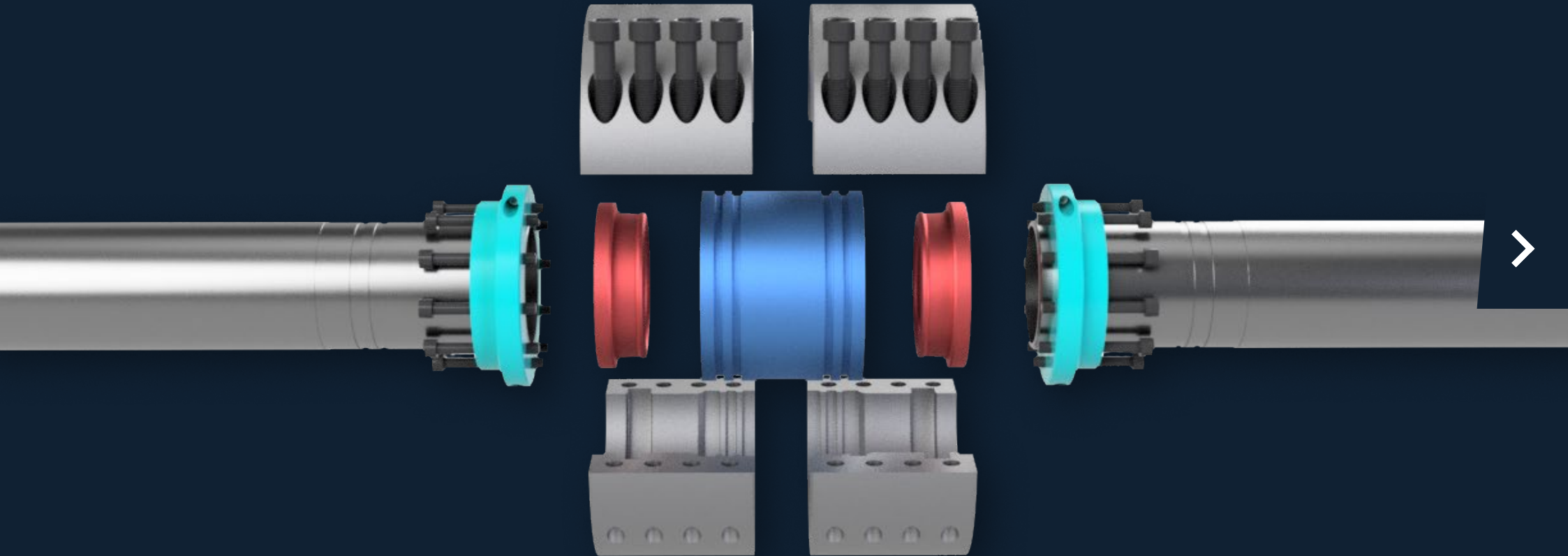


POULTON TECHNOLOGIES

CONNECT AND SEAL



PT1

INSTALLATION MANUAL

The weldless pipe connection system

SUMMARY

This manual explains the major applications for the PT-1. Within the Appendices, the users will find critical dimensions of the PT-1 and Torque Values.

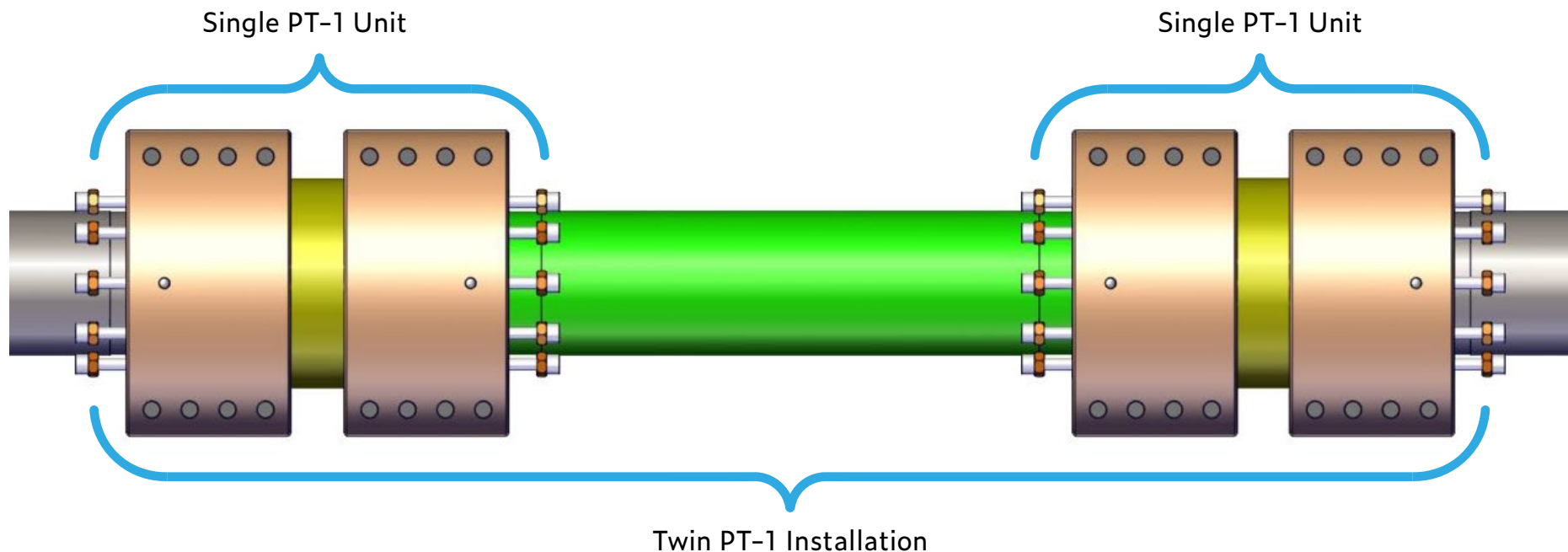
A NEW INSTALLATIONS

Replacement of conventional flanges

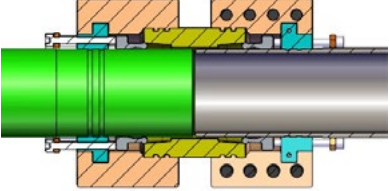

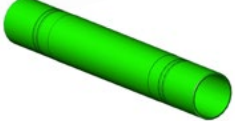


B REPAIR

B1: Single PT-1 application to replace a damaged flange connection or short damaged pipe element.

B2: Twin PT-1 application to replace any length of damaged pipe, either from existing flange to flange or creating a longer pipe section of a damaged pipe.





