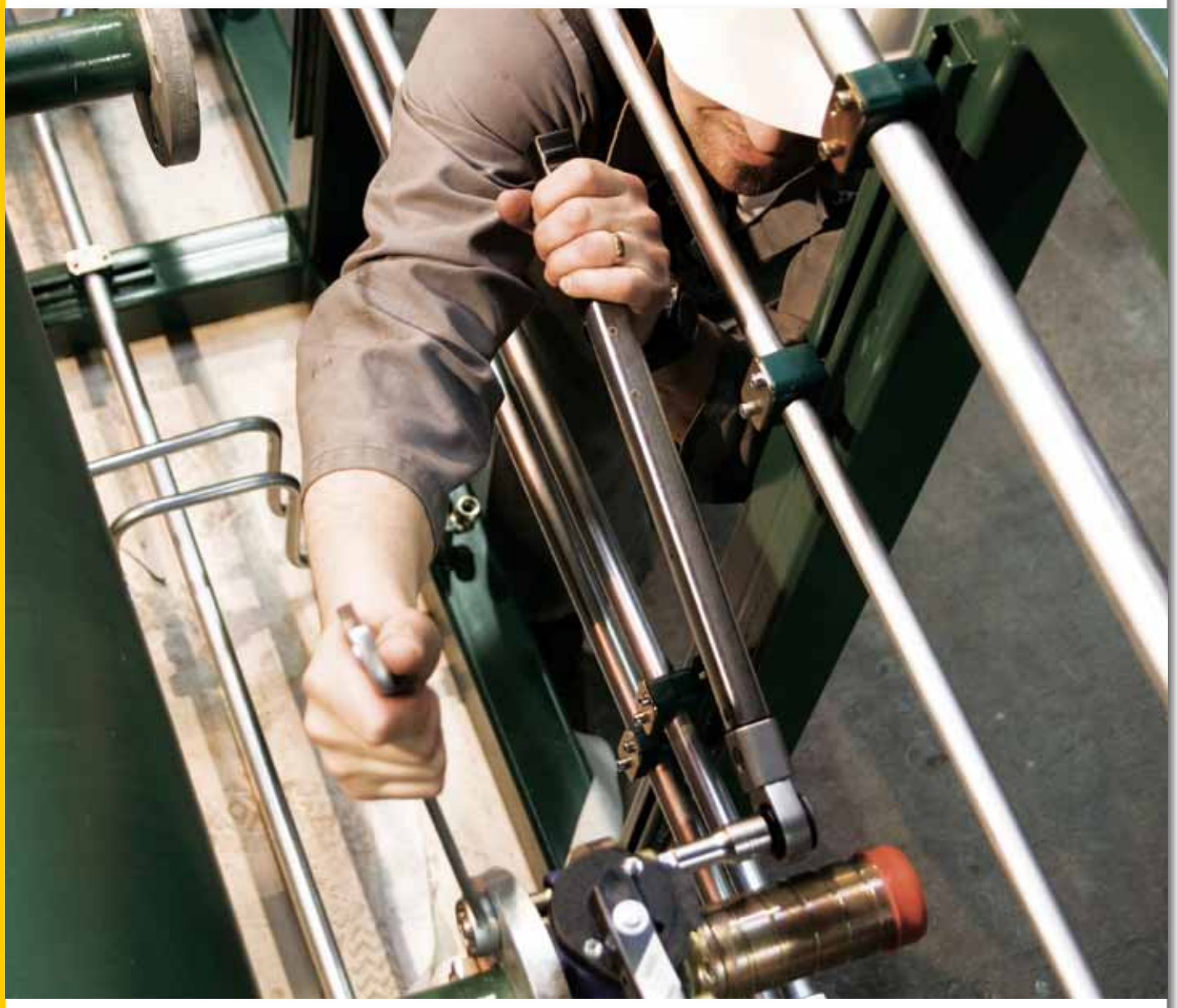
## FLARING AND INSTALLATION INSTRUCTIONS

