

COOL-FIT 4.0

Installation Instructions

Refrigeration Applications
Flow $\geq -15^{\circ}\text{C}$



Refrigeration Applications (Flow ≥ -15°C)

Supplement to Planning Fundamentals

1 General Guidelines and Boundary Conditions

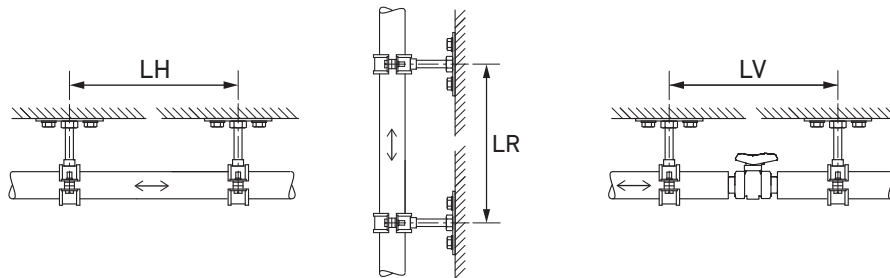
The installation guidelines are recommendations on the basis of the outlined assumptions and boundaries. For deviating situations like more complex routings, less available space for an L-Bend, different load cases, static evidences, please contact GF Advanced Engineering. At any time, the planning fundamentals have to be taken into account and the instructions have to be followed for a correct and long lasting function of the system.

Boundary conditions	
System and pipe class	COOL-FIT 4.0
Flow temperature	-15 to +47°C
Ambient temperature	-5 to +45°C
Installation temperature	-5 to +40°C
Medium type	Glycol (reduction factor PE100: F=1.1; ABS: F=1.7)
Operation time	25 years for flow temp. ≤47°C; reduced for flow temp. >47°C

2 Maximal Permissible Operating Pressure

	[°C]	-50	-40	-30	-20	-10	0	10	20	30	40	50	60
COOL-FIT 4.0 pipe and fitting, SDR11, PE100, C=1.6	[bar]	13.70	13.70	13.70	13.70	13.70	13.70	13.70	11.54	9.83	8.46	7.35	6.44
COOL-FIT 4.0 pipe and fitting, SDR17, PE100, C=1.6	[bar]	8.56	8.56	8.56	8.56	8.56	8.56	8.56	7.21	6.14	5.29	4.59	4.02
Ball valve, ABS, PN10	[bar]		5.88	5.88	5.88	5.88	5.88	5.88	5.88	4.71	3.53	2.35	1.18
Butterfly valve, ABS, PN10	[bar]			5.88	5.88	5.88	5.88	5.88	5.88	4.71	3.53	2.35	1.18

3 Maximum Support Distances



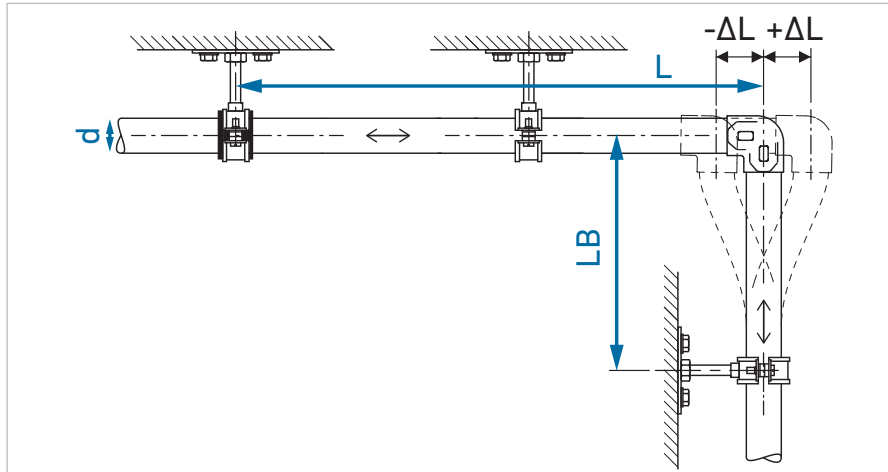
	Horizontal LH max. [m]	Riser LR max. (1.3 x LA) [m]	Valve LV max. (0.5 x LA) [m]	Pipe weight with media ρ=1025 kg/m3 [kg/m]
d32/90	1.8	2.3	0.9	2.1
d40/110	2.0	2.6	1.0	3.1
d50/110	2.0	2.6	1.0	3.9
d63/125	2.0	2.6	1.0	5.6
d75/140	2.1	2.7	1.1	7.5
d90/160	2.2	2.9	1.1	10.1
d110/180	2.3	3.0	1.2	14.2
d140/225	2.5	3.3	1.3	22.7
d160/250	2.6	3.4	1.3	29.5
d225/315	2.9	3.8	1.5	55.2
d250/355	3.3	4.3	1.7 (metal valve*)	67
d280/400	3.5	4.6	1.8 (metal valve*)	84
d315/450	3.7	4.8	1.9 (metal valve*)	105
d355/500	3.9	5.1	2.0 (metal valve*)	133
d400/560	4.1	5.3	2.1 (metal valve*)	168
d450/630	4.3	5.6	2.2 (metal valve*)	212