GLOSSARY

| PART NAME | ABBREVIATION | DESCRIPTION | IMAGE |
|------------------|--------------|---|---|
| PT-1 Unit | | A Unit is defined as one pair of Clamps, a pair of Spigot Rings, a pair of Radial Wedge Seals and a single Joining Stock with all necessary bolts |  |
| Original Pipe | | The Pipe that already exists on site that is to be connected. |  |
| Replacement Pipe | RP | A section of pipe machined offsite that will replace a section of damaged existing pipework. |  |
| Clamps | C | The Clamps are two shells that clamp around the Original Pipe and the Joining Stock. The same set of clamps to be used for different pipe Schedules with the same Nominal Diameter, this is not valid for the spigot ring. |  |
| Spigot Ring | SR | The Spigot Ring contains the thread for the energising bolts to function and positions the clamps on the Pipe with the spigots. |  |

GLOSSARY

| PART NAME | ABBREVIATION | DESCRIPTION | IMAGE |
|----------------------------|--------------|---|---|
| Joining Stock | JS | A short section of Pipe, with a precision machined internal taper. Used in applications A and B2 |  |
| Joining Stock 3D | JS3D | A longer Joining Stock that allows a gap between Original Pipe ends of 3 times the diameter. Used in application B1 |  |
| Radial Wedge Seal | RWS | A stainless-steel precision machined ring used to create a metal-to-metal seal in the connection. |  |
| Clamping Bolt | | Grade 10.9 Socket Cap Bolts which bolt together the two halves of the clamp |  |
| Energising Bolts | | Grade 10.9 Socket Cap Bolts used to force the RWS into sealing position |  |
| Spigot rings screws | | M6 Grade 8.8 Socket cap screws, that are used to hold the Spigot Rings in position during installation |  |









GLOSSARY

| PART NAME | ABBREVIATION | DESCRIPTION | IMAGE |
|------------------------|--------------|--|---|
| Nordlock Washer | | Locking washers that ensure the Clamping Bolts do not loosen under load vibration. |  |
| Lock Nut | | Nuts used to lock the Energising Bolts after they have been torqued as safety measure. |  |



TOOL AND EQUIPMENT LIST

The following is an indicative set of tools required by the field team for the safe and correct installation.

| HAND TOOLS | | |
|--|---|---|
| Calibrated and tested Torque Wrench |  Torque ranges vary, see Appendix 2 for specifications |  |
| Allen Key set 4-14mm | |  |
| Suitable Allen Key Socket set 4-14mm |  Ensure that the square drive for the sockets is suitable for the required torque |  |
| PT-1 Groove Scribe Provided by Poulton Technologies | |  |
| Lifting eyes | |  |
| Crows Foot Socket Set | |  |

PT1

APPLICATIONS

A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

A New Installations - Instead of using conventional Flange Connection:



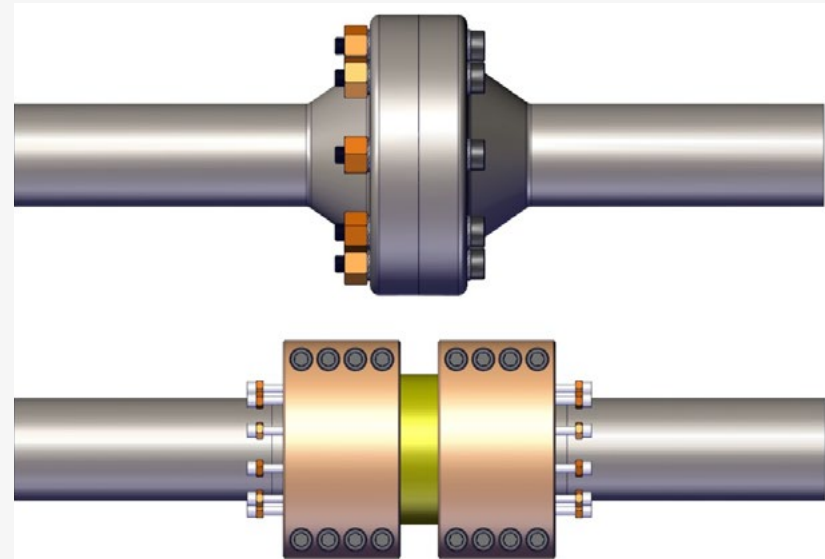
You must use the standard **Joining Stock** for New Installations.



The Pipe End Gap must be 5mm.

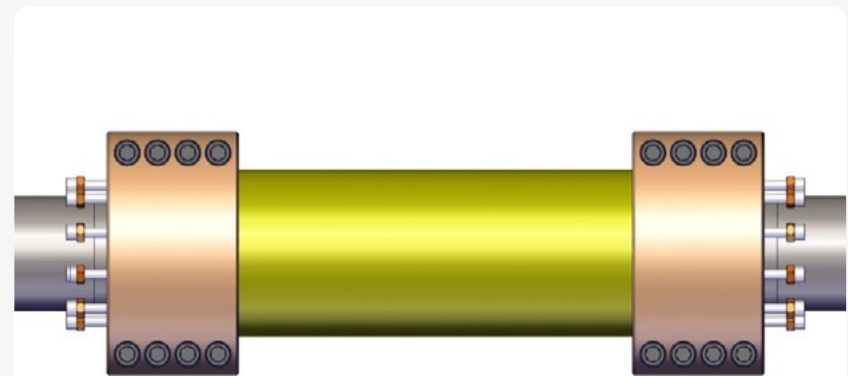
Prepare the pipe ends as shown on the relevant drawings.

Fit the clamps disregarding steps 1-4 and 12-13 below.



B1 Repairs:

B1: For Pipe Element Replacement with a maximum element length of three times the pipe diameter.



A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

- 1 For replacing a short pipe element
Cut out the section of damaged Original Pipe.



- 2 Fully prepare one of the two of the Original Pipe Ends as shown in Pipe End Preparation drawings.

⚠ Only machine the external diameter of the other Original Pipe End!



Fully prepared

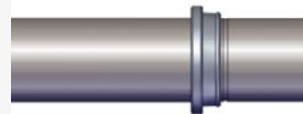


Only Diameter prepared

- 3 Slide a Radial Wedge Seal (RWS) over each of the pipe ends.
Push them as far as then can go on the prepared diameter

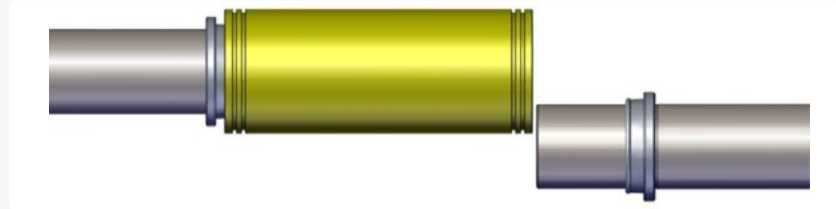


- 4 To be able to fit the extended version of the **Joining Stock (JS3D)**, move the two pipe ends out of alignment



A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

- 5 Fit the **JS3D**, on to the fully prepared end of the pipe



- 6 Move the Radial Wedge Seal (RWS), on the prepared end as close to the joining stock as possible.



- 7 Place the Spigot Rings on prepared Original Pipe End. Make sure the grooves and spigots align and fit correctly!

You must use the correct Spigot Ring size for the Schedule of original pipe.