# GS-37° FLARE FLANGE SYSTEM

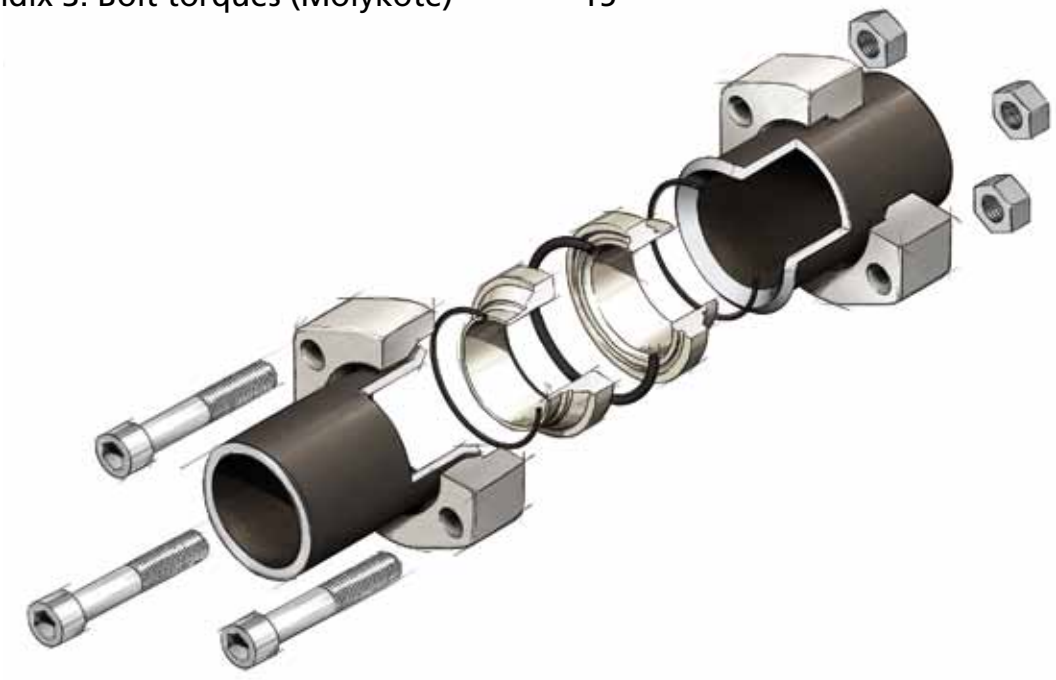
REVISION FEBRUARY 2016




GS-Hydro

## Table of contents



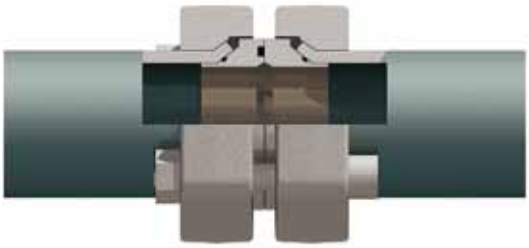


# Introduction

These are GS-Hydro's guidelines for the manufacture and assembly of the GS-Hydro 37° 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 the required personal protective equipments.



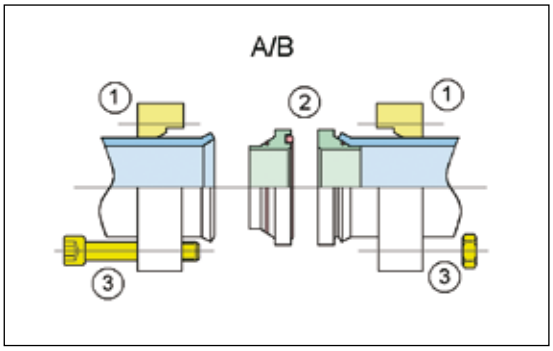
The GS-37° Flare System is used for piping with pressure with ranges of 50–420 bar. Extensive test programs – including rigorous vibration testing – have proven the suitability of the GS-37° flare flange system for a wide range of different materials and applications. GS-Hydro solutions are approved by many Classification companies for a wide range of materials and applications.

| ***GS-37° Flare Flange System (technical data):*** | | | | |
|---|---|---|---|---|
| | **SAE 50** | **SAE 3000** | **SAE 6000** | **ISO 6164** |
| **pressure, bar** | < 50 | 210–350 | 420 | 350–400 |
| **size, pipe** | 50x3–273x6 | 16x2–90x5 | 16x2–60x6 | 50x5–72x7 |
| **size, flange** | 1 1/2"– 10" | 1/2"– 3" | 1/2"– 2" | 1 1/2"– 2 1/2" |
| **material, pipe** | carbon steel, stainless steel, duplex, super duplex, titanium (materials having elongation above 20 %) | | | |
| **material, flange** | electric zinced carbon steel, hot dip galvanized carbon steel, stainless steel or titanium | | | |
| **material, insert cone** | electric zinced carbon steel, stainless steel | | | |
| **material, seal** | NBR, Viton | | | |

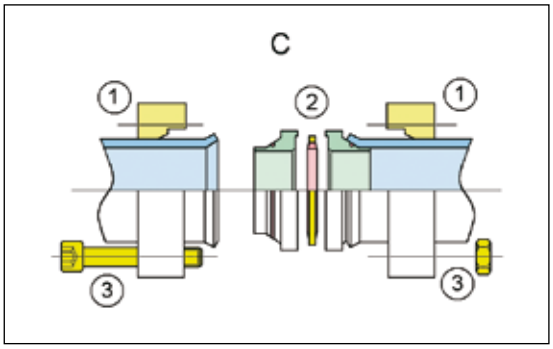
## GS-37° Connection Technology

The GS-37° flare flange system provides a variety of different ways to connect pipes.

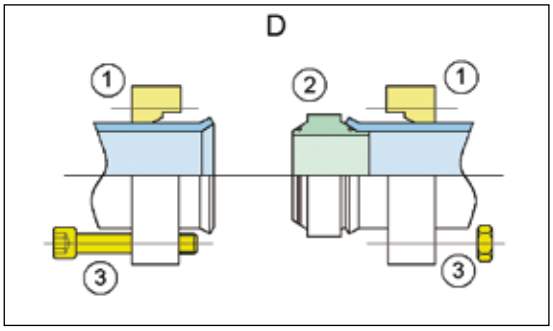
Type A/B utilises O-rings on all sealing surfaces.



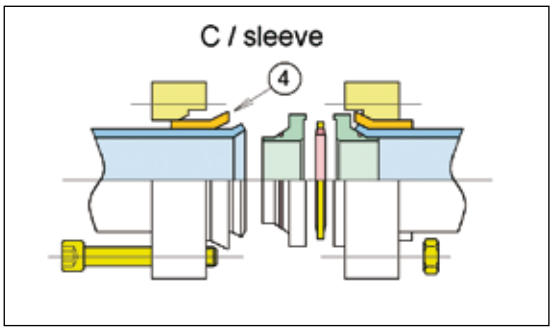

Type C, with bonded seal, is a safe method of connection particularly in field conditions as inserts are identical.




