



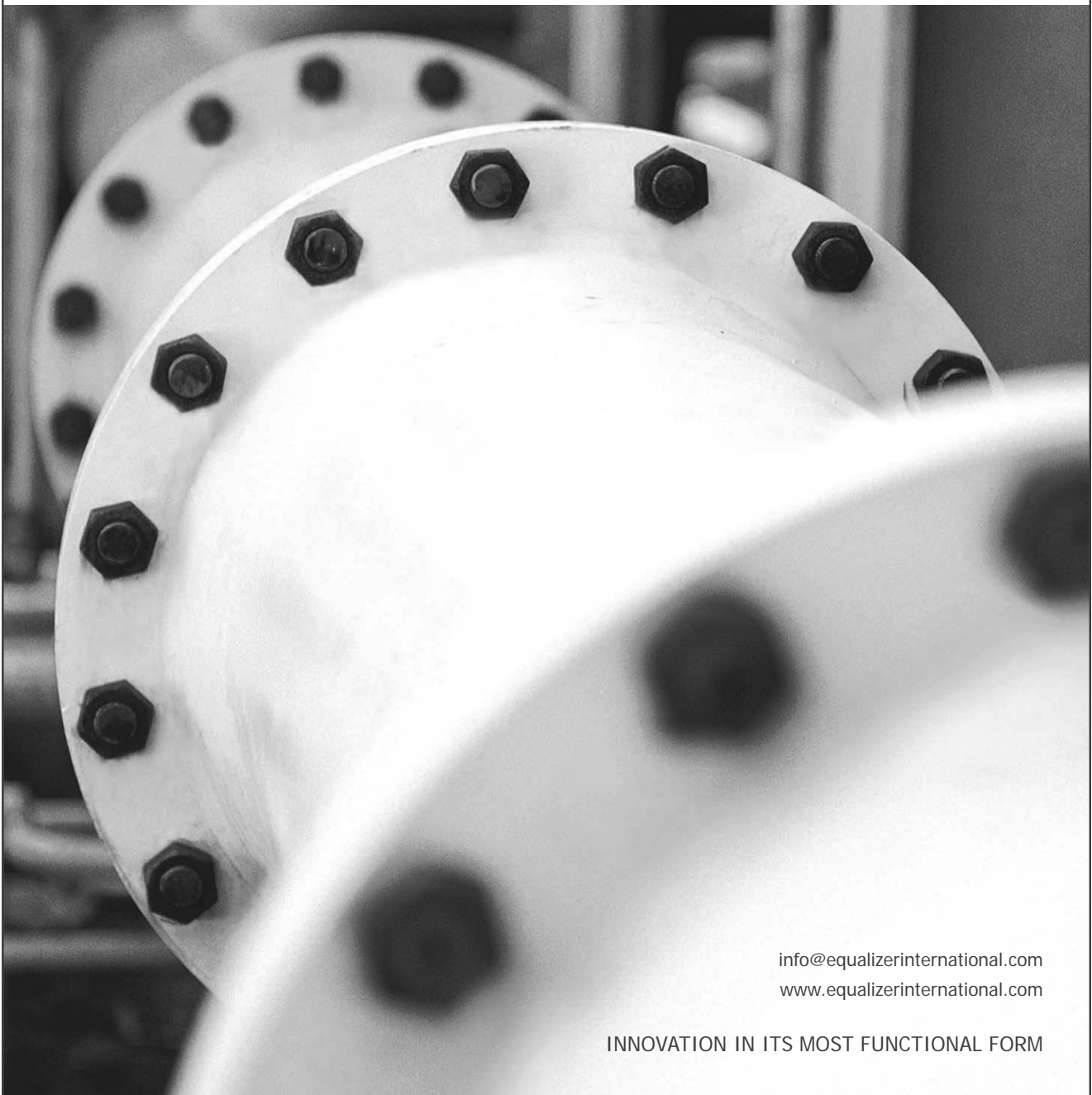
SG13TE, SG15TE

SECURE-GRIP HYDRAULIC FLANGE SPREADERS

Operator Instruction Manual



EQUALIZERTM
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INNOVATION IN ITS MOST FUNCTIONAL FORM



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1. INTRODUCTION

The Equalizer Secure-Grip Flange Spreading Tools are a range of tools designed to assist in the maintenance and installation of pipeline flange assemblies.