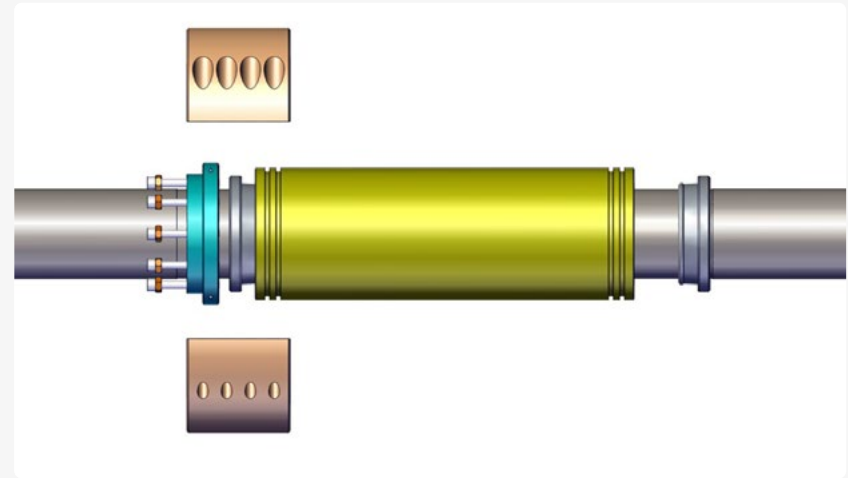
- 8 Loosely secure the **Spigot Ring** with the **Spigot Ring Screws**

The **Spigot Ring**, must be able to rotate on the pipe to allow you to align it later



A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

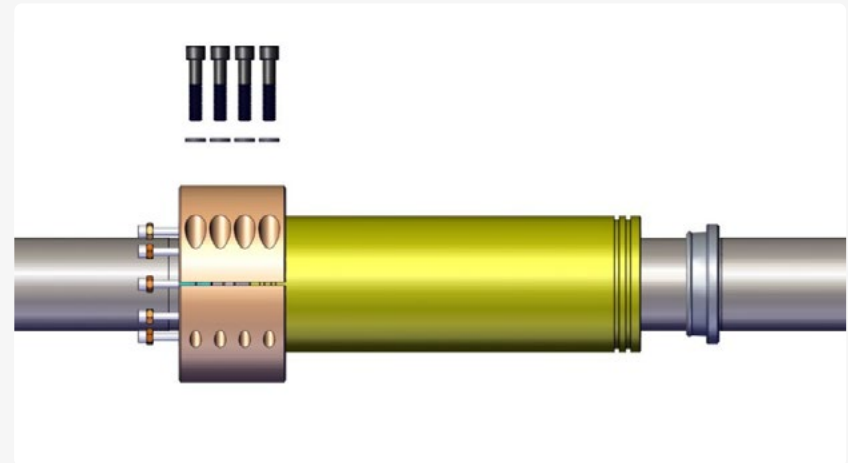
- 9 Fit a **Clamp** over the **Spigot Ring** and align the **Clamp Spigots** with the grooves in the **JS3D**.



- 10 Secure the **Clamp** in position using the **Clamp Bolts**

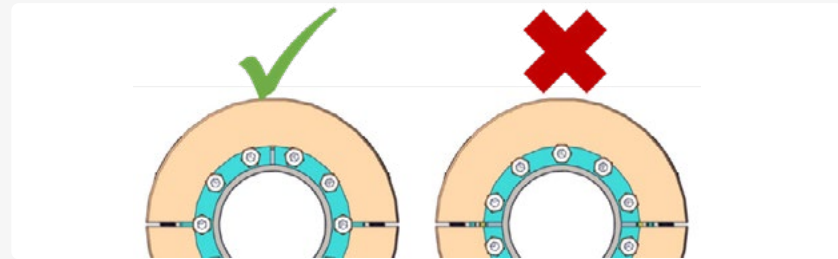


Do not tighten the **Clamp Bolts** yet!

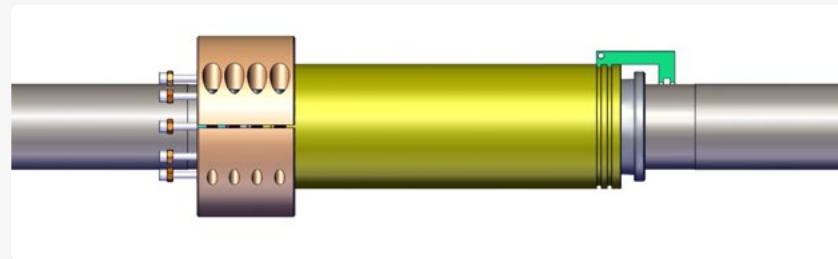


A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

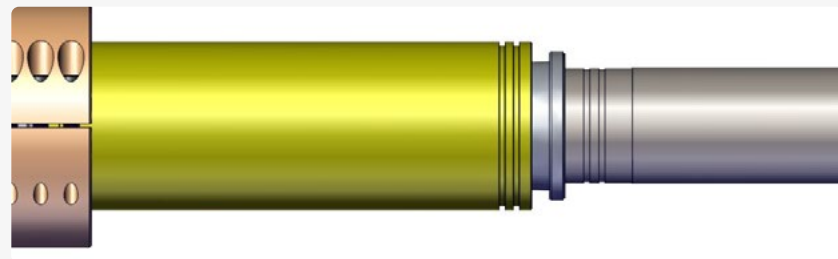
- 11 Check that the gap between the **Spigot Ring** halves and the gap between the **Clamp** halves is a right angle!



- 12 Align the other end of the pipe so that it is concentric with the **JS3D**.
Use the **PT-1 Groove Scribe** for the size of pipe to mark the groove location

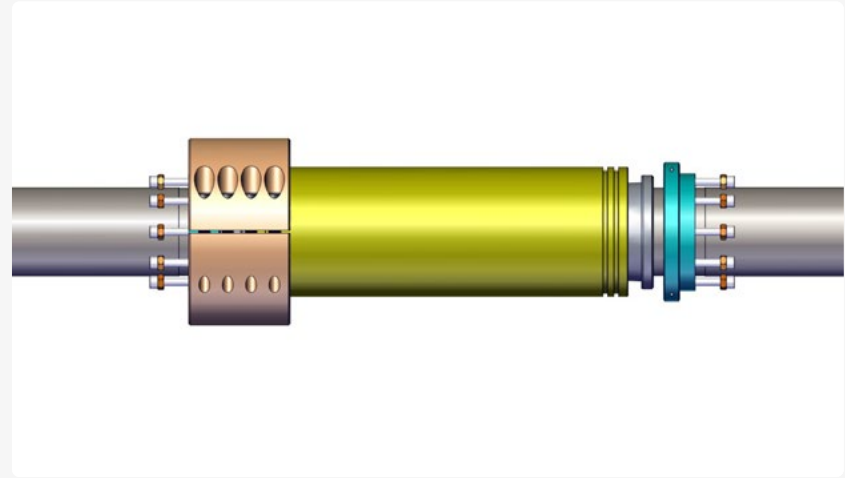


- 13 Using the scribe line as a reference, machine the grooves on the pipe
Partly dismantle or move the pipes apart to allow you to machine the grooves if needed

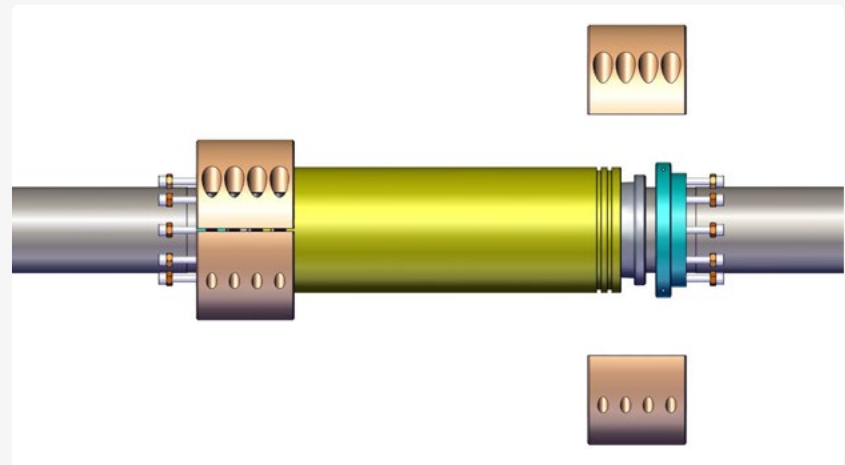


A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

- 14 Fit the second **Spigot Ring** on to the second pipe end and loosely secure it with the **Spigot Ring Screws**



- 15 Fit the second **Clamp** over the **Spigot Ring** and align the **Clamp Spigots** with the grooves in the **JS3D**.