Type D is an optional connection method when assembling long straight lines.




With an extra sleeve there is a possibility to have flange and pipe with different nominal sizes (i.e. 38 x 4 pipe can be used with 1 1/4" SAE flange).



## Selection of the pipe

GS-Hydro recommends the use of cold drawn pipes & tubes due to their 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 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 |

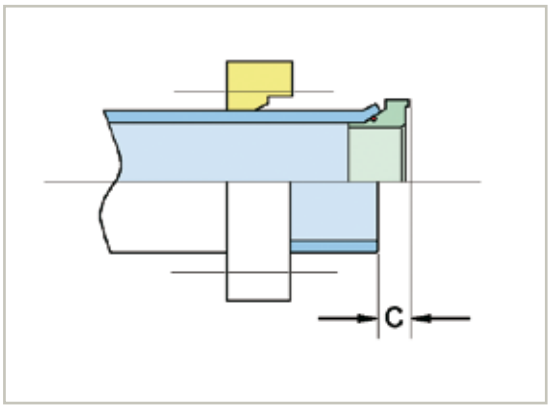
All precision steel pipes are supplied with trace numbers

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

## Cutting of the pipe

When cutting a pipe for GS-37° flare flange piping, the measurement C must be considered. This dimension C is the adjustment to the length of the tube to compensate for the dimension of the insert cone. Cut tubes squarely by using a cold saw. Do not use a roller cutter or a grinder.

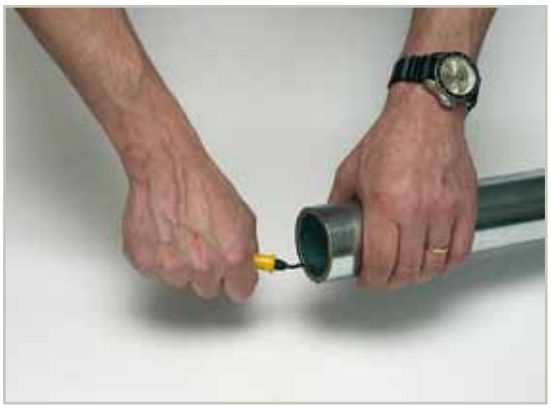
The measurement C is shown for the different flange types in Appendix 1, page 13.




All pipes are to be cut with a cold saw. No roller cutter or grinder shall be used.

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

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



## Cleaning operations before flaring

Inspect the flange type before placing it on to the pipe (remember to use the sleeve if required). 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. Also ensure the correct size cone and dies are selected for the pipe 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.

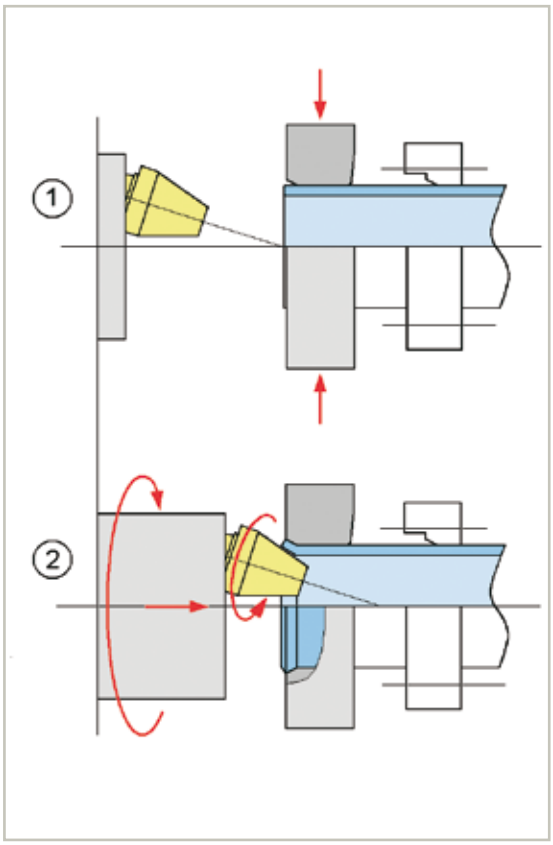
## Flaring operations

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, ensure 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).




Note that the flange is being placed onto the pipe before the flaring operation.

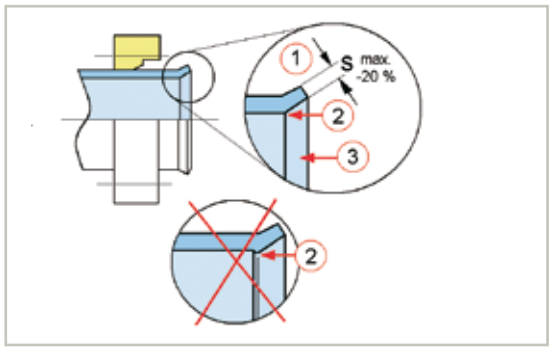
When the flare has been formed completely, it should be rolled another 3 to 5 more turns, before the cone is retracted.

For detailed information refer to the relevant operating instructions of the machine utilised.

Never reach into the tool area while the machine is working.

## Checking the flaring

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




The thinning of the flared part of the tube “S” may not exceed 20% of wall thickness (1).

If the pipe has been over-flared a lip will appear, which will stop the fitting of the insert cone past (2).

At the same time the quality of the inner flared surface (3) should be checked. It should be perfectly smooth, clean and glassy.