* Support metal valves direct

4 Flexible Sections

4.1 Flexible Sections (L-Bend or LB)

Temperature Range	
Flow temperature	-15 to +47°C
Ambient temperature	-5 to +45°C
Installation temperature	-5 to +40°C



① Pipe length L	② d (mm)	
	③ LB [m]	
	-ΔL [mm]	④ +ΔL [mm]

- ① choose pipe length L
- ② choose dimension d
- ③ determine minimal clamping distance of the flexible section LB.
- ④ consider space for pipe movement due to contraction $-\Delta L$ and expansion $+\Delta L$

Table for L-Bend, pipe contraction and expansion - COOL-FIT 4.0 pipe

Pipe length L	d32	d40	d50	d63	d75	d90	d110	d140	d160	d225	d250	d280	d315	d355	d400	d450
0.5 m	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.2
1.0 m	0.6	0.7	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.8
1.5 m	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.3	1.3	1.5	1.6	1.7	1.8	1.9	2.0	2.1
2.0 m	0.9	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.7	1.9	2.0	2.1	2.2	2.3	2.5
2.5 m	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.6	1.7	2.0	2.1	2.2	2.3	2.5	2.6	2.8
3.0 m	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.8	1.9	2.1	2.3	2.4	2.6	2.7	2.9	3.0
3.5 m	1.1	1.3	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.3	2.5	2.6	2.8	2.9	3.1	3.3
4.0 m	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.2	2.5	2.6	2.8	2.9	3.1	3.3	3.5
4.5 m	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.2	2.3	2.6	2.8	2.9	3.1	3.3	3.5	3.7
5.0 m	1.4	1.5	1.5	1.7	1.8	1.9	2.0	2.3	2.4	2.8	2.9	3.1	3.3	3.5	3.7	3.9
6.0 m	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.5	2.7	3.0	3.2	3.4	3.6	3.8	4.0	4.3
7.0 m	1.6	1.8	1.8	2.0	2.1	2.2	2.4	2.7	2.9	3.3	3.5	3.7	3.9	4.1	4.4	4.6
8.0 m	1.7	1.9	1.9	2.1	2.2	2.4	2.6	2.9	3.1	3.5	3.7	3.9	4.2	4.4	4.7	5.0
9.0 m	1.8	2.0	2.1	2.2	2.4	2.6	2.7	3.1	3.2	3.7	3.9	4.2	4.4	4.7	4.9	5.3
10 m	1.9	2.1	2.2	2.3	2.5	2.7	2.9	3.2	3.4	3.9	4.1	4.4	4.7	4.9	5.2	5.5
15 m	2.4	2.6	2.7	2.9	3.1	3.3	3.5	4.0	4.2	4.8	5.1	5.4	5.7	6.0	6.4	6.8
20 m	2.7	3.0	3.1	3.3	3.5	3.8	4.1	4.6	4.8	5.5	5.9	6.2	6.6	7.0	7.4	7.8
25 m	3.0	3.4	3.4	3.7	4.0	4.3	4.6	5.1	5.4	6.2	6.6	6.9	7.4	7.8	8.2	8.8
30 m	3.3	3.7	3.8	4.1	4.3	4.7	5.0	5.6	5.9	6.8	7.2	7.6	8.1	8.5	9.0	9.6
40 m	3.8	4.2	4.3	4.7	5.0	5.4	5.8	6.5	6.8	7.8	8.3	8.8	9.3	9.8	10.4	11.1
50 m	4.3	4.7	4.9	5.2	5.6	6.0	6.5	7.2	7.7	8.7	9.3	9.8	10.4	11.0	11.7	12.4