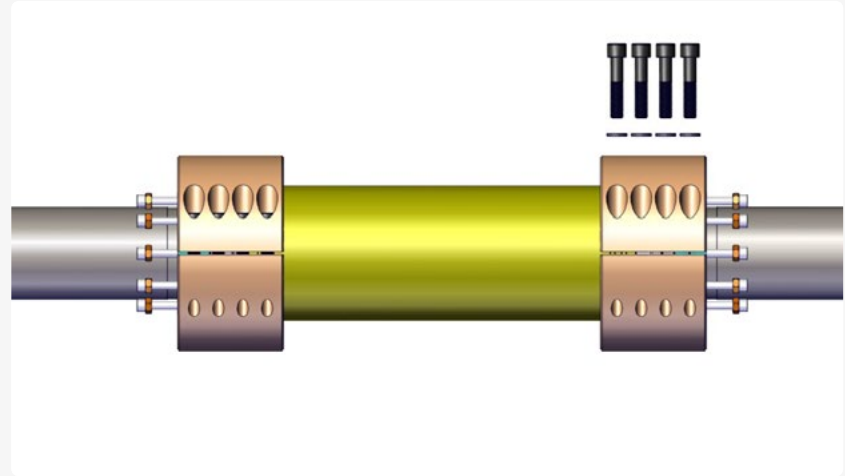


A AND B1 – SINGLE PT-1 UNIT APPLICATIONS

16 Secure the **Clamp** in position using the Clamp Bolts



Do not tighten the Clamp Bolts yet!



17 The bolts on the PT-1 Connection must now be torqued.

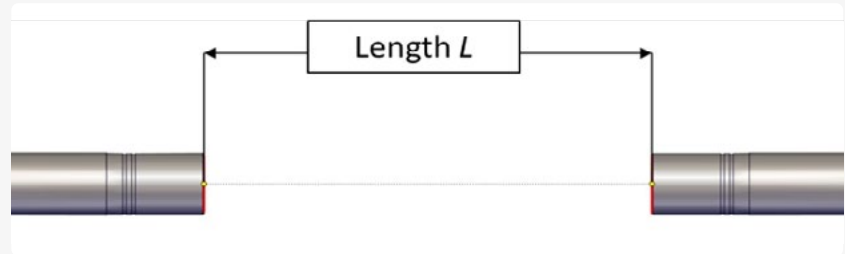
Refer to chapter "Torqueing the PT-1" for the correct procedure.

B2 – TWIN PT-1 APPLICATIONS

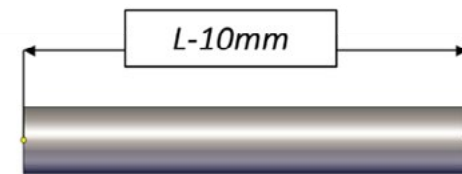
- 1 Establish the length of the original pipe that must be replaced (L_{min})



- 2 Make sure that L is greater than the minimum length (L_{min}).
See Appendix 1 for each Pipe Diameter and Schedule.



- 3 In the workshop, cut the **Replacement Pipe** with the length (L) minus 10mm

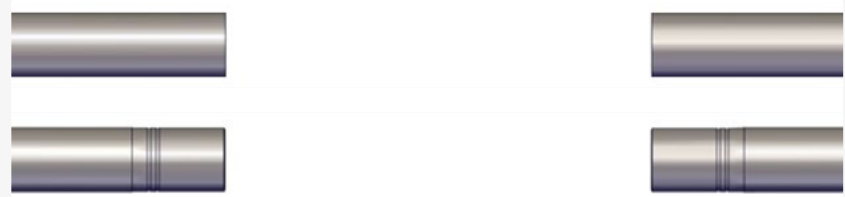


- 4 Prepare the ends of the **Replacement Pipe** as shown in the Drawings in the **PT-1 Drawings Manual**.
You must use the same **Pipe Diameter** and **Schedule** as for the **Original Pipe**.

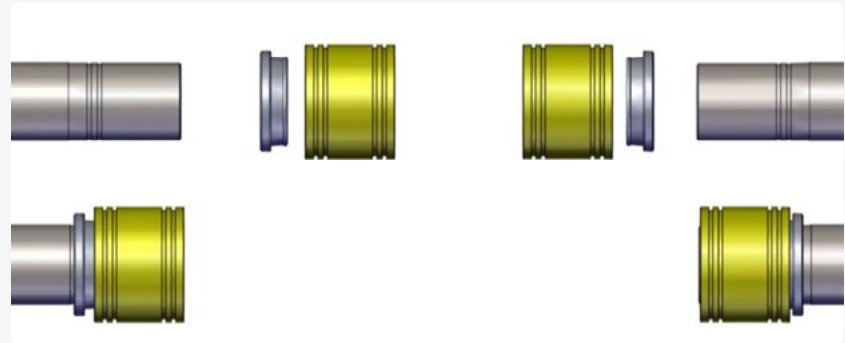


B2 – TWIN PT-1 APPLICATIONS

- 5 Cut out the section of length L from the **Original Pipe**.
Prepare the Pipe Ends according to the drawings shown in the **PT-1 Drawings Manual**.



- 6 Slide a Radial Wedge Seal (RWS) and a **Joining Stock (JS)** over each of the **Original Pipe Ends**