Verify the outside dimension of the flaring (Appendix 1, page 13) and check that the flare is concentric with the pipe.

After the flare is checked and cleaned the pipe end is covered with a plug or tape.

## 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
• verify that all components are of correct material and size

ALWAYS USE ORIGINAL GS-HYDRO PARTS

Lubricate the O-ring with Gleitmo 750 or equivalent lubricant. Place O-ring carefully into its groove. Examine all sealing surfaces to detect possible rust or mechanical damages.

Fit the insert cone into the tube flare. If needed, tap gently with plastic or hide mallet.

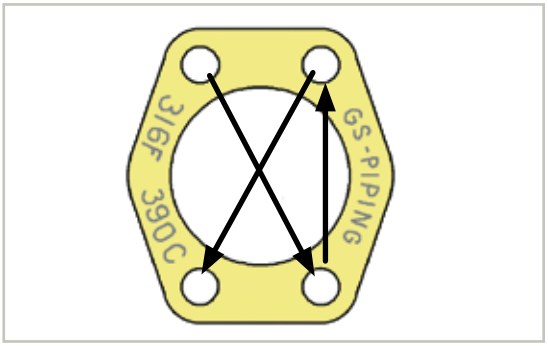
Lubricate the bonded seal (dowty seal) with Gleitmo 805 -paste or equivalent.
Control that pipe ends fit together and are aligned for sealing.
Control that the bolts run free through bolt holes, and that the flanges are parallel before starting the tightening sequence.

## Connecting the joint


Verify that you are using the right type and size of bolts (Appendix 2 and 3, pages 14 and 15). Always use calibrated torque tools.

Please note that there are two values shown for each bolt type, one for **Gleitmo 805** and one for **MOLYKOTE G-Rapid Plus**. Torque tables are only valid for these two lubrication agents.

Inspect the bolts and nuts to ensure no damage.
Lubricate bolt threads amply according to illustration.
Spread evenly with a brush.
Tightening must be done from the bolt side. If in special case nut is tightened, then the bolt torque values must be increased with 5%.



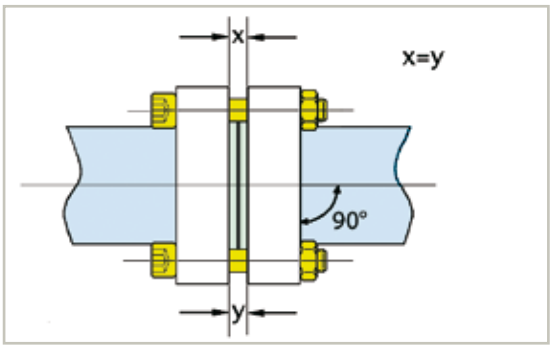

Tighten bolts in diagonal sequence in small increments to appropriate torque level. See illustrated example.
1. Tightening of the bolts should start immediately after greasing of threads
2. Tighten lightly with a wrench.
3. Tighten crosswise with 30% of the recommended torque.
4. Tighten crosswise with 70% of the recommended torque.
5. Tighten crosswise with 100% of the recommended torque. Repeat this step until all bolts stand still with full torque applied. Minimum 2 full cycles.

We recommend that all bolt torques are checked immediately after pressure test – at least 10% of connections must be verified. We also recommend that after 1 - 2 weeks of system operation, bolt torques of all connections are verified.

## During installation

After each tightening sequence ensure that flanges are at 90 degrees to the pipe and that the gap between flanges is equal to (x=y) ±1 mm.

Also, verify that the bolts protrude 1–2 threads from the nut.




## Reassembly

Ensure that all pressure is bled out from the system.

DO NOT take for granted that there is no pressure in the system, all connections must be disassembled with great caution. Please check that all relevant HSE regulations are followed.

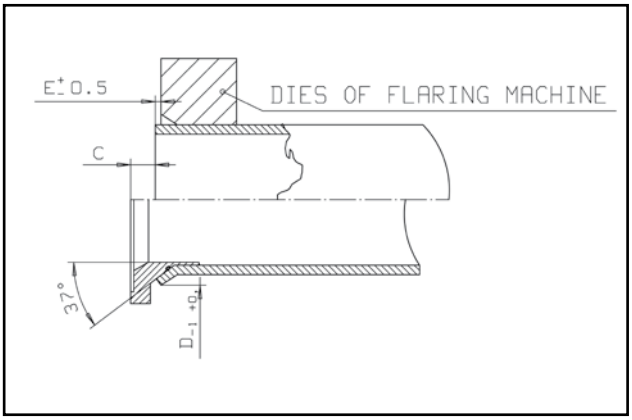

Loosen bolts a quarter of a turn in a crosswise pattern similar to assembly. Repeat until all pretension of bolts is released.
Continue disassembly until the flange can be moved. Ensure that no pressure is left in the system and the clamping of bonded seal is released.
Remove the bolts. Mark the insert cone and the pipe to ensure the sealing surfaces are easily re-aligned. (see illustration photo) Take the connection apart carefully.

Check all seals and sealing surfaces of components and ensure that there is no damage.
We recommend that all soft seals (O-rings) are replaced before reassembly.
If the time in operation has been short, and no damage can be seen on the seals, they might be used again.
When the connection is to be assembled again please follow the step by step procedure for connecting the joint. Use the correct bolt torque from the tables in appendix 2.
**Do not use increased torque values!**

With all replaced parts that are not to be re-used: Please recycle considering environmental aspects.