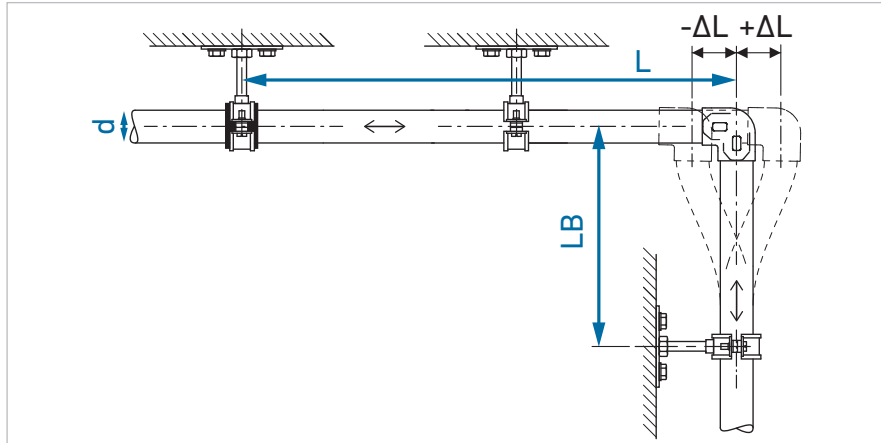
Request GF support for values in dark grey fields and complex routings.

L-bends not required for pipe length smaller 0.5m.

4.2 Flexible Sections (L-Bend or LB) – Reduced Temperature Range (Lowered Requirements)

Choose the pipe length L and dimension d and determine the minimal clamping distance of the flexible section LB. Consider space for pipe movement due to contraction $-\Delta L$ and expansion $+\Delta L$.

Reduced Temperature Range	
Flow temperature	-15 to +47°C
Ambient temperature	+5 to +45°C
Installation temperature	-5 to +35°C



① Pipe length L	② d (mm)	
	③ LB [m]	
	-ΔL [mm]	④ +ΔL [mm]

- ① choose pipe length L
- ② choose dimension d
- ③ determine minimal clamping distance of the flexible section LB.
- ④ consider space for pipe movement due to contraction $-\Delta L$ and expansion $+\Delta L$