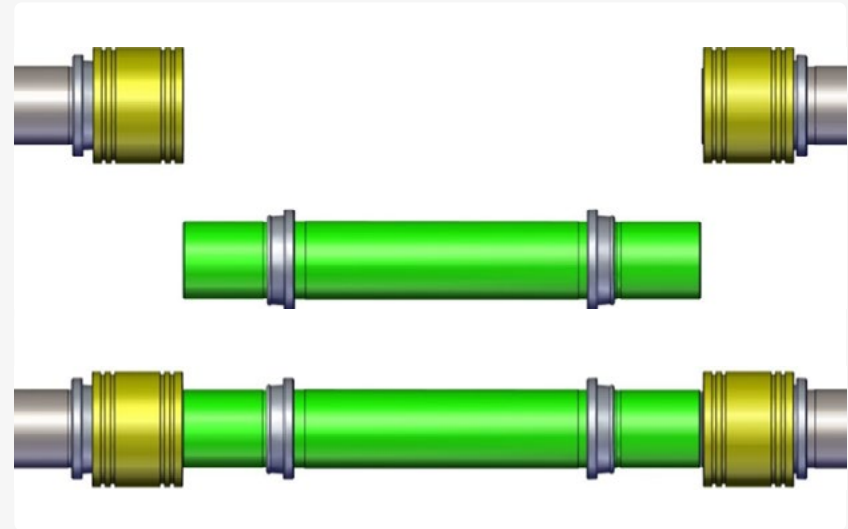


- 7 Slide two RWS over the **Replacement Pipe** ends



B2 – TWIN PT-1 APPLICATIONS

- 8 Lift the **Replacement Pipe** and align it with the **Original Pipe** ends

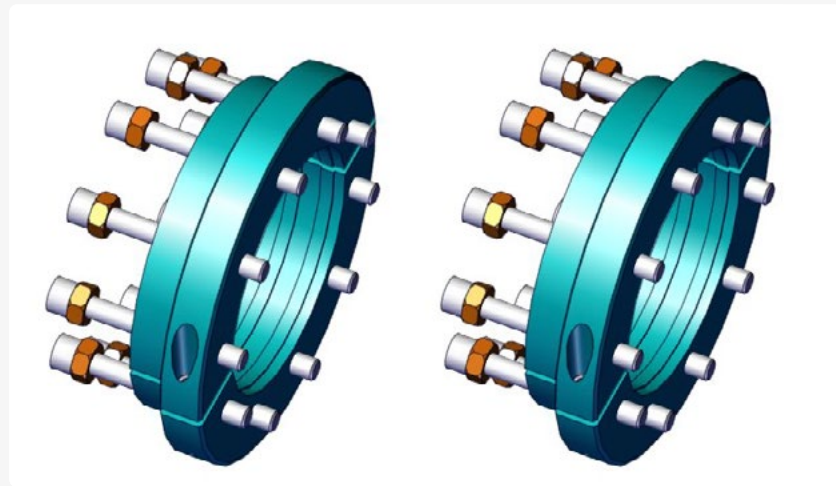


- 9 Slide the **JS** on each side of the **Replacement Pipe** over the Pipe End Gaps

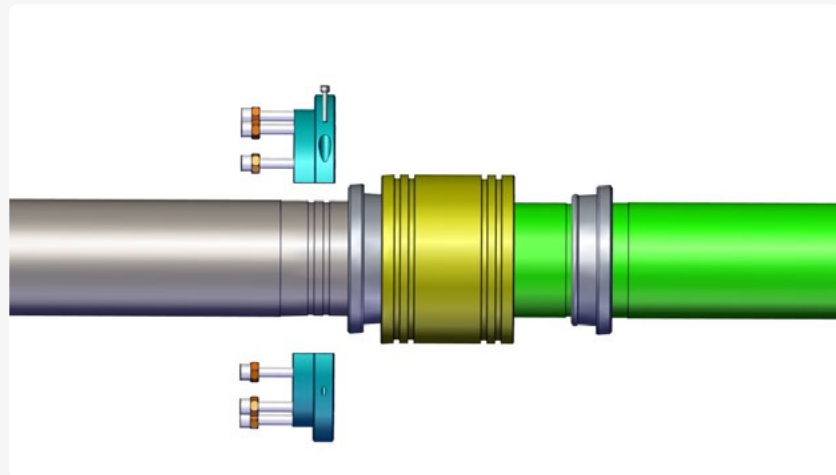


B2 – TWIN PT-1 APPLICATIONS

- 10 Unscrew the Energising Bolts in the **Spigot Rings**, until the threaded end is not protruding.

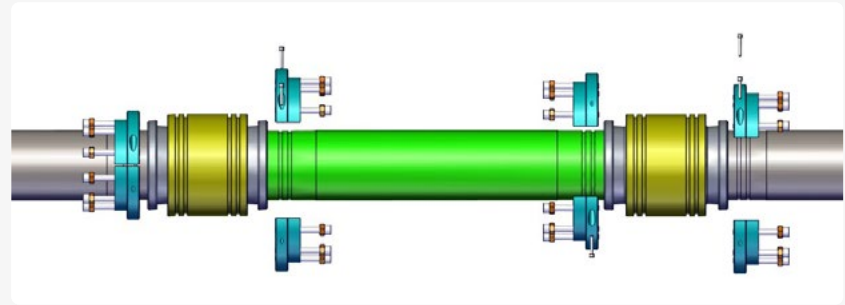


- 11 Place the **Spigot Rings** on prepared **Original Pipe End**. Make sure the grooves and spigots align and fit correctly!
- Loosely secure the **Spigot Ring** with the **Spigot Ring Screws**
- The **Spigot Ring**, must be able to rotate on the pipe to allow you to align it later.

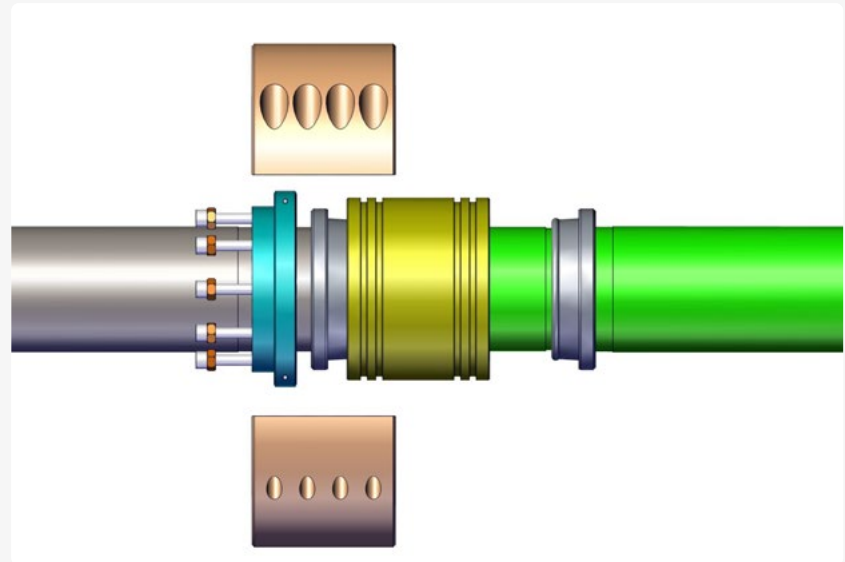


B2 – TWIN PT-1 APPLICATIONS

- 12 Repeat the process for the remaining grooved locations.



- 13 Starting at one side, Fit the Clamps over the Spigot Rings and align the Clamp Spigots with the grooves in the JS.

