

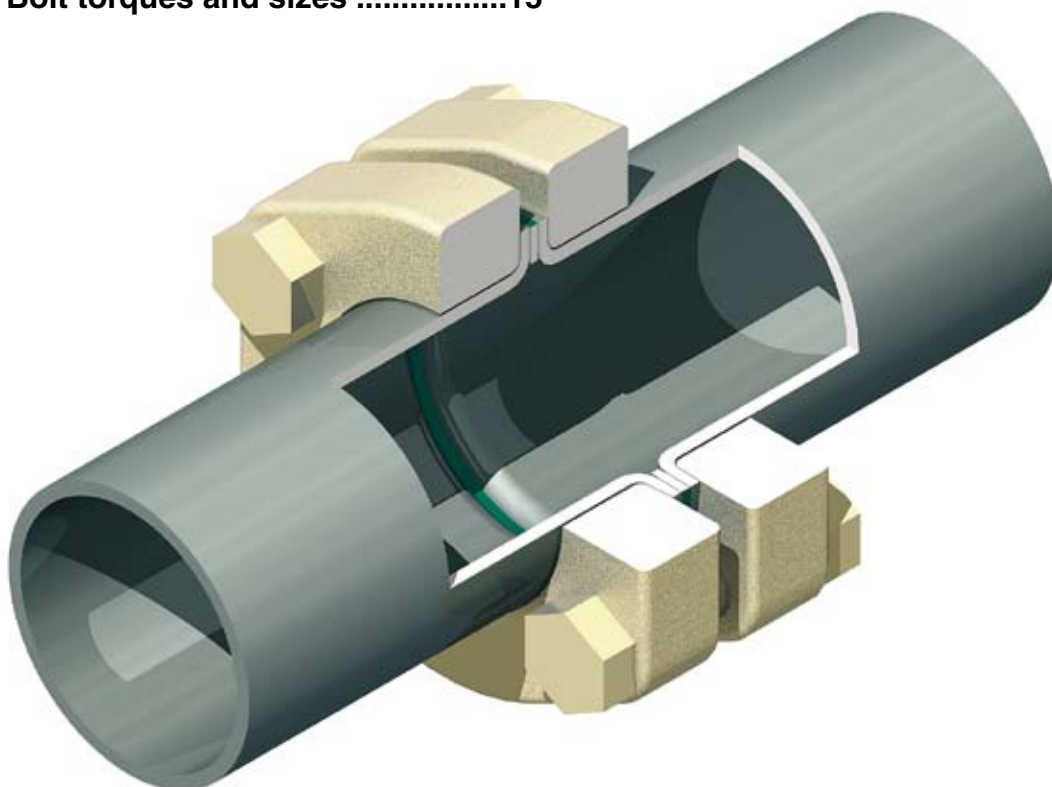
GS 90° Flare Flange System

Flaring and Installation Instructions



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Introduction

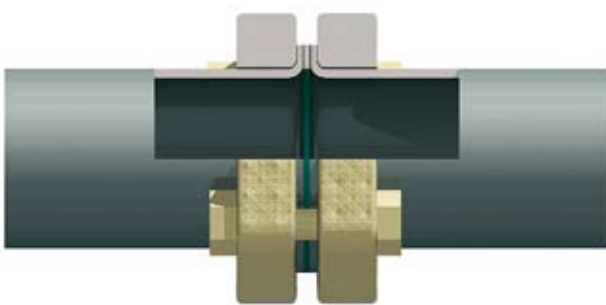
These are GS-Hydro's guidelines for the manufacture and assembly of the GS-Hydro 90° flare flange system. In the case of special applications (special sealing arrangements, non-conductive connections, special materials etc) please contact GS-Hydro for further instructions.

In order to achieve the integrity required in any piping system it is imperative that operators are fully trained and conversant with the tools and machines to be used. GS Hydro can provide training and instruction as well as installation supervision if required.



Refer to the relevant health and safety instructions for protective measures.

Protect yourself always by using required personal protective equipments.



The GS 90° flare system is used for class III piping systems with operating pressures of up to 40 bar. Extensive test programs – including rigorous vibration testing – have proven the suitability of the GS 90° flare flange system for a wide range of different materials and applications.

