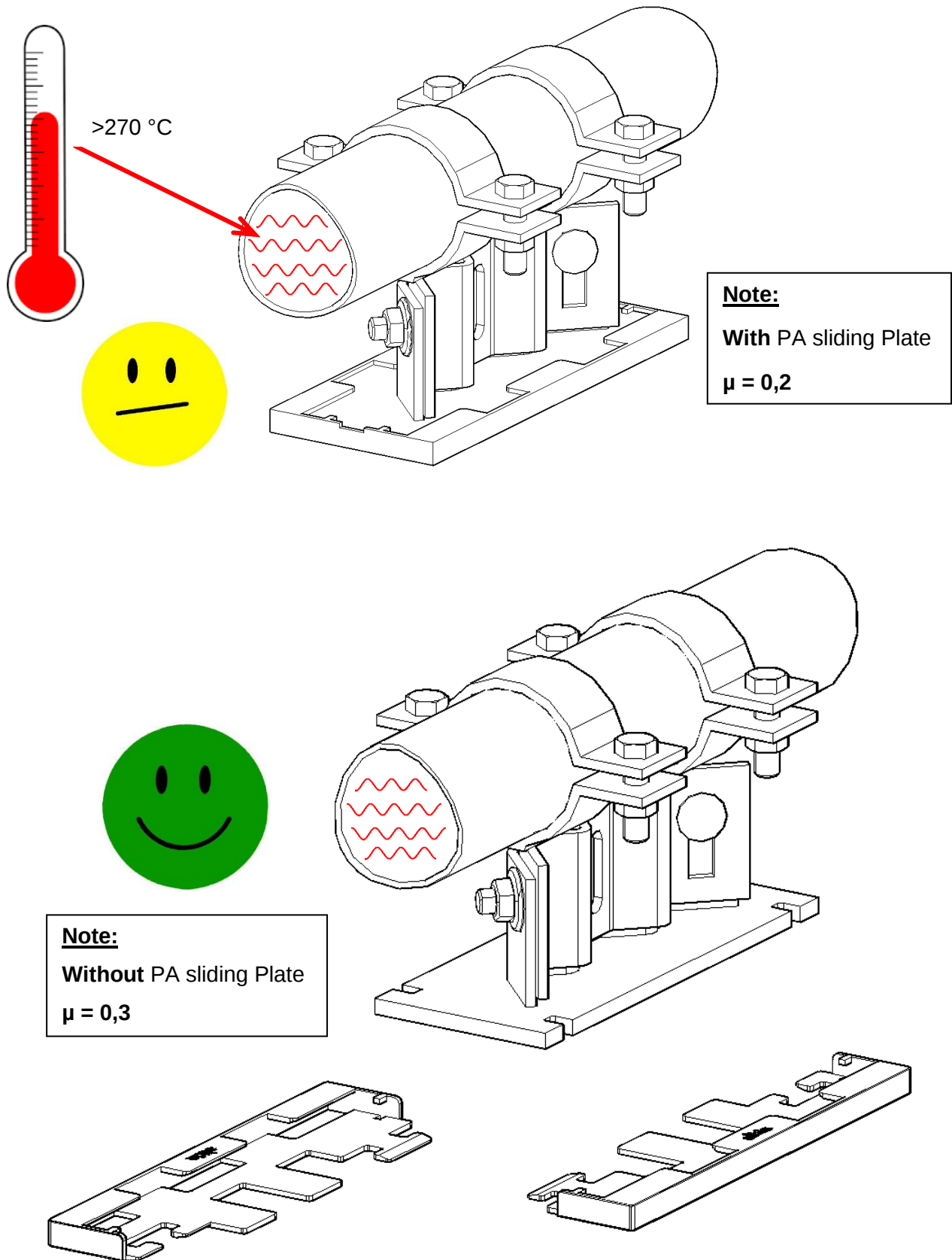
K117819 (on demand)