The Hydraulic Secure-Grip Flange Spreading Tools are used to spread flanges with little or no access gap producing a spreading force of up to:

- **26T (260kN)** for the **SG13TE** when used in pairs
- **30T (300kN)** for the **SG15TE** when used in pairs



2. SAFETY INFORMATION

The operator MUST read this manual prior to using the tools.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury; read the manual fully!

Read all the following instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation.

Equalizer International Ltd cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Equalizer International Ltd when in doubt as to the safety precautions and applications. To protect your warranty, use only good quality hydraulic oil of the grade 15cSt.

Only people competent in the use of hydraulic equipment should use these tools.

In all installations the site safety requirements must be adhered to. ALSO the safety of the operator, and when present, any assisting personnel, is of paramount importance along with the safety of others including, when present, the general public.

These instructions are only to cover the safe operation of THE EQUALIZER SG13TE & SG15TE SECURE-GRIP HYDRAULIC TOOLS during normal maintenance/installation operations. All other safety aspects must be controlled by the operation supervisor.



A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is only used when your action or lack of action may cause serious injury or even death.



IMPORTANT: Operator must be competent in the use of hydraulic equipment. The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the Equalizer equipment.



WARNING: To avoid personal injury and possible equipment damage, make sure all hydraulic components are rated to a safe working pressure of 700 bar (10,000 psi)



WARNING: Do not overload equipment. Overloading causes equipment failure and possible personal injury.

The risk of overloading can be avoided by using the Equalizer Hand Pump, which has its safety valve set to 700 bar by the factory. If alternative pumps are used, ensure they are rated at a safe working pressure of 700 bar (10,000 psi).



CAUTION: Make sure that all system components are protected from external sources of damage, such as excessive heat, flame, moving machine parts, sharp edges and corrosive chemicals.



CAUTION: Avoid sharp bends and kinks that will cause severe back-up pressure in hoses. Bends and kinks lead to premature hose failure. Do not drop heavy objects onto hoses. A sharp impact may cause internal damage to hose wire strands; applying pressure to a damaged hose may cause it to rupture. Do not place heavy weights on the hoses, or allow vehicles to roll over the hoses; crush damage will lead to premature hose failure.



WARNING: Immediately replace worn or damaged parts with genuine Equalizer parts. Equalizer parts are designed to fit properly and withstand rated loads. For repair or maintenance service contact your Equalizer distributor or service centre.



DANGER: To avoid personal injury keep hands and feet away from the tool and workpiece during operation.



WARNING: Always wear suitable clothing and Personal Protective Equipment (PPE).



DANGER: Do not handle pressurised hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, seek medical attention immediately.



WARNING: Never pressurize unconnected couplers. Only use hydraulic equipment in a connected system.



IMPORTANT: Do not lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport.



WARNING: Never place fingers in a joint held by an activated tool



CAUTION: Never hammer or force the tool into a bolt hole; if it does not fit easily you are using the wrong size of tool.



CAUTION: Do not operate the equipment without lubricating all moving parts as in section 7. Use only high pressure molybdenum disulphide grease.