Table for L-Bend, pipe contraction and expansion - COOL-FIT 4.0 pipe

Pipe length L	d32	d40	d50	d63	d75	d90	d110	d140	d160	d225	d250	d280	d315	d355	d400	d450
0.5 m	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.1
	-2 1	-2 1	-2 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1	-3 1
1.0 m	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6
	-5 2	-5 2	-5 2	-5 2	-5 2	-5 2	-6 2	-6 2	-6 2	-6 2	-6 2	-6 2	-6 2	-6 2	-6 2	-6 2
1.5 m	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.4	1.5	1.6	1.7	1.8	1.9	2.0
	-7 3	-7 3	-7 3	-8 3	-8 3	-8 3	-8 3	-9 3	-9 3	-9 3	-9 3	-9 3	-9 3	-9 3	-9 3	-9 3
2.0 m	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.0	2.2	2.3
	-9 4	-9 4	-10 4	-10 4	-11 4	-11 4	-11 4	-11 4	-12 4	-12 4	-12 4	-12 4	-12 4	-12 4	-12 4	-12 4
2.5 m	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.5	1.6	1.8	1.9	2.0	2.2	2.3	2.4	2.6
	-11 5	-11 5	-12 5	-13 5	-13 5	-14 5	-14 5	-14 5	-15 5	-15 5	-15 5	-15 5	-15 5	-15 5	-15 5	-16 5
3.0 m	0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.6	1.7	2.0	2.1	2.2	2.4	2.5	2.6	2.8
	-14 6	-14 6	-15 6	-15 6	-16 6	-16 6	-17 6	-17 6	-18 6	-18 6	-18 6	-18 6	-18 6	-18 6	-18 6	-19 6
3.5 m	1.0	1.1	1.1	1.2	1.3	1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	2.7	2.9	3.0
	-16 7	-16 7	-17 7	-18 7	-19 7	-19 7	-20 7	-20 7	-20 7	-21 7	-21 7	-21 7	-21 7	-21 7	-22 7	-22 7
4.0 m	1.1	1.2	1.2	1.3	1.4	1.5	1.7	1.9	2.0	2.3	2.4	2.6	2.7	2.9	3.1	3.3
	-18 8	-18 8	-20 8	-21 8	-21 8	-22 8	-23 8	-23 8	-23 8	-24 8	-25 8	-24 8	-24 8	-25 8	-25 8	-25 8
4.5 m	1.1	1.2	1.3	1.4	1.5	1.6	1.8	2.0	2.1	2.4	2.6	2.7	2.9	3.1	3.2	3.4
	-20 9	-21 9	-22 9	-23 9	-24 9	-24 9	-25 9	-26 9	-26 9	-27 9	-28 9	-27 9	-28 9	-28 9	-28 9	-28 9
5.0 m	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.1	2.2	2.5	2.7	2.9	3.0	3.2	3.4	3.6
	-23 10	-23 10	-25 10	-26 10	-26 10	-27 10	-28 10	-29 10	-29 10	-30 10	-31 10	-30 10	-31 10	-31 10	-31 10	-31 10
6.0 m	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.3	2.4	2.8	3.0	3.1	3.3	3.5	3.7	4.0
	-27 12	-28 12	-30 12	-31 12	-32 12	-33 12	-34 12	-34 12	-35 12	-37 12	-37 12	-37 12	-37 12	-37 12	-37 12	-37 12
7.0 m	1.4	1.5	1.6	1.7	1.9	2.0	2.2	2.5	2.6	3.0	3.2	3.4	3.6	3.8	4.0	4.3
	-32 14	-32 14	-35 14	-36 14	-37 14	-38 14	-40 14	-40 14	-41 14	-43 14	-43 14	-43 14	-43 14	-43 14	-43 14	-43 14
8.0 m	1.5	1.7	1.7	1.9	2.0	2.2	2.3	2.6	2.8	3.2	3.4	3.6	3.9	4.1	4.3	4.6
	-36 16	-37 16	-40 16	-41 16	-42 16	-43 16	-45 16	-46 16	-46 16	-49 16	-49 16	-49 16	-49 16	-49 16	-49 16	-50 16
9.0 m	1.6	1.8	1.8	2.0	2.1	2.3	2.5	2.8	3.0	3.4	3.6	3.8	4.1	4.3	4.6	4.9
	-41 18	-41 18	-45 18	-46 18	-48 18	-49 18	-51 18	-51 18	-52 18	-55 18	-55 18	-55 18	-55 18	-55 18	-55 18	-56 18
10 m	1.7	1.8	1.9	2.1	2.2	2.4	2.6	2.9	3.1	3.6	3.8	4.1	4.3	4.6	4.8	5.1
	-46 19	-46 20	-50 20	-52 20	-53 20	-54 20	-57 20	-57 20	-58 20	-61 20	-61 20	-61 20	-61 20	-61 20	-62 20	-62 20
15 m	2.0	2.3	2.4	2.6	2.7	3.0	3.2	3.6	3.8	4.4	4.7	5.0	5.3	5.6	5.9	6.3
	-68 29	-69 29	-74 29	-77 29	-79 29	-82 30	-85 30	-86 30	-87 30	-91 30	-92 30	-91 30	-92 30	-92 30	-92 30	-93 30
20 m	2.4	2.6	2.7	3.0	3.2	3.4	3.7	4.2	4.4	5.1	5.4	5.7	6.1	6.4	6.8	7.3
	-91 39	-92 39	-99 39	-103 39	-106 39	-109 39	-113 40	-114 40	-116 40	-122 40	-123 40	-122 40	-122 40	-122 40	-123 40	-124 40
25 m	2.6	2.9	3.0	3.3	3.5	3.8	4.1	4.7	5.0	5.7	6.1	6.4	6.8	7.2	7.6	8.1
	-114 49	-115 49	-124 49	-129 49	-132 49	-136 49	-141 50	-143 50	-145 50	-152 50	-153 50	-152 50	-153 50	-154 50	-154 50	-155 51
30 m	2.9	3.2	3.3	3.6	3.9	4.2	4.5	5.1	5.4	6.2	6.6	7.0	7.5	7.9	8.4	8.9
	-137 58	-138 59	-149 59	-155 59	-159 59	-163 59	-170 59	-171 59	-174 60	-183 59	-184 60	-183 60	-183 60	-184 60	-185 60	-186 61
40 m	3.3	3.7	3.8	4.2	4.5	4.8	5.2	5.9	6.3	7.2	7.7	8.1	8.6	9.1	9.7	10.3
	-182 78	-184 78	-198 78	-207 78	-212 78	-217 79	-226 79	-228 79	-232 80	-244 79	-245 80	-244 80	-245 80	-246 80	-246 80	-248 81
50 m	3.7	4.1	4.3	4.7	5.0	5.4	5.9	6.6	7.0	8.1	8.6	9.1	9.6	10.2	10.8	11.5
	-228 97	-229 98	-248 98	-258 98	-265 98	-272 99	-283 99	-285 99	-290 99	-305 99	-306 100	-304 100	-306 101	-307 100	-308 100	-310 101