GS Hydro solutions are approved by many Classification companies for a wide range of materials and applications.

	SAE	DIN/BS/ANSI/JIS/GOST
pressure, bar	10 – 40	10 – 40
size, pipe	16x1.5 – 220x6	21.3x2.1 – 608x12.5
size, flange	1/2" – 8"	1/2" – 24"
material, pipe	mild steel, galvanised steel, copper-nickel, aluminium/brass duplex, super duplex, titanium, tungum	
material, flange	electric zincd carbon steel, hot dip galvanized carbon steel, stainless steel or titanium	
material, seal	based on media inside pipe (example Klinger® SIL C-4430)	

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Selection of the pipe

GS-Hydro recommends the use of cold drawn pipes & tubes due to the inherent quality, (precision dimensions and shape) and cleanliness (no scale) characteristics. As a comparison, hot rolled tubes will always have scale both inside and outside due to the manufacturing process and may not be exactly round.

GS-Hydro's cold forming process ensures there will not be any scale inside the cold drawn tube after the manufacturing.

Original GS-Hydro high-pressure piping can be recognised from the marking **GS-PIPING** along the tube length.

GS-Hydro maintains a large stock of carbon and stainless steel pipes & tubes to be utilised in hydraulic and other piping systems:

	Carbon Steel	
Material Specification	DIN 1630	–
Manufacturing Tolerances	DIN 2391-1	EN 10305-4
Technical Terms of Delivery	DIN 2391-2/C	EN 10305-4
	Stainless Steel (mm)	Stainless Steel (sch)
Material Specification	ASTM A269/A213 (A.W.)	ASTM A312
Manufacturing Tolerances	ASTM A269	ASTM A530

All precision steel pipes are supplied with trace numbers.

Always keep the tubes stored indoors away from rain and moisture. Make sure all the tubes are fitted with plastic plugs in the ends.



Cutting off the pipe

Cut tubes squarely by using cold saw. Do not use roller cutter or grinder.

After cutting the tube, make sure to put a plastic plug in the tube you do not use.



After cutting, the pipe is de-burred inside and outside; then wiped clean by a clean cloth in order to remove any metal particles.

Especially with small size pipes (below 60 mm) it is recommended also to shoot foam projectiles by means of compressed air through pipes – use Jet Clean, Compri Tube Clean or respective method.



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Cleaning operations before flaring

Place the GS 90° flare flange on the pipe end with the chamfer facing outwards.

Inspect the flange type before placing it on to the tube. The original GS-flange has a **GS-PIPING** text, marking of flange type and a charge number for traceability.



Clean the flaring cone and dies before fitting to the flaring machine. Ensure the correct size cone and dies are selected for the tube size.



Tools must be kept clean and lubricated.



Tools must be checked regularly.

Worn-out tools must be replaced.

Damaged, worn, or dirty tools will affect the sealing efficiency.

Clamping the pipe

Place the pipe between the dies and push it against the stopper. Check that the pipe is positioned horizontally and aligned with the flaring machine. Use pipe supports with long and heavy pipes.



Flaring operations



Use only GS-Hydro flaring machine and genuine flaring cones and clamping dies.

It is recommended to carry out a test flare to find the exact setting of the stopper, the right pressure of the clamping jaws and the flaring pressure as well as the right time setting for the work cycle.

Before beginning the flaring operation check that the surface of the flaring cone has been thoroughly oiled or treated with Gleitmo 830 (Fuchs Lubritech) lubricating paste for cold forming.

After the flaring machine has been set up, the pipe to be flared is pushed into its jaws against the stopper and the jaws are locked (1). Then the pipe is flared (2).



GS-90° flaring is done in two steps – at first with 37° cone...



... and then with 90° cone.

Ensure that the flange is placed on the pipe before beginning flaring operation.



When the flare has formed completely, it should be rolled another 3 to 5 more turns, before the cone is retracted.

Checking of the flaring

The flared pipe is cleaned with a cloth before visually checking quality.

Verify the outside dimension of the flaring (Appendix 1–4, pages 11–14) and check that flare is concentric with the pipe.

Check the wall thickness of the flared part. The thickness should be approx. 80% of the nominal thickness of the pipe.

Ensure that the flare is at 90° angle to the pipe.