# Appendix 1.Flared 37° joint

| Size | Pipe Size | Part No | D | E | C |
|---|---|---|---|---|---|
| 1 1/2” | 50x3 | 124/50X3FA | 58 | 1.0 | 13 |
| 2” | 60x3 | 132/60X3FA | 68 | 1.5 | 13 |
| 2 1/2” | 73x3 | 140/73X3FA | 83 | 1.5 | 12 |
| 3” | 90x3.5 | 148/90X3.5FA | 100 | 1.5 | 16 |
| 3 1/2” | 100x4 | 156/100X4FA | 110.8 | 1.5 | 18 |
| 4” | 115x4 | 164/115X4FA | 124.5 | 1.5 | 16 |
| 5” | 140x4.5 | 180/140X4.5FA | 150 | 1.5 | 17 |
| 6” | 165x5 | 196/165X5FA | 181 | 1.5 | 16 |
| 8” | 220x6 | 228/220X6FA | 236 | 1.5 | 20 |
| 10” | 273x6 | 260/273X6FA | | | 18 |




| Size | Pipe Size | Part No | D | E | C |
|---|---|---|---|---|---|
| 1/2” | 16x2.0 | 308/16X2FC | 20 | 0 | 10 |
| 1/2” | 18x2.0 | 308/18X2FC | 22 | 0 | 11 |
| 1/2” | 20x2.0 | 308/20X2FC | 24 | 0 | 9 |
| 1/2” | 25x2.5 | 308/25X2.5FC | 29 | 0 | 9 |
| 1/2” | 25x3.0 | 308/25X3FC | 29 | 0 | 9 |
| 3/4” | 20x2.0 | 312/20X2FC | 24 | 0 | 12 |
| 3/4” | 20x2.5 | 312/20X2.5FC | 24 | 0 | 12 |
| 3/4” | 25x2.5 | 312/25X2.5FC | 29 | 0 | 9 |
| 3/4” | 25x3.0 | 312/25X3FC | 29 | 0 | 10 |
| 3/4” | 30x3.0 | 312/30X3FC | 36 | 0.5 | 9 |
| 1” | 25x2.5 | 316/25X2.5FC | 29 | 0 | 9 |
| 1” | 25x3.0 | 316/25X3FC | 29 | 0 | 9 |
| 1” | 30x3.0 | 316/30X3FC | 36 | 0.5 | 7 |
| 1” | 30x4.0 | 316/30X4FC | 36 | 0.5 | 7 |
| 1” | 38x4.0 | 316/38X4FC | 43.5 | 0.5 | 10 |
| 1 1/4” | 30x3.0 | 320/30X3.0FC | 36 | 0.5 | 10 |
| 1 1/4” | 30x4.0 | 320/30X4FC | 36.5 | 0.5 | 10 |
| 1 1/4” | 38x4.0 | 320/38X4FC | 43.5 | 0.5 | 9 |
| 1 1/4” | 38x5.0 | 320/38X5FC | 43.5 | 0.5 | 9 |
| 1 1/4” | 42x4.0 | 320/42X4FC | 49.5 | 0.5 | 11 |
| 1 1/2” | 30x3.0 | 324/30X3FC | 36.5 | 0.5 | 14 |
| 1 1/2” | 38x4.0 | 324/38X4FC | 43.5 | 0.5 | 13 |
| 1 1/2” | 42x4.0 | 324/42X4FC | 49.5 | 0.5 | 13 |
| 1 1/2” | 50x5.0 | 324/50X5FC | 58 | 1.0 | 11 |
| 2” | 50x5.0 | 332/50X5FC | 58 | 1.0 | 11 |
| 2” | 60x5.0 | 332/60X5FC | 68 | 1.5 | 11 |
| 2” | 60x6.0 | 332/60X6FC | 68 | 1.5 | 11 |
| 2 1/2” | 60x5.0 | 340/60X5FC | 68 | 1.5 | 12 |
| 2 1/2” | 73x7.0 | 340/73X7FC | 82 | 1.5 | 12 |
| 2 1/2” | 73x5.0 | 340/73X5FC | 83 | 1.5 | 13 |
| 3” | 73x5.0 | 348/73X5FC | 83 | 1.5 | 16 |
| 3” | 90x5.0 | 348/90X5FC | 100 | 1.5 | 14 |