Request GF support for values in dark grey fields and complex routings.

L-bends not required for pipe length smaller 0.5m.

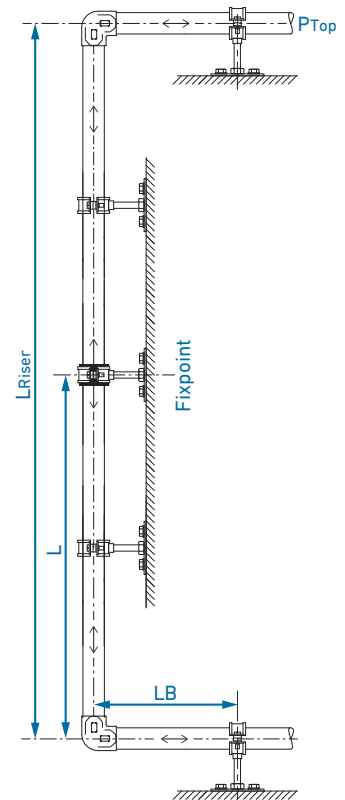
5 Riser Installation Example

Following table shows an example of the achievable riser lengths under assumptions:

Boundary conditions	
System and pipe class	COOL-FIT 4.0 SDR11
Flow temperature	-15 to +47°C
Ambient temperature	-5 to +45°C
Installation temperature	-5 to +40°C
Fixed point position	Middle of the riser pipe
Pressure on top level	3 bar (P _{Top})
Support distance vertical	Equal to horizontal (stability increase for very long riser pipe length)