Assembling of parts



Inspect components prior to assembly:

- Use non-abrasive soft cloth to ensure all components are free from grease, dirt or any contaminants
- use non-abrasive soft cloth to clean all components from grease and dirt
- verify that all components are of correct material and size



Insert the bolts and gasket which will centralize on bolts.

Connecting the joint

Verify that you are using right type and size of bolts (Appendix 5, page 15).

Torque bolts in diagonal sequence in small increments to appropriate torque level. See illustrated example.

Tighten bolts in sequence in small increments to appropriate torque level. See illustrated example.

Bolt torques for 90° flare flanges are shown in Appendix 5, page 15.

Bolt torque values are based on friction factor $\mu=0,15$ (slightly greased bolts). Effective greasing can reduce the friction factor 30–50 %.

1. Tighten lightly with a wrench.
2. Tighten crosswise with 30% of the recommended torque.
3. Tighten crosswise with 70% of the recommended torque.
4. Tighten crosswise with 100% of the recommended torque.



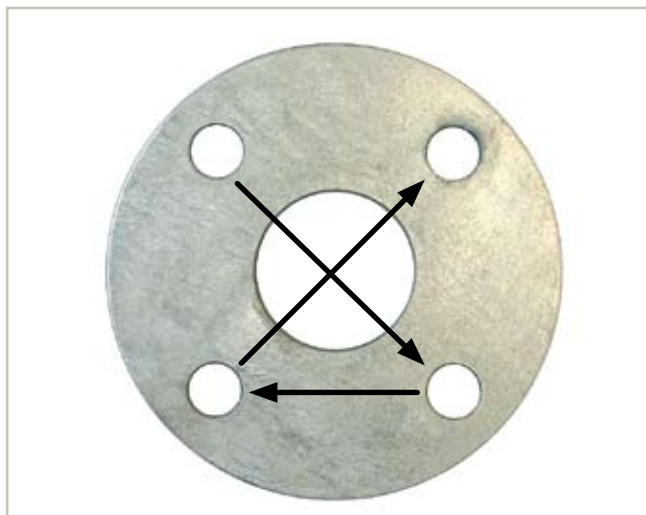
Do not tighten further after step 4.

It is recommended to use calibrated bolt torque wrench in all cases.

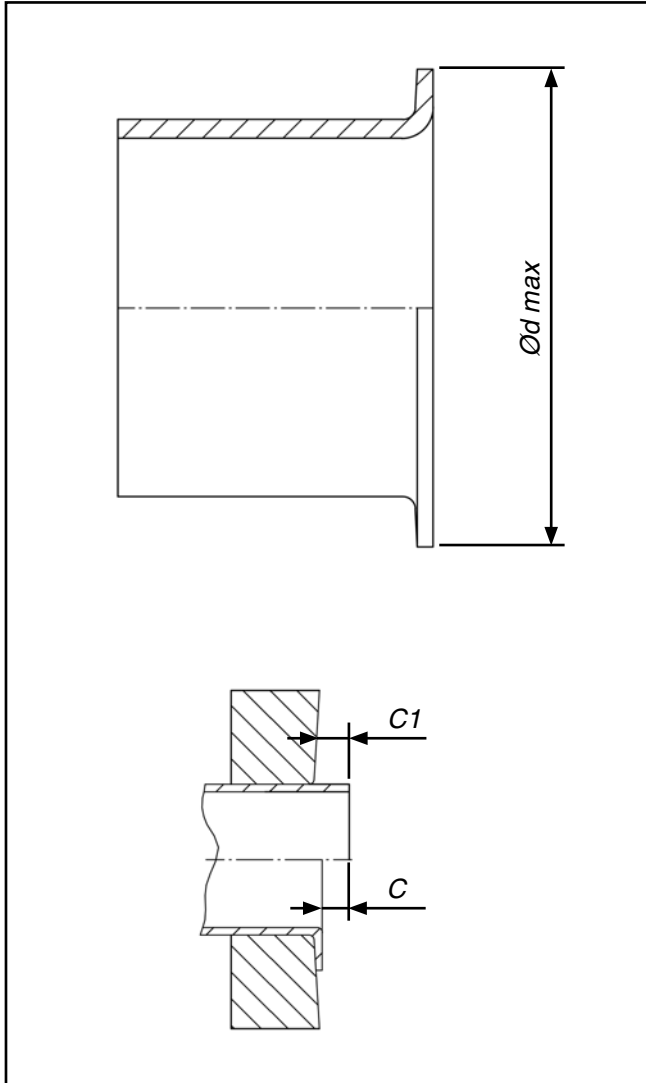


Remember! The given tightening torques are working values when the system is in operation.