| Size | Pipe Size | Part No | D | E | C |
|---|---|---|---|---|---|
| 1/2” | 16x2.0 | 608/16X2FC | 20 | 0 | 10 |
| 1/2” | 18x2.0 | 608/18X2FC | 22 | 0 | 11 |
| 1/2” | 20x2.0 | 608/20X2FC | 24 | 0 | 9 |
| 1/2” | 25x2.5 | 608/25X2.5FC | 29 | 0 | 9 |
| 1/2” | 25x3.0 | 608/25X3FC | 29 | 0 | 9 |
| 3/4” | 20x2.0 | 612/20X2FC | 24 | 0 | 12 |
| 3/4” | 20x2.5 | 612/20X2.5FC | 24 | 0 | 12 |
| 3/4” | 25x2.5 | 612/25X2.5FC | 29 | 0 | 9 |
| 3/4” | 25x3.0 | 612/25X3FC | 29 | 0 | 10 |
| 3/4” | 30x3.0 | 612/30X3FC | 36 | 0.5 | 9 |
| 3/4” | 30x4.0 | 612/30X4FC | 36 | 0.5 | 9 |
| 1” | 25x2.5 | 616/25X2.5FC | 29 | 0 | 9 |
| 1” | 25x3.0 | 616/25X3FC | 29 | 0 | 9 |
| 1” | 30x3.0 | 616/30X3FC | 36 | 0.5 | 7 |
| 1” | 30x4.0 | 616/30X4FC | 36 | 0.5 | 8 |
| 1” | 38x4.0 | 616/38X4FC | 43.5 | 0.5 | 10 |
| 1 1/4” | 30x3.0 | 620/30X3FC | 36 | 0.5 | 10 |
| 1 1/4” | 30x4.0 | 620/30X4FC | 36 | 0.5 | 10 |
| 1 1/4” | 38x4.0 | 620/38X4FC | 43.5 | 0.5 | 9 |
| 1 1/4” | 38x5.0 | 620/38X5FC | 43.5 | 0.5 | 9 |
| 1 1/4” | 42x4.0 | 620/42X4FC | 49.5 | 0.5 | 11 |
| 1 1/2” | 30x3.0 | 624/30X3FC | 36 | 0.5 | 14 |
| 1 1/2” | 38x4.0 | 624/38X4FC | 43.5 | 0.5 | 13 |
| 1 1/2” | 38x5.0 | 624/38X5FC | 43.5 | 0.5 | 13 |
| 1 1/2” | 42x4.0 | 624/42X4FC | 49.5 | 0.5 | 13 |
| 1 1/2” | 50x5.0 | 624/50X5FC | 58 | 1.5 | 11 |
| 2” | 50x5.0 | 632/50X5FC | 58 | 1.5 | 11 |
| 2” | 60x5.0 | 632/60X5FC | 68 | 1.5 | 11 |
| 2” | 60x6.0 | 632/60X6FC | 68 | 1.5 | 11 |

# Appendix 2. Bolt Torques for Gleitmo 805 -grease

## Metric connections

| SAE 50 bar | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1 1/2" | **124F** | M12x70 | x40 | 36 Nm | 43 Nm |
| 2" | **132F** | M12x70 | x40 | 36 Nm | 43 Nm |
| 2 1/2" | **140F** | M12x70 | x40 | 36 Nm | 43 Nm |
| 3" | **148F** | M16x80 | x50 | 50 Nm | 60 Nm |
| 3 1/2" | **156F** | M16x90 | x50 | 50 Nm | 60 Nm |
| 4" | **164F** | M16x90 | x50 | 63 Nm | 76 Nm |
| 5" | **180F** | M16x120 | x60 | 92 Nm | 76 Nm |
| 6" | **196F** | M16x110 | x60 | 81 Nm | 97 Nm |
| 8" | **228F** | M20x120 | x70 | 118 Nm | 142 Nm |
| 10" | **260F** | M20x140 | x80 | 166 Nm | 199 Nm |

| SAE 3000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1/2" | **308F** | M8x60 | x35 | 22 Nm | 27 Nm |
| 3/4" | **312F** | M10x60 | x35 | 24 Nm | 29 Nm |
| 1" | **316F** | M10x60 | x35 | 31 Nm | 37 Nm |
| 1 1/4" | **320F** | M10x70 | x35 | 40 Nm | 48 Nm |
| 1 1/2" | **324F** | M12x80 | x45 | 45 Nm | 54 Nm |
| 2" | **332F** | M12x90 | x50 | 53 Nm | 64 Nm |
| 2 1/2" | **340F** | M12x110 | x60 | 69 Nm | 83 Nm |
| 3" | **348F** | M16x140 | x80 | 137 Nm | 165 Nm |

| SAE 6000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1/2" | **608F** | M8x60 | x35 | 22 Nm | 27 Nm |
| 3/4" | **612F** | M10x70 | x40 | 28 Nm | 34 Nm |
| 1" | **616F** | M12x70 | x45 | 41 Nm | 50 Nm |
| 1 1/4" | **620F** | M12x90 | x50 | 59 Nm | 71 Nm |
| 1 1/4" | **621F** | M14x90 | x50 | 69 Nm | 83 Nm |
| 1 1/2" | **624F** | M16x100 | x60 | 116 Nm | 140 Nm |
| 2" | **632F** | M20x110 | x70 | 145 Nm | 174 Nm |
| 2 1/2" | **640F** | M24x140 | x90 | 240 Nm | 288 Nm |
| 3" | **648F** | M30x160 | x100 | 415 Nm | 492 Nm |

| DIN 350–400 bar | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1 1/2" | **424F** | M16x100 | x60 | 88 Nm | 98 Nm |
| 2" | **432F** | M16x110 | x60 | 113 Nm | 127 Nm |
| 2 1/2" | **440F** | M20x120 | x70 | 158 Nm | 190 Nm |