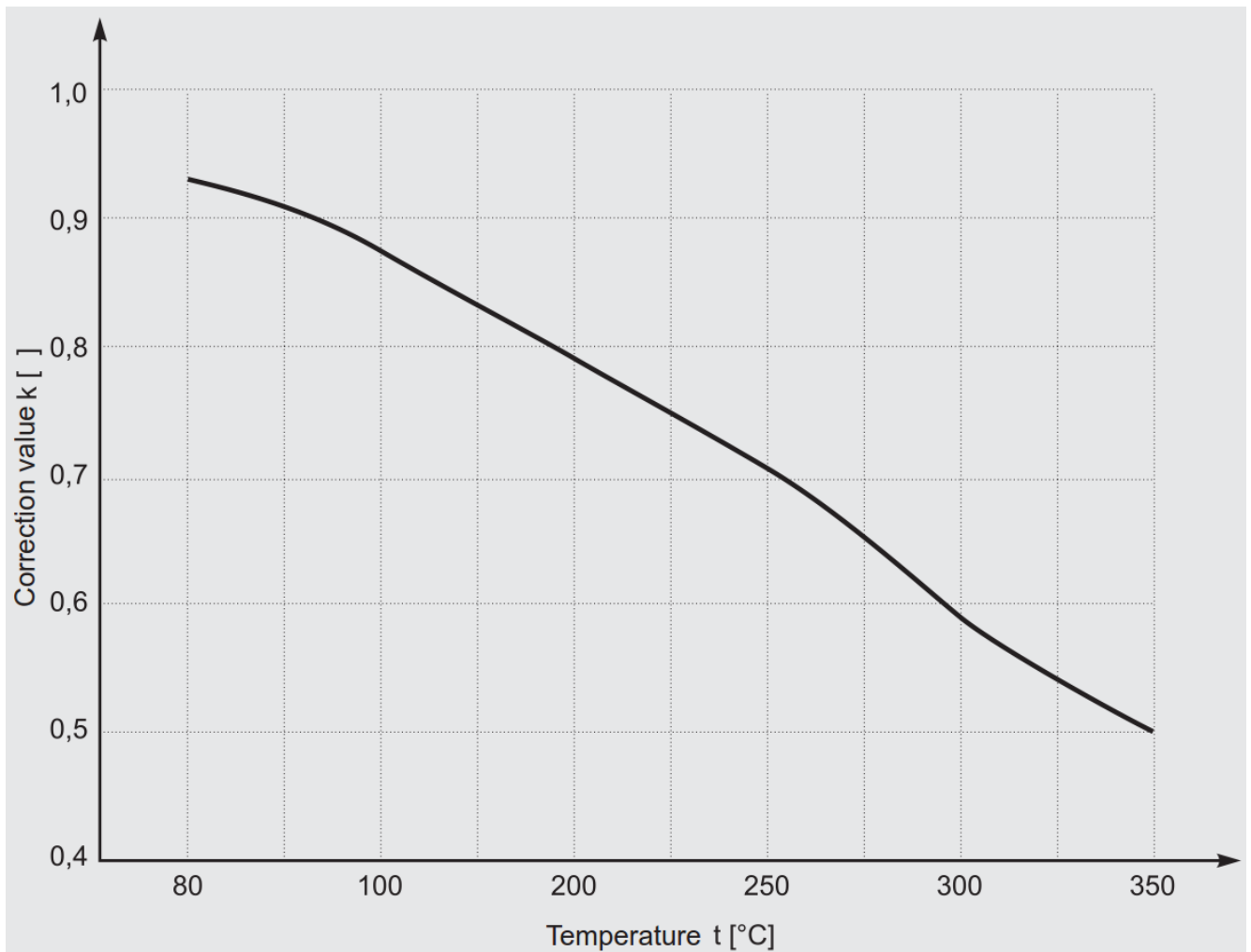


Primary steel structure



26. Maximum Fluid Temperature for PA Sliding Plate under Pipe Shoes

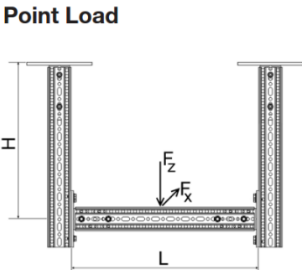


27. Correction Factors for Pipe Shoes due to Fluid Temperature $> 80\text{ }^{\circ}\text{C}$ 

28. Installation guideline (Static)

Installation Guideline siFramo 80

Working loads in accordance with Eurocode 3

Point Load	H _{max} [mm]	500		1000		1500		2000		2500		3000	
		F _{z, perm} for		F _{z, perm} for		F _{z, perm} for		F _{z, perm} for		F _{z, perm} for		F _{z, perm} for	
		F _x = 0	F _x = μ ₀ * F _z	F _x = 0	F _x = μ ₀ * F _z	F _x = 0	F _x = μ ₀ * F _z	F _x = 0	F _x = μ ₀ * F _z	F _x = 0	F _x = μ ₀ * F _z	F _x = 0	F _x = μ ₀ * F _z
	1000	19,67	9,02	16,21	8,76	11,21	8,18	8,63	6,56	6,08	5,38	4,52	4,25
	1500	19,67	5,49	16,13	5,42	11,15	5,26	8,51	5,00	5,99	4,63	4,45	4,18
	2000	19,67	3,74	16,04	3,72	11,09	3,66	8,40	3,56	5,92	3,41	4,39	3,22
	2500	19,67	2,74	15,96	2,73	11,04	2,70	8,31	2,65	5,85	2,59	4,34	2,49
	3000	19,67	2,09	15,89	2,09	10,98	2,08	8,22	2,05	5,78	2,02	4,29	1,97

F_z [kN] as a permanent load at distance L/2; F_x [kN] as a variable load at distance L/2.

Figure 1: Clip out of the installation guideline page 10

Example

U-shape support with the following dimensions:

H = 1000 mm

L = 1500 mm

Load case 1

Cold pipe, only vertical loads, no forces in pipe axis direction or lateral forces:

→ F_x = F_y = 0→ Maximum vertical load F_z = 11,21 kN

Load case 2

Hot pipe, vertical loads as well as forces in pipe axis direction and/or lateral forces:

→ F_x ≠ 0 and/or F_y ≠ 0→ F_x = μ * F_z**ATTENTION:**

The given loads base on the use of Sikla pipe shoes with the polyamide sliding plate and friction value of μ = 0,2! In case of using a Sikla pipe shoe without sliding plate (liquid temperature > 270 °C) or a non Sikla pipe shoe the maximal allowable loads must be recalculated with a friction value of μ = 0,3!

Load case 2 with Sikla pipe shoes including the sliding plate (fluid temperature ≤ 270 °C), μ = 0,2:

→ F_z = 8,18 kN→ F_x = μ * F_z = 0,2 * 8,18 = 1,64 kN

Load case 2, non Sikla pipe shoes or Sikla pipe shoes without sliding plate (fluid temperature > 270 °C), μ = 0,3:

F_x = 1,64 kN→ Σ F_x + F_y ≤ 1,64 kN→ F_x = μ * F_z→ 1,64 = 0,3 * F_z→ F_z = 5,47 kN**Summary**F_x + F_y = 1,64 kNF_z = 8,18 kNF_x + F_y = 1,64 kNF_z = 5,47 kN