This means that the torques must be checked either after the pressure test and/or a week after the start-up.



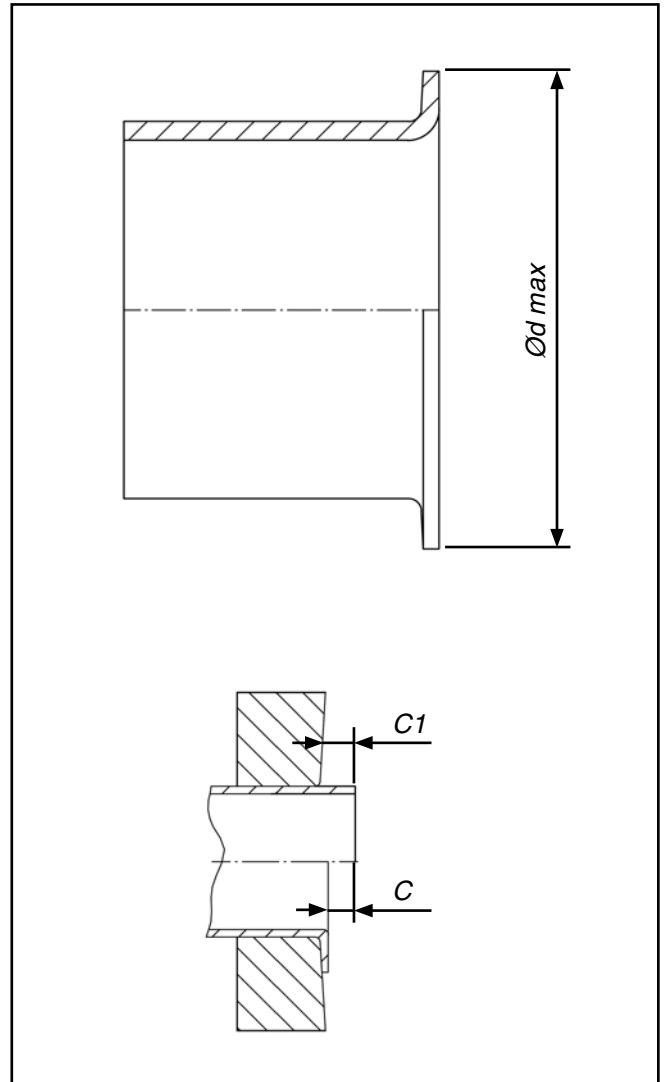
Appendix 1. Flared joint DIN 90°/St37.4



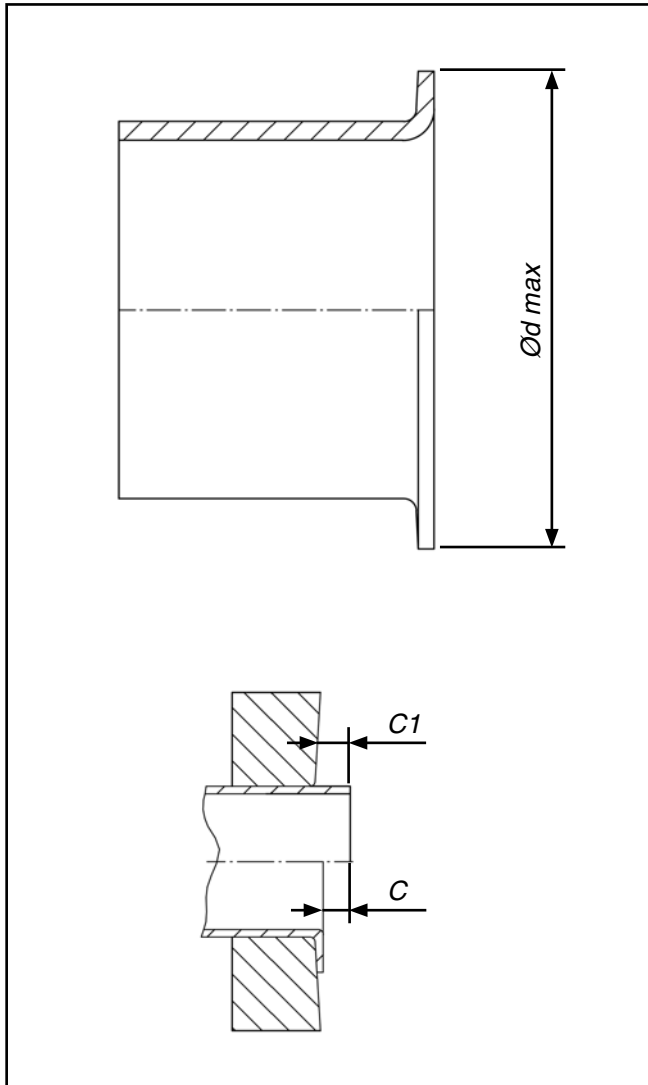
Size	PN	Pipe O.D.	C	C1	d max
DN40	10-40	48.3	13	14	73
DN50	10-40	60.3	18	22	92
DN65	10-40	76.1	17	20	105
DN80	10-40	88.9	23	27	127
DN100	10-16	114.3	24	28	158
DN100	25-40	114.3	26	31	162
DN125	10-25	139.7	25	32	188
DN150	10-16	168.3	23	27	212
DN150	25	168.3	26	31	218
DN200	10-16	219.1	23	29	268
DN200	25	219.1	32	36	278
DN250	10-16	273.0	24	27	320
DN300	10	323.9	25	28	370
DN300	16	323.9	29	31	378
DN350	10	355.6	43	41	430
DN350	16	355.6	47	46	438
DN400	10	406.4	45	44	482
DN400	16	406.4	49	48	490

Appendix 2. Flared joint DIN 90°/AISI 316

Size	PN	Pipe O.D.	C	C1	d max
DN40	10-40	48.3	9	9	65
DN50	10-40	60.3	10	10	80
DN65	10-40	76.1	12	12	100
DN80	10-40	88.9	16	15	120
DN100	10-40	114.3	15	14	143
DN125	10-25	139.7	16	15	170
DN150	10-25	168.3	16	15	200
DN200	10-25	219.1	21	19	260
DN250	10-16	273.0	24	22	320
DN300	10-16	323.9	24	22	370
DN350	10-16	355.6	26	24	407
DN400	10-16	406.4	27	25	459