3. KIT COMPONENTS

SG13TE KIT COMPONENTS

- 1 x SG13TE Tool c/w Hydraulic Cylinder
- 1 x 10,000 psi (700 bar) HP550S Sealed Hand Pump with Gauge
- 1 x 10,000 psi (700 bar) Hydraulic Hose, 2m (78.75")
- 1 x 150 mm (6") Vernier Calliper
- 1 x ½" Square Drive Flexible Handle
- 1 x 30 mm (1 ⅛") Drive Socket
- 1 x Safety Block
- 2 x M39 (1 ½") Collets
- 2 x M42 (1 ⅝") Collets
- 2 x M45 (1 ¾") Collets
- 1 x Instruction Manual
- 1 x Carry-Case with Protective Foam Inserts



Product Code: SG13TESTD

SG15TE KIT COMPONENTS

- 1 x SG15TE Tool c/w Hydraulic Cylinder
- 1 x 10,000 psi (700 bar) HP550S Sealed Hand Pump with Gauge
- 1 x 10,000 psi (700 bar) Hydraulic Hose, 2m (78.75")
- 1 x 300 mm (12") Vernier Calliper
- 1 x ½" Square Drive Flexible Handle
- 1 x 36 mm Drive Socket
- 1 x Safety Block
- 2 x M48 (1 ⅞") Collets
- 2 x M52 (2") Collets
- 2 x M56 (2 ¼") Collets
- 1 x Instruction Manual
- 1 x Carry-Case with Protective Foam Inserts



Product Code: SG15TESTD



4. TECHNICAL DATA

SG13TE TECHNICAL DATA

Spreading force = 13 T (130 kN) per tool

It is recommended that tools are used in pairs giving 2 x 13 = 26 T (260 kN)

If using the Equalizer HP550S Hand Pump (or if a hydraulic pressure gauge is fitted), the spreading force per tool can be determined by taking a reading from the gauge. Gauge pressures will produce spreading forces as set out below.

| | | | | | | |
|------------------------|------------|------|------|------|------|--------|
| Pressure | Bar | 138 | 276 | 414 | 552 | 690 |
| | psi | 2000 | 4000 | 6000 | 8000 | 10,000 |
| Spreading force | T | 2.6 | 5.2 | 7.8 | 10.4 | 13 |
| | kN | 26 | 52 | 78 | 104 | 130 |

Spreading distance = 0 - 115mm (0 - 4.53")

Hydraulic oil grade: 15 centistokes(cSt) @ 40°C tested by ASTM D 445

SG15TE TECHNICAL DATA

Spreading force = 15 T (150 kN) per tool

It is recommended that tools are used in pairs giving 2 x 15 = 30 T (300 kN)

If using the Equalizer HP550S Hand Pump (or if a hydraulic pressure gauge is fitted), the spreading force per tool can be determined by taking a reading from the gauge. Gauge pressures will produce spreading forces as set out below.

| | | | | | | |
|------------------------|------------|------|------|------|------|--------|
| Pressure | Bar | 138 | 276 | 414 | 552 | 690 |
| | psi | 2000 | 4000 | 6000 | 8000 | 10,000 |
| Spreading force | T | 3 | 6 | 9 | 12 | 15 |
| | kN | 30 | 60 | 90 | 120 | 150 |

Spreading distance = 0 - 100mm (0 - 3.94")

Hydraulic oil grade: 15 centistokes(cSt) @ 40°C tested by ASTM D 445

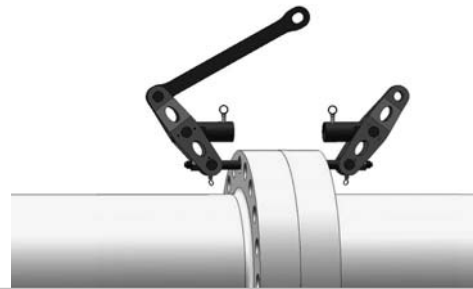


5. HOW THE SECURE-GRIP HYDRAULIC TOOLS WORK

1. The two halves of the hydraulic Secure-Grip tool are inserted into opposing flange bolt-holes



2. Both drive nuts are tightened locking the tool in to the flange bolt-holes



3. The actuator followed by the cantilever are locked into position



4. The hydraulic hose and hand pump are attached



5. The hand pump is actuated which powers the hydraulics that spread the flange





6. INSTALLATION AND OPERATION

6.1 COLLET SELECTION BASED ON FLANGE SPECIFICATION



It is important that the correct size of collet is used!
An undersized collet could allow the collet holder to pull through its bore!
An oversized collet has the potential to become jammed in the bolt-hole!