## ANSI 36.19 connections

| SAE 3000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1/2" | **308F/21.3** | M8x60 | x35 | 22 Nm | 27 Nm |
| 3/4" | **312F/26.7** | M10x60 | x35 | 24 Nm | 29 Nm |
| 1" | **316F/33.4** | M10x60 | x35 | 31 Nm | 37 Nm |
| 1 1/4" | **320F/42.2** | M10x70 | x35 | 40 Nm | 48 Nm |
| 1 1/2" | **324F/48.3** | M12x80 | x45 | 45 Nm | 54 Nm |
| 2" | **332F/60.3** | M12x90 | x50 | 53 Nm | 64 Nm |
| 2 1/2" | **340F** | M12x110 | x60 | 69 Nm | 83 Nm |
| 3" | **348F/88.9** | M16x140 | x80 | 137 Nm | 165 Nm |

| SAE 6000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1/2" | **608F/21.3** | M8x60 | x35 | 22 Nm | 27 Nm |
| 3/4" | **612F/26.7** | M10x70 | x40 | 28 Nm | 34 Nm |
| 1" | **616F/33.4** | M12x70 | x45 | 41 Nm | 50 Nm |
| 1 1/4" | **620F/42.2** | M12x90 | x50 | 59 Nm | 71 Nm |
| 1 1/4" | **621F/42.2** | M14x90 | x50 | 69 Nm | 83 Nm |
| 1 1/2" | **624F/48.3** | M16x100 | x60 | 119 Nm | 140 Nm |
| 2" | **632F/60.3** | M20x110 | x70 | 145 Nm | 174 Nm |
| 2 1/2" | **640F** | M24x140 | x90 | 240 Nm | 288 Nm |
| 3" | **648F/88.9** | M30x160 | x100 | 415 Nm | 492 Nm |

| DIN 350–400 bar | | Bolt DIN 912, 8.8 | | Bolt Torque | |
|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts |
| 1 1/2" | **424F/48.3** | M16x100 | x60 | 88 Nm | 98 Nm |
| 2" | **432F/60.3** | M16x110 | x60 | 113 Nm | 127 Nm |
| 2 1/2" | **440F** | M20x120 | x70 | 158 Nm | 190 Nm |

ELZ = Zinc electroplated coating
HDG = Hot dip galvanised coating
Torque values are with a tolerance of 0...5% .
**(Note! The torque values of 340-flanges shall not be exceeded).**

# Appendix 2. Bolt Torques for MOLYKOTE G-Rapid Plus -grease

## Metric connections

| SAE 50 bar | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1 1/2" | **124F** | M12x70 | x40 | 33 Nm | 36 Nm | 50 Nm |
| 2" | **132F** | M12x70 | x40 | 33 Nm | 36 Nm | 50 Nm |
| 2 1/2" | **140F** | M12x70 | x40 | 33 Nm | 36 Nm | 50 Nm |
| 3" | **148F** | M16x80 | x50 | 45 Nm | 50 Nm | 60 Nm |
| 3 1/2" | **156F** | M16x90 | x50 | 45 Nm | 50 Nm | 70 Nm |
| 4" | **164F** | M16x90 | x50 | 57 Nm | 63 Nm | 85 Nm |
| 5" | **180F** | M16x120 | x60 | 83 Nm | 92 Nm | 125 Nm |
| 6" | **196F** | M16x110 | x60 | 73 Nm | 81 Nm | 110 Nm |
| 8" | **228F** | M20x120 | x70 | 107 Nm | 113 Nm | 200 Nm |
| 10" | **260F** | M20x140 | x80 | 150 Nm | 166 Nm | 238 Nm |

| SAE 3000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1/2" | **308F** | M8x60 | x35 | 20 Nm | 22 Nm | 20 Nm |
| 3/4" | **312F** | M10x60 | x35 | 22 Nm | 24 Nm | 28 Nm |
| 1" | **316F** | M10x60 | x35 | 28 Nm | 31 Nm | 37 Nm |
| 1 1/4" | **320F** | M10x70 | x35 | 36 Nm | 40 Nm | 48 Nm |
| 1 1/2" | **324F** | M12x80 | x45 | 41 Nm | 45 Nm | 62 Nm |
| 2" | **332F** | M12x90 | x50 | 48 Nm | 53 Nm | 73 Nm |
| 2 1/2" | **340F** | M12x110 | x60 | 63 Nm | 69 Nm | 87 Nm |
| 3" | **348F** | M16x140 | x80 | 124 Nm | 137 Nm | 187 Nm |

| SAE 6000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1/2" | **608F** | M8x60 | x35 | 20 Nm | 22 Nm | 20 Nm |
| 3/4" | **612F** | M10x70 | x40 | 26 Nm | 28 Nm | 34 Nm |
| 1" | **616F** | M12x70 | x45 | 37 Nm | 41 Nm | 56 Nm |
| 1 1/4" | **620F** | M12x90 | x50 | 54 Nm | 59 Nm | 73 Nm |
| 1 1/4" | **621F** | M14x90 | x50 | 63 Nm | 69 Nm | 85 Nm |
| 1 1/2" | **624F** | M16x100 | x60 | 105 Nm | 116 Nm | 158 Nm |
| 2" | **632F** | M20x110 | x70 | 131 Nm | 145 Nm | 205 Nm |
| 2 1/2" | **640F** | M24x140 | x90 | 216 Nm | 305 Nm | 305 Nm |
| 3" | **648F** | M30x160 | x100 | 376 Nm | 415 Nm | 544 Nm |

| DIN 350–400 bar | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1 1/2" | **424F** | M16x100 | x60 | 80 Nm | 88 Nm | 120 Nm |
| 2" | **432F** | M16x110 | x60 | 104 Nm | 113 Nm | 155 Nm |
| 2 1/2" | **440F** | M20x120 | x70 | 143 Nm | 158 Nm | 226 Nm |