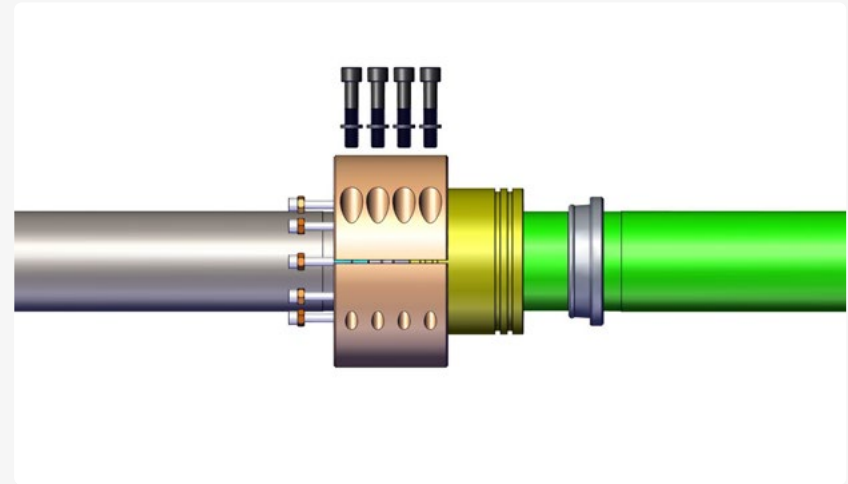


B2 – TWIN PT-1 APPLICATIONS

- 14 Secure the **Clamp** in position using the Clamp Bolts



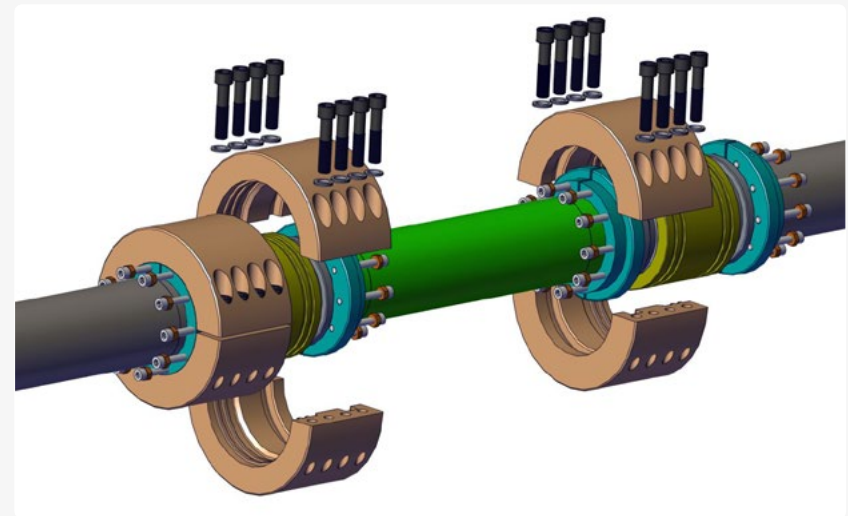
Do not tighten the Clamp Bolts yet!
You will need to be able to move the assembly axially to fit the last clamp



- 15 Fit **Clamps** over the **Spigot Rings** on the Replacement Pipe ends.
Align the **Clamp** spigots with the grooves in the **JS**.
Loosely screw the Clamping Bolts in the **Clamps** to hold them in position over the Replacement Pipe.

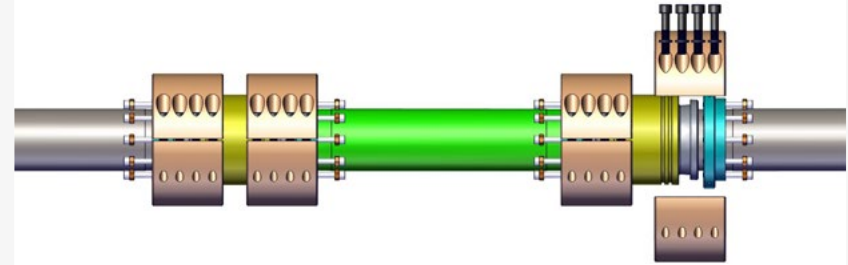


Do not tighten the Clamp Bolts yet!

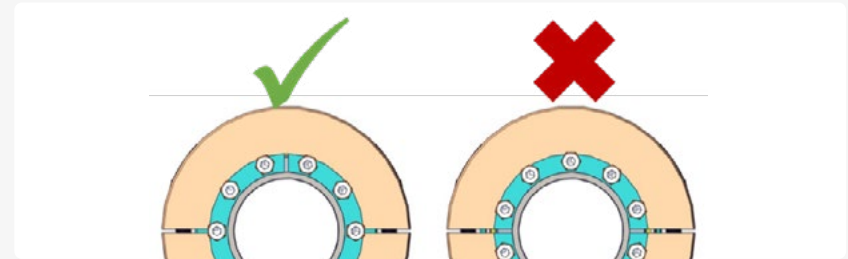


B2 – TWIN PT-1 APPLICATIONS

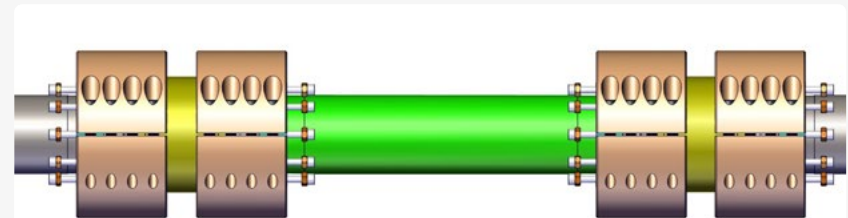
- 16 Fit and secure the last **Clamp**.



- 17 Check that the gap between the **Spigot Ring** halves and the gap between the **Clamp** halves is at right angles!



- 18 The bolts on the PT-1 Connection must now be torqued.
Refer to chapter "Torqueing the PT-1" for the correct procedure.



PT1

TORQUEING

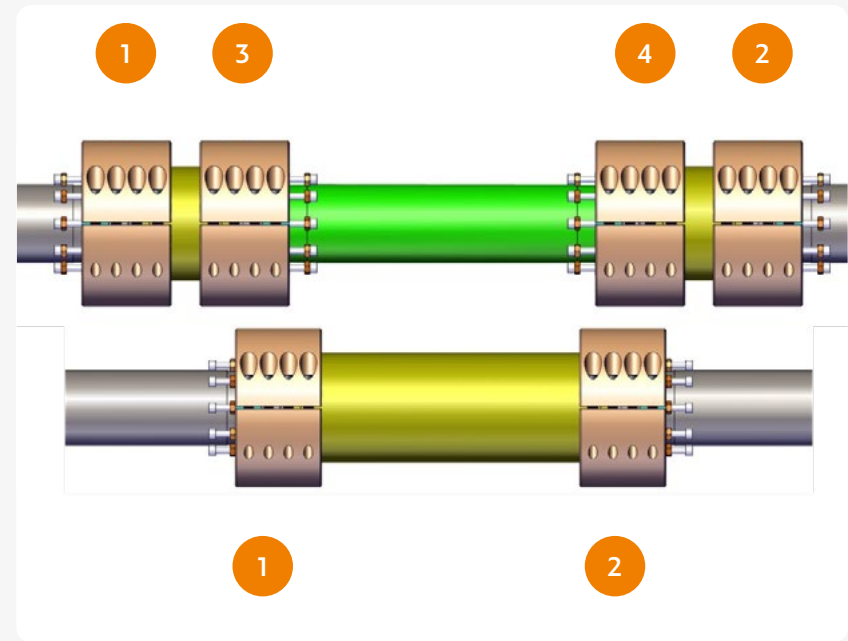
TORQUEING THE PT-1

- 1 In a Twin PT-1 Installation you must first Torque the Bolts in the **Clamps** on the **Original Pipe ends**.



You must tighten them in the pattern shown in three stages!

Follow the same procedure for the Clamps on the Replacement Pipe.