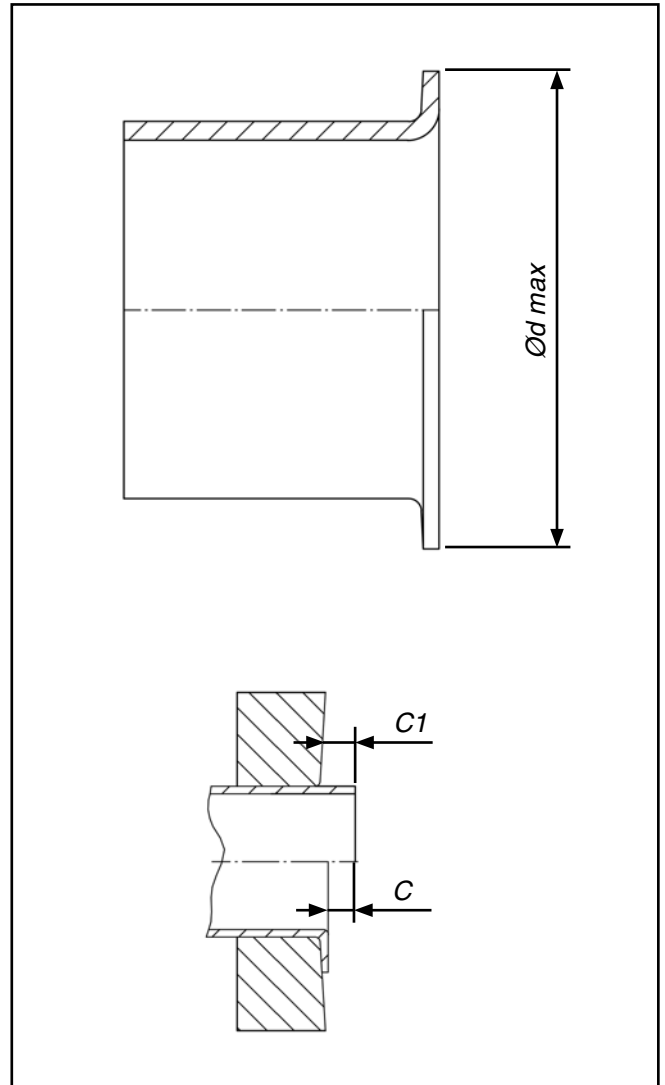
Appendix 3. Flared joint SAE 90°/St37.4



Type	Pipe O.D.	C	C1	d max
24N	48.3/50	8	9	65.3
32N	60.3/60	8	10	76
40N	76.1/75	8	9	90
48N	88.9/90	8	10	107
56N	101.6/100	11	13	123
64N	114.3/115	10	12	135
80N	139.7/140	11	12	161
96N	168.3/165	12	15.5	191
28N	219.1/220	17	20	254