To select the applicable tool and collet for your flange please refer to the Secure-Grip application charts at the back of this manual (section 12, pages 28-37).

The Secure-Grip hydraulic tools have a range of collets which are applicable to the following bolts and flange bolt-hole diameters:

| Collet type | Minimum bolt-hole diameter | Maximum bolt-hole diameter | Metric coarse bolt | UNC bolt | Tool |
|-------------------|----------------------------|----------------------------|--------------------|----------|--------|
| M39 1 1/2" | 38 | 42 | M39 | 1 1/2" | SG13TE |
| M42 1 5/8" | 41 | 45 | M42 | 1 5/8" | SG13TE |
| M45 1 3/4" | 44 | 49 | M45 | 1 3/4" | SG13TE |
| M48 1 7/8" | 47.5 | 52 | M48 | 1 7/8" | SG15TE |
| M52 2" | 50.5 | 56 | M52 | 2" | SG15TE |
| M56 2 1/4" | 55.5 | 62 | M56 | 2 1/4" | SG15TE |

If the specification of the flange is unknown then the vernier calliper supplied in the kit should be used to determine the correct collet as shown in section 6.2, pages 8-10.



Important: The Secure-Grip collets are consumable items. The lifespan of a collet will vary depending on the flange materials with which it is used. To increase the lifespan of the collets it is recommended that they are flipped through 180 degrees on the collet holder, this will produce more even wear across the four ridges on the outer profile of the collet. See section 6.3 for details on collet removal and replacement