TORQUEING THE PT-1

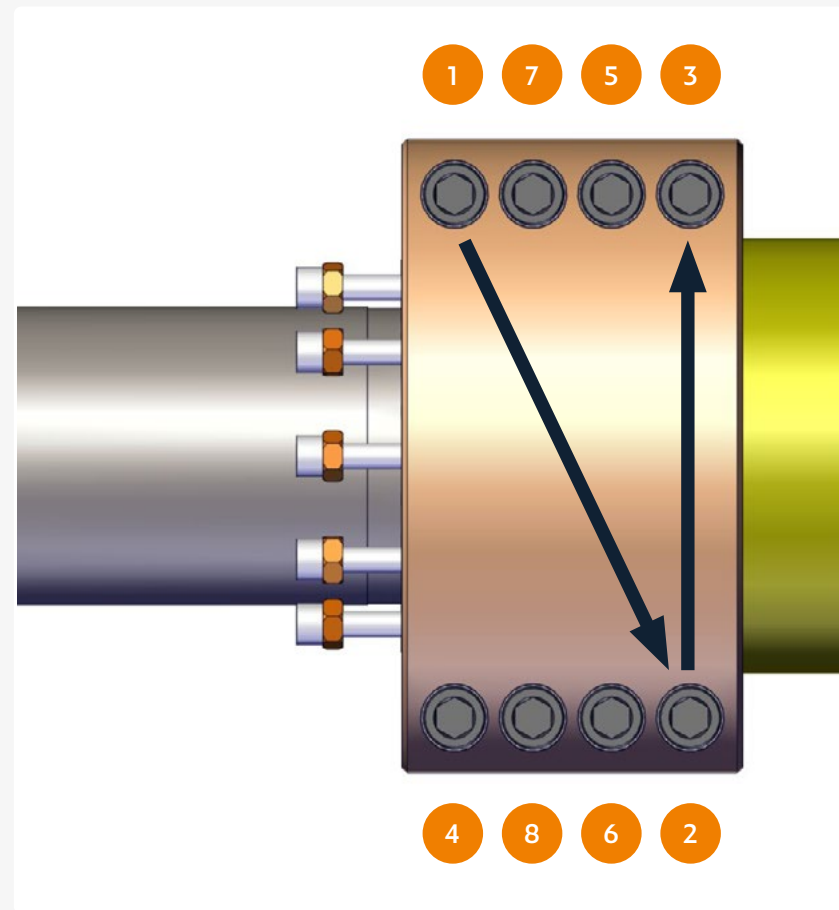
- 2 Using a calibrated **Torque Wrench** and the correct **Allen Head**, tighten the **Clamp Bolts** in three stages in the indicated pattern

Stage 1: 45Nm (33lbf-ft)

Stage 2: 120Nm (88lbf-ft)

Stage 3: 180Nm (132lbf-ft)

Follow a similar pattern for clamps with more **Clamping Bolts**

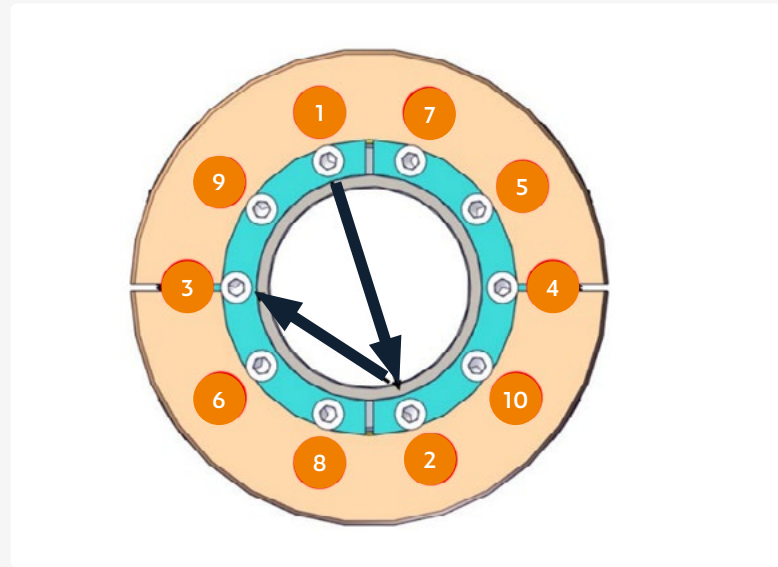


TORQUEING THE PT-1

3 The Radial Wedge must now be energised correctly.

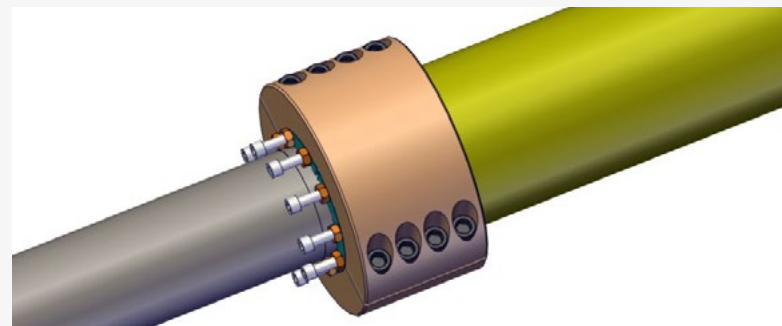
Follow the shown sequence to torque the Energising Bolts in four steps.

The torque value for each step is shown in **Appendix 2**



4 After the last torque stage has been applied to all Energising Bolts, apply the torque of stage one to all again to ensure that they are correctly seated

5 Finally, tighten the locking nuts to the specified torque in **Appendix 3**





THE INSTALLATION
IS NOW COMPLETE

SECTION 4 TROUBLE SHOOTING

| PROBLEM | POSSIBLE CAUSE | SOLUTIONS |
|-----------------|---|---|
| PT-1 is leaking | Insufficient Torque on the Energising Bolts | Do not disassemble the PT-1! Re-torque the Energising Bolts to the Stage 3 value |



PT1

APPENDIX 1 SIZES AND WEIGHTS

METRIC - SIZES AND WEIGHTS

Data for single length Joining Stock (JS)

| NOMINAL DIAMETER (INCHES) | SCHEDULE | OUTER CLAMP DIAMETER | MINIMUM REPLACEMENT PIPE LENGTH | SINGLE PT-1 UNIT LENGTH CLAMP TO CLAMP | SINGLE PT-1 UNIT WEIGHT |
|------------------------------|---------------|-------------------------|---------------------------------------|--|----------------------------|
| | | D Clamp (mm) | L (mm) | H (mm) | M (kg) |
| 4" | All Schedules | 242 | 550 | 302 | 70 |
| 6" | All Schedules | 298.5 | 550 | 312 | 98 |
| 8" | All Schedules | 364 | 650 | 352 | 150 |
| 10" | All Schedules | 457 | 750 | 460 | 300 |
| 12" | Sched 40-100 | 503 | 750 | 430 | 320 |
| | Sched 120-160 | | 780 | 460 | 350 |
| 16" | Sched 40-100 | 603 | 750 | 505 | 465 |
| | Sched 120-160 | | 780 | 522 | 500 |

METRIC - SIZES AND WEIGHTS

Data for 3x Length Joining Stock (JS3D)

| NOMINAL DIAMETER (INCHES) | SCHEDULE | OUTER CLAMP DIAMETER | SINGLE PT-1 UNIT LENGTH CLAMP TO CLAMP | SINGLE PT-1 UNIT WEIGHT |
|------------------------------|---------------|----------------------|---|-------------------------|
| | | D Clamp (mm) | H (mm) | M (kg) |
| 4" | All Schedules | 242 | 597 | 92 |
| 6" | All Schedules | 298.5 | 756 | 147 |
| 8" | All Schedules | 364 | 918 | 238 |
| 10" | All Schedules | 364 | TBD | TBD |
| 12" | Sched 40-100 | 503 | 1319 | 622 |
| | Sched 120-160 | | 1349 | 650 |
| 16" | Sched 40-100 | 603 | 1561 | 1045 |
| | Sched 120-160 | | 1591 | 1084 |

IMPERIAL - SIZES AND WEIGHTS

Data for single length Joining Stock (JS)

| NOMINAL DIAMETER (INCHES) | SCHEDULE | OUTER CLAMP DIAMETER | MINIMUM REPLACEMENT PIPE LENGTH | SINGLE PT-1 UNIT LENGTH CLAMP TO CLAMP | SINGLE PT-1 UNIT WEIGHT |
|------------------------------|---------------|-------------------------|---------------------------------------|--|----------------------------|
| | | D Clamp (in) | L (in) | H (in) | M (lbs) |
| 4" | All Schedules | 9.52 | 21.65 | 11.89 | 154 |
| 6" | All Schedules | 11.75 | 21.65 | 12.28 | 216 |
| 8" | All Schedules | 14.33 | 25.6 | 13.85 | 330 |
| 10" | All Schedules | 18 | 29.5 | 18.11 | 660 |
| 12" | Sched 40-100 | 19.8 | 29.5 | 16.92 | 705 |
| | Sched 120-160 | | 30.7 | 18.11 | 771 |
| 16" | Sched 40-100 | 23.75 | 29.5 | 19.88 | 1025 |
| | Sched 120-160 | | 30.7 | 20.55 | 1102 |