Appendix 4. Flared joint SAE 90°/AISI 316

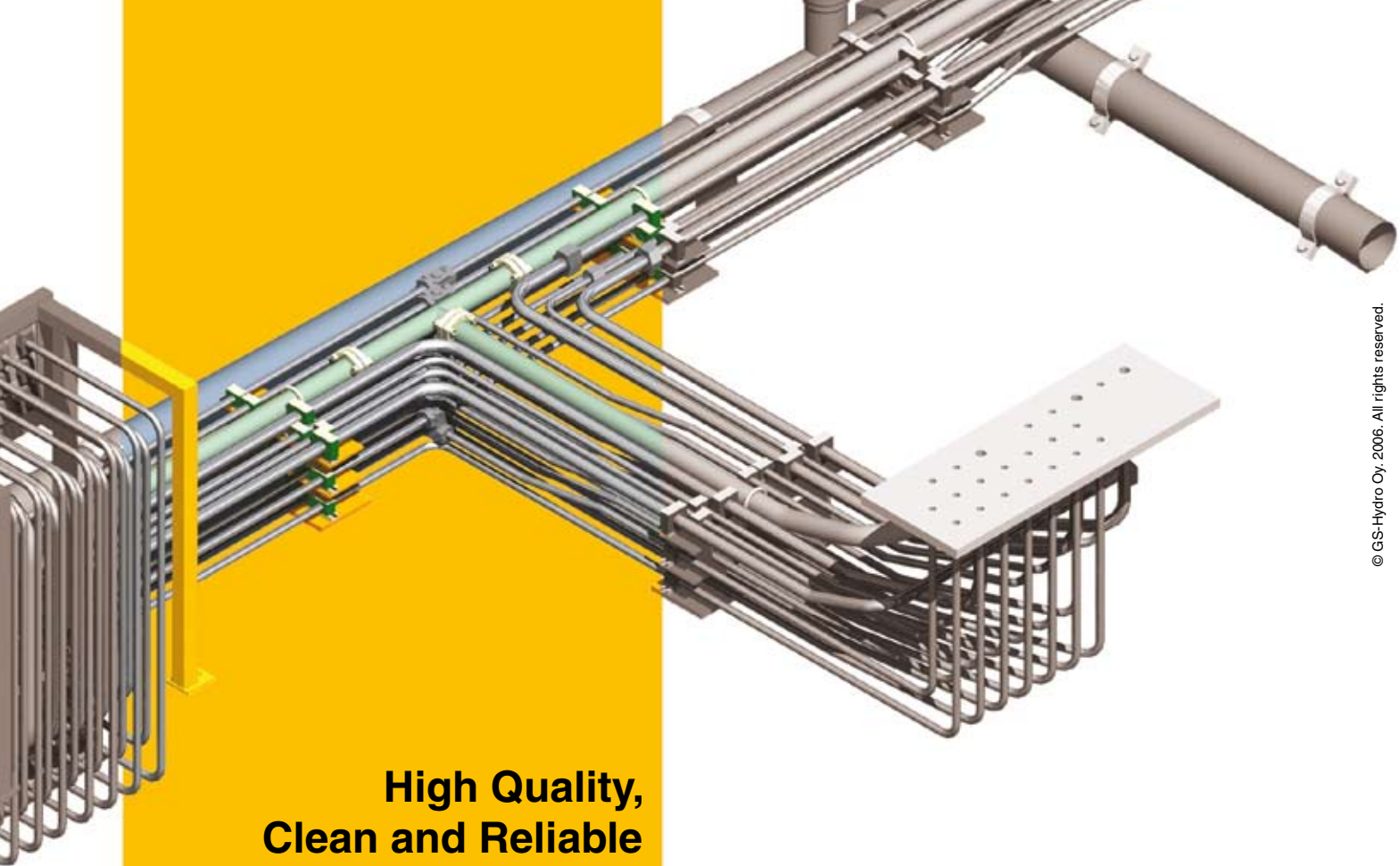
Type	Pipe O.D.	C	C1	d max
16NSS	30.0	7.5	9	45
24NSS	48.3	8	9	65.3
32NSS	60.3	8	10	76
40NSS	76.1	8	9	90
48NSS	88.9	8	10	107
56NSS	101.6	11	13	123
64NSS	114.3	10	12	135
80NSS	139.7	11	12	161
96NSS	168.3	12	15.5	191
28NSS	219.1	17	20	254