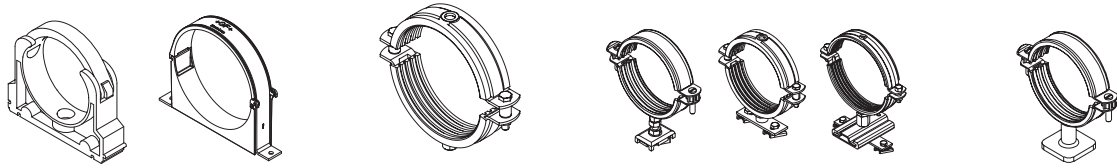
	Pipe support distance reduced for long riser		Fixed point		Fixed point for increased forces	
	Horizontal [m]	Vertical [m]	Max. riser length (LRiser) [m]	Fixed point force [kN]	Max. riser length (LRiser) [m]	Fixed point force [kN]
d32/90	1.8	1.8	43	0.9		
d40/110	2.0	2.0	54	1.7		
d50/110	2.0	2.0	44	1.7		
d63/125	2.0	2.0	49	2.7		
d75/140	2.1	2.1	52	3.8		
d90/160	2.2	2.2	54	5.4		
d110/180	2.3	2.3	54	7.5		
d140/225	2.5	2.5	45	10	55	12
d160/250	2.6	2.6	35	10	55	16
d225/315	2.9	2.9	17	10	54	29
d250/355	3.3	3.3	14	10	54	35
d280/400	3.5	3.5			41	35
d315/450	3.7	3.7			32	35
d355/500	3.9	3.9			24	35
d400/560	4.1	4.1			18	35
d450/630	4.3	4.3			14	35



⚠ Following sections are recommended to be proofed by GF Specialized Services before installation:

- Riser pipe dimension >d160
- Riser pipe with multiple dimensions
- Installation differ from normal installation with fixed point in the middle