## ANSI 36.19 connections

| SAE 3000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1/2" | **308F/21.3** | M8x60 | x35 | 20 Nm | 22 Nm | 20 Nm |
| 3/4" | **312F/26.7** | M10x60 | x35 | 22 Nm | 24 Nm | 28 Nm |
| 1" | **316F/33.4** | M10x60 | x35 | 28 Nm | 31 Nm | 37 Nm |
| 1 1/4" | **320F/42.2** | M10x70 | x35 | 36 Nm | 40 Nm | 48 Nm |
| 1 1/2" | **324F/48.3** | M12x80 | x45 | 41 Nm | 45 Nm | 62 Nm |
| 2" | **332F/60.3** | M12x90 | x50 | 48 Nm | 53 Nm | 73 Nm |
| 2 1/2" | **340F** | M12x110 | x60 | 63 Nm | 69 Nm | 87 Nm |
| 3" | **348F/88.9** | M16x140 | x80 | 124 Nm | 137 Nm | 187 Nm |

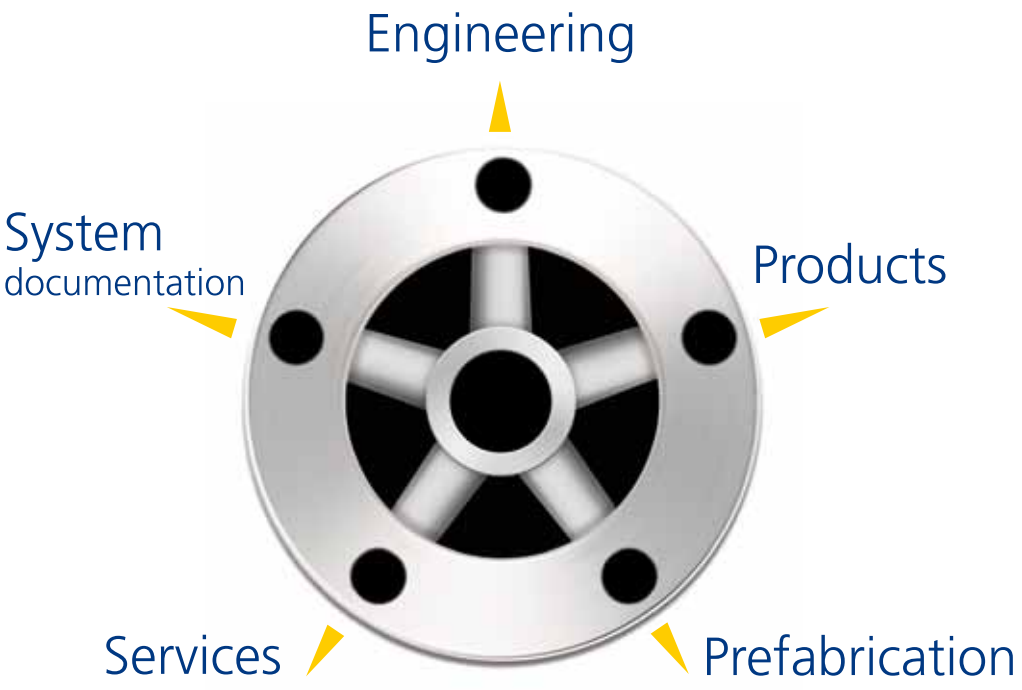
| SAE 6000 psi | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1/2" | **608F/21.3** | M8x60 | x35 | 20 Nm | 22 Nm | 20 Nm |
| 3/4" | **612F/26.7** | M10x70 | x40 | 26 Nm | 28 Nm | 34 Nm |
| 1" | **616F/33.4** | M12x70 | x45 | 37 Nm | 41 Nm | 56 Nm |
| 1 1/4" | **620F/42.2** | M12x90 | x50 | 54 Nm | 59 Nm | 73 Nm |
| 1 1/4" | **621F/42.2** | M14x90 | x50 | 63 Nm | 69 Nm | 85 Nm |
| 1 1/2" | **624F/48.3** | M16x100 | x60 | 108 Nm | 119 Nm | 158 Nm |
| 2" | **632F/60.3** | M20x110 | x70 | 131 Nm | 145 Nm | 205 Nm |
| 2 1/2" | **640F** | M24x140 | x90 | 216 Nm | 305 Nm | 305 Nm |
| 3" | **648F/88.9** | M30x160 | x100 | 376 Nm | 415 Nm | 544 Nm |

| DIN 350–400 bar | | Bolt DIN 912, 8.8 | | Bolt Torque | | |
|---|---|---|---|---|---|---|
| Size | Flange Type | Flange to flange | Flange to block | ELZ 8.8-bolts | HDG 8.8-bolts | SS A4-80 -bolts |
| 1 1/2" | **424F/48.3** | M16x100 | x60 | 80 Nm | 88 Nm | 120 Nm |
| 2" | **432F/60.3** | M16x110 | x60 | 104 Nm | 113 Nm | 155 Nm |
| 2 1/2" | **440F** | M20x120 | x70 | 143 Nm | 158 Nm | 226 Nm |

ELZ = Zinc electroplated coating
HDG = Hot dip galvanised coating
SS= Stainless steel
Torque values are with a tolerance of 0...5% .
**(Note! The torque values of 340-flanges shall not be exceeded).**

**GS-Hydro** is the original provider of non-welded piping solutions with numerous benefits for a wide variety of demanding applications. The company operates globally in more than twenty-five countries through own companies and partners. GS-Hydro supplies complete piping systems with engineering, products, prefabrication, services and documentation.

## GS-Hydro system offering




ISO 9001
MED 96/98/EC
PED 97/23/EC

**GS-Hydro**
sales@gshydro.com
**www.gshydro.com**

GS-Hydro

8990306502 GS-37° Installation Instructions, February 2016