Appendix 5. Bolt Torques and sizes

SAE 10–40 bar			Bolt DIN 931, 8.8	
Size	Flange Type	Bolt Torque	Flange to flange	Flange to block
1 1/2"	124N	50 Nm	M12x70	x40
2"	132N	50 Nm	M12x70	x40
2 1/2"	140N	60 Nm	M12x70	x40
3"	148N	100 Nm	M16x80	x50
3 1/2"	156N	130 Nm	M16x90	x50
4"	164N	140 Nm	M16x90	x50
5"	180N	175 Nm	M16x110	x60
6"	196N	150 Nm	M16x110	x60
8"	228N	220 Nm	M20x120	x70

DIN 2576 10–40 bar			Bolt DIN 931, 8.8	
Size	Flange Type	Bolt Torque	Flange to flange	Flange to block
1 1/4"	DN32PN10-40-GS	40 Nm	M16x60	x40
1 1/2"	DN40PN10-40-GS	40 Nm	M16x60	x40
2"	DN50PN10-40-GS	50 Nm	M16x60	x40
2 1/2"	DN65PN10-40-GS	70 Nm	M16x70	x45
3"	DN80PN10-40-GS	45 Nm	M16x70	x45
4"	DN100PN10-16-GS	50 Nm	M16x80	x50
4"	DN100PN25-40-GS	70 Nm	M20x80	x55
5"	DN125PN10-16-GS	50 Nm	M16x80	x50
5"	DN125PN25-40-GS	110 Nm	M24x100	x70
6"	DN150PN10-16-GS	100 Nm	M20x90	x60
6"	DN150PN25-40-GS	130 Nm	M24x120	x80
8"	DN200PN10-GS	120 Nm	M20x100	x65
8"	DN200PN16-GS	90 Nm	M20x100	x65
8"	DN200PN25-GS	140 Nm	M24x120	x80
10"	DN250PN10-GS	102 Nm	M20x100	x65
10"	DN250PN16-GS	143 Nm	M24x100	x70
12"	DN300PN10-GS	126 Nm	M20x120	x70
12"	DN300PN16-GS	179 Nm	M24x120	x75
14"	DN350PN10-GS	128 Nm	M20x120	x70
14"	DN350PN16-GS	188 Nm	M24x120	x75
16"	DN400PN10-GS	183 Nm	M24x130	x80
16"	DN400PN16-GS	253 Nm	M27x130	x90



High Quality, Clean and Reliable Piping without Welding

The innovative GS Piping System is used primarily in hydraulic applications, but it is also ideal for both low and high pressure applications with high demands on quality, reliability and cleanliness. In addition to being inherently clean, the GS Piping System is easy, fast and flexible to install.

Taking complete responsibility for the piping system allows GS-Hydro to optimise every phase of the delivery, thus ensuring a high quality, cost-efficient, on-time delivery of the entire piping system.



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