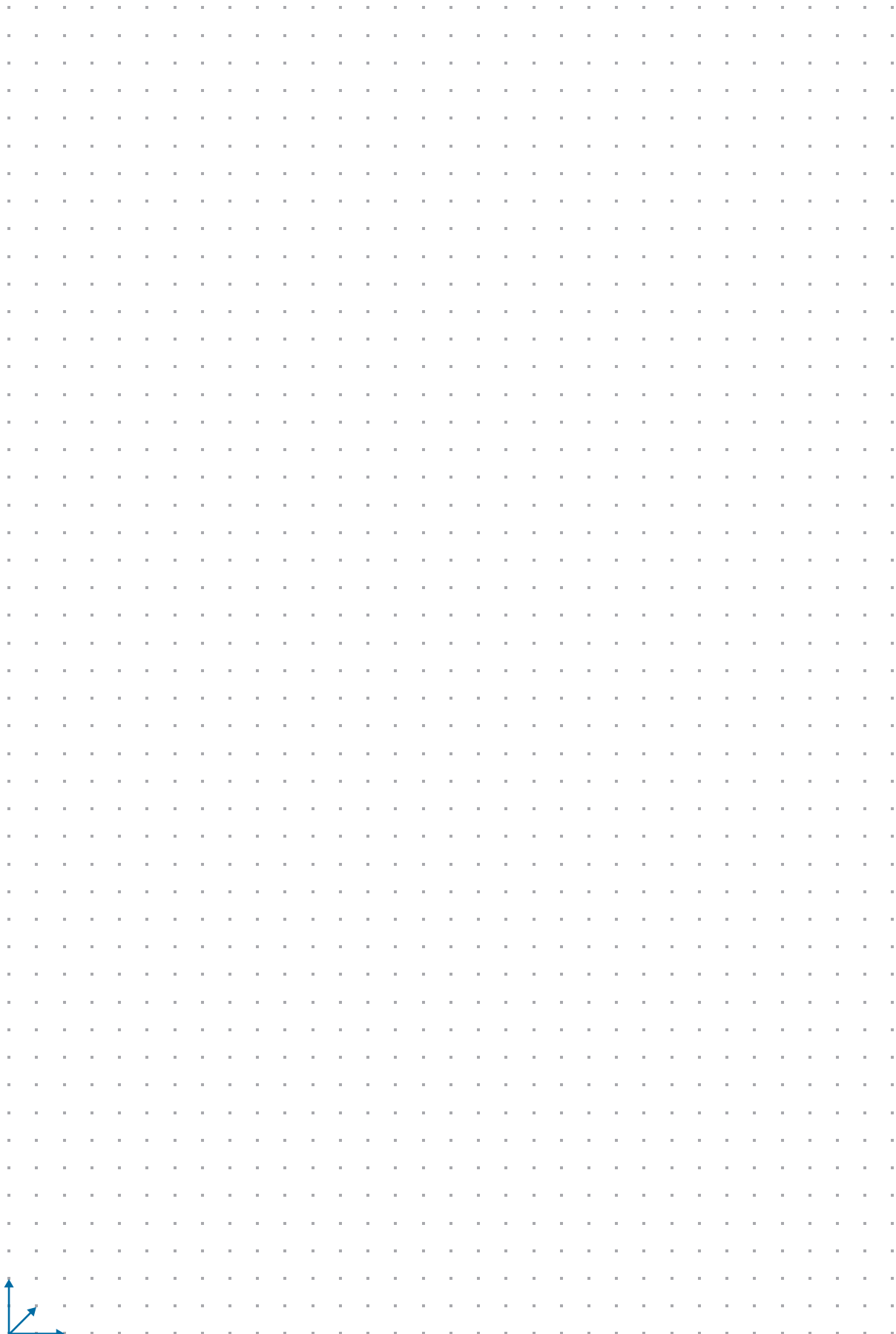
6 Sliding Clamps



Klip-It		Stress Less	Sikla sliding clamp		Sikla sliding clamp with screws and threaded plates for connection to Sikla rail system		Sikla sliding clamp with welding plate	
Code GF	Code GF	Code GF	Typ	Code Sikla	Typ	Code Sikla	Typ	Code Sikla
d32/90	173061013	155484507	Ratio S-K 90	155993	GLH-CC 90	802867	GLH-ASP 90	802866
d40/110	173061014	155484508	Ratio S-K 110	156000	GLH-CC 110	802869	GLH-ASP 110	802868
d50/110	173061014	155484508	Ratio S-K 110	156000	GLH-CC 110	802869	GLH-ASP 110	802868
d63/125	173061015	155484518	Stabil D-3G-K 125	802130	GLH-CC 125	802871	GLH-ASP 125	802870
d75/140	173061016	155484519	Stabil D-3G-K 140	802131	GLH-CC 140	802873	GLH-ASP 140	802872
d90/160	173061017	155484509	Stabil D-3G-K 160	802132	GLH-CC 160	802875	GLH-ASP 160	802874
d110/180			Stabil D-3G-K Top 180	802897	GLH-CC 180	802877	GLH-ASP 180	802876
d140/225		155484511	Stabil D-3G mE 219-225	107468	GLH-CC 225	802881	GLH-ASP 225	802880
d160/250		155484512	Stabil D-3G mE 244-250	107477	GLH-CC 250	802883	GLH-ASP 250	802882
d225/315		155484511	Stabil D-3G mE 307-318	189974	GLH-CC 315	802887	GLH-ASP 315	802886
d250/355			LC-HV 90Da 365 HCP m.E.	802905				
d280/400			LC-HV 90Da 407 HCP m.E.	802906				
d315/450			LC-HV 90Da 457 HCP m.E.	802907				
d355/500			LD-HV 90Da 508 HCP m.E.	802908				
d400/560			LD-HV 90Da 574 HCP m.E.	802909				
d450/630			LD-HV 90Da 641 HCP m.E.	802910				
Comment	Klip-It \geq D110 must be mounted upright		\geq D225 sliding function via sliding plate					

Clamps are just recommendations and individual clarification is recommended

7 Notes/Isometric Grid



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