IMPERIAL - SIZES AND WEIGHTS

Data for 3x Length Joining Stock (JS3D)

| NOMINAL DIAMETER (INCHES) | SCHEDULE | OUTER CLAMP DIAMETER | SINGLE PT-1 UNIT LENGTH CLAMP TO CLAMP | SINGLE PT-1 UNIT WEIGHT |
|------------------------------|---------------|----------------------|---|-------------------------|
| | | D Clamp (in) | H (in) | M (lbs) |
| 4" | All Schedules | 9.52 | 23.5 | 203 |
| 6" | All Schedules | 11.75 | 29.76 | 324 |
| 8" | All Schedules | 14.33 | 36.14 | 525 |
| 10" | All Schedules | 18 | TBD | TBD |
| 12" | Sched 40-100 | 19.8 | 51.93 | 1371 |
| | Sched 120-160 | | 53.11 | 1433 |
| 16" | Sched 40-100 | 23.75 | 61.45 | 2304 |
| | Sched 120-160 | | 62.64 | 2390 |

PT1

APPENDIX 2

ENERGISING BOLTS
TORQUE VALUES

METRIC (NM) - ENERGISING BOLTS TORQUE VALUES

| NOMINAL DIAMETER | SCHEDULE | ENERGISING BOLTS TORQUE | | |
|------------------|-----------|-------------------------|---------|---------|
| | | STAGE 1 | STAGE 2 | STAGE 3 |
| 4" | Sched 40 | 10 | 20 | 30 |
| | Sched 60 | 10 | 20 | 30 |
| | Sched 80 | 10 | 20 | 32 |
| | Sched 120 | 10 | 20 | 37 |
| | Sched 160 | 10 | 20 | 41 |
| 6" | Sched 40 | 10 | 20 | 37 |
| | Sched 80 | 10 | 20 | 46 |
| | Sched 120 | 10 | 20 | 53 |
| | Sched 160 | 10 | 20 | 60 |
| 8" | Sched 40 | 30 | 45 | 45 |
| | Sched 60 | 30 | 45 | 55 |
| | Sched 80 | 30 | 45 | 60 |
| | Sched 100 | 30 | 45 | 65 |
| | Sched 120 | 30 | 45 | 75 |
| | Sched 140 | 30 | 45 | 80 |
| | Sched 160 | 30 | 45 | 85 |
| 10" | Sched 40 | 30 | 45 | 55 |
| | Sched 60 | 30 | 45 | 65 |
| | Sched 80 | 30 | 50 | 70 |
| | Sched 100 | 30 | 50 | 76 |
| | Sched 120 | 30 | 50 | 85 |
| | Sched 140 | 30 | 80 | 90 |
| | Sched 160 | 30 | 80 | 95 |

METRIC (NM) - ENERGISING BOLTS TORQUE VALUES

| | | | | |
|-----|-----------|----|-----|-----|
| 12" | Sched 40 | 30 | 50 | 95 |
| | Sched 60 | 30 | 50 | 115 |
| | Sched 80 | 30 | 50 | 130 |
| | Sched 100 | 30 | 80 | 145 |
| | Sched 120 | 30 | 80 | 155 |
| | Sched 140 | 30 | 100 | 165 |
| | Sched 160 | 30 | 100 | 180 |
| 16" | Sched 40 | 30 | 50 | 90 |
| | Sched 60 | 30 | 50 | 115 |
| | Sched 80 | 30 | 50 | 125 |
| | Sched 100 | 30 | 80 | 140 |
| | Sched 120 | 30 | 80 | 155 |
| | Sched 140 | 30 | 100 | 170 |
| | Sched 160 | 30 | 100 | 180 |

IMPERIAL (FT-LBS) – ENERGISING BOLTS TORQUE VALUES

| NOMINAL DIAMETER | SCHEDULE | ENERGISING BOLTS TORQUE | | |
|------------------|-----------|-------------------------|---------|---------|
| | | STAGE 1 | STAGE 2 | STAGE 3 |
| 4" | Sched 40 | 8 | 15 | 23 |
| | Sched 60 | 8 | 15 | 23 |
| | Sched 80 | 8 | 15 | 24 |
| | Sched 120 | 8 | 15 | 28 |
| | Sched 160 | 8 | 15 | 31 |
| 6" | Sched 40 | 8 | 15 | 28 |
| | Sched 80 | 8 | 15 | 34 |
| | Sched 120 | 8 | 15 | 40 |
| | Sched 160 | 8 | 15 | 45 |
| 8" | Sched 40 | 23 | 34 | 34 |
| | Sched 60 | 23 | 34 | 41 |
| | Sched 80 | 23 | 34 | 45 |
| | Sched 100 | 23 | 34 | 48 |
| | Sched 120 | 23 | 34 | 56 |
| | Sched 140 | 23 | 34 | 59 |
| | Sched 160 | 23 | 34 | 63 |
| 10" | Sched 40 | 23 | 37 | 41 |
| | Sched 60 | 23 | 37 | 48 |
| | Sched 80 | 23 | 37 | 51 |
| | Sched 100 | 23 | 60 | 56 |
| | Sched 120 | 23 | 60 | 62 |
| | Sched 140 | 23 | 74 | 66 |
| | Sched 160 | 23 | 74 | 70 |

IMPERIAL (FT-LBS) - ENERGISING BOLTS TORQUE VALUES

| | | | | |
|-----|-----------|----|----|-----|
| 12" | Sched 40 | 23 | 37 | 71 |
| | Sched 60 | 23 | 37 | 85 |
| | Sched 80 | 23 | 37 | 96 |
| | Sched 100 | 23 | 59 | 107 |
| | Sched 120 | 23 | 59 | 115 |
| | Sched 140 | 23 | 74 | 122 |
| | Sched 160 | 23 | 74 | 133 |
| 16" | Sched 40 | 23 | 37 | 67 |
| | Sched 60 | 23 | 37 | 85 |
| | Sched 80 | 23 | 37 | 93 |
| | Sched 100 | 23 | 59 | 104 |
| | Sched 120 | 23 | 59 | 115 |
| | Sched 140 | 23 | 74 | 126 |
| | Sched 160 | 23 | 74 | 133 |

PT1

APPENDIX 3

LOCK NUT TORQUE VALUES

METRIC (NM) – LOCK NUT TORQUE VALUES

| NOMINAL DIAMETER | TORQUE (NM) |
|------------------|-------------|
| 4" | 40 |
| 6" | 40 |
| 8" | 60 |
| 10" | 60 |
| 12" | 120 |
| 16" | 120 |

IMPERIAL (FT-LBS) – LOCK NUT TORQUE VALUES

| NOMINAL DIAMETER | TORQUE (LBS-FT) |
|------------------|-----------------|
| 4" | 30 |
| 6" | 30 |
| 8" | 45 |
| 10" | 45 |
| 12" | 90 |
| 16" | 90 |