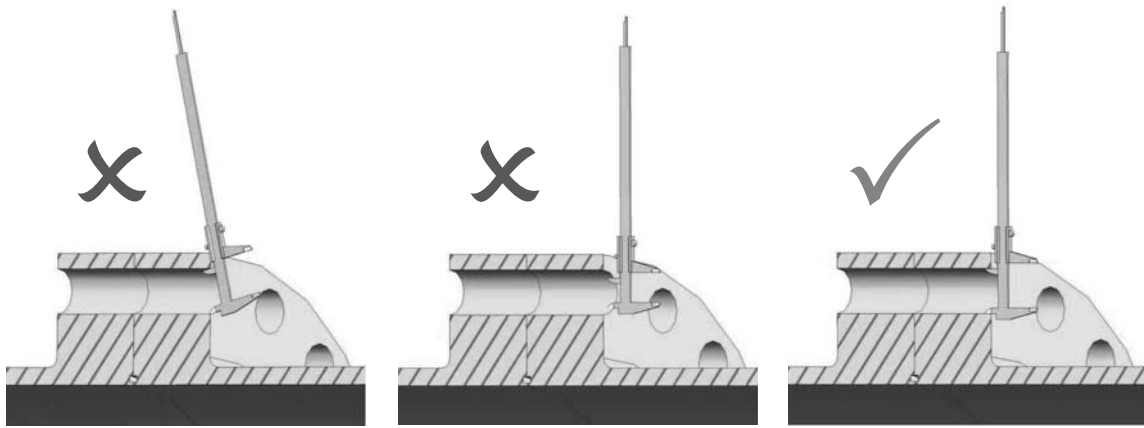


6.2 COLLET SELECTION BASED ON BOLT-HOLE MEASUREMENT

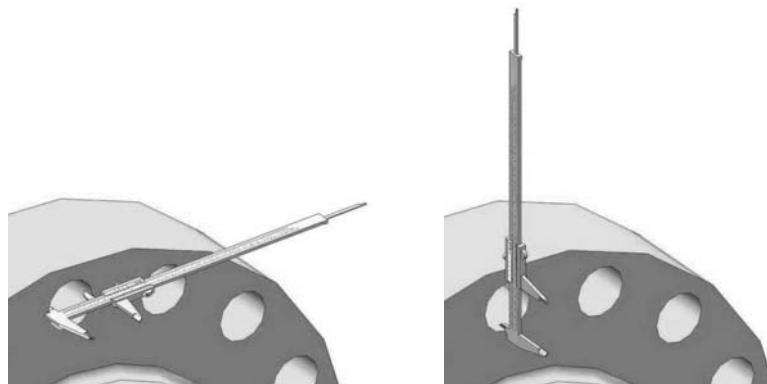


Note: It is important that the vernier calliper is held in the middle of the bolt-hole, and not held at an angle to the flange face, nor used on a bolt-hole which is worn, damaged or distorted, as these actions may result in the selection of an incorrect size of collet

1. To ensure a true measurement is taken, hold the vernier calliper:
 - square to the flange face
 - in the middle of the bolt-hole



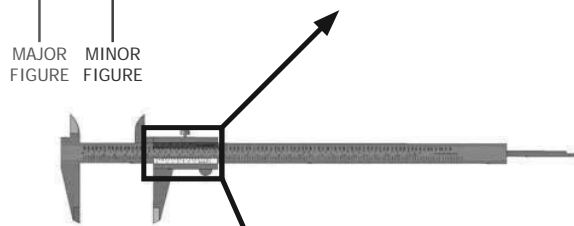
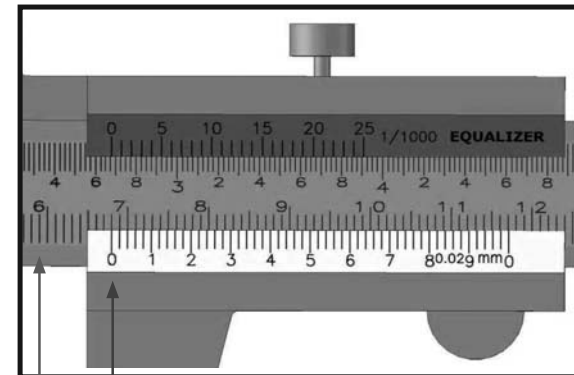
2. To determine whether the bolt-hole is round, take two separate measurements with the vernier calliper turned through 90° between measurements



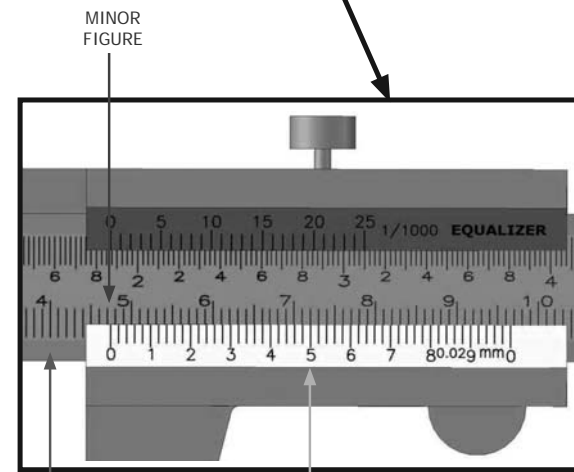


3. To read the measurement from the vernier calliper, scan along the desired scale from left to right. In this example, the major figure is 60mm, this is added to the minor figure of 8mm (indicated by where the vernier scale aligns with the main scale), giving a total measurement of 68mm.

With a bolt-hole size of 68mm, the operator can determine which collet and tool is appropriate to this flange by referring to the Secure-Grip Tool Range chart in section 11, page 27. For example: 68mm falls within the 63mm minimum and 69mm maximum bolt-hole sizes. Therefore collet identification is M64 / 2½" and the tool to be used is the SG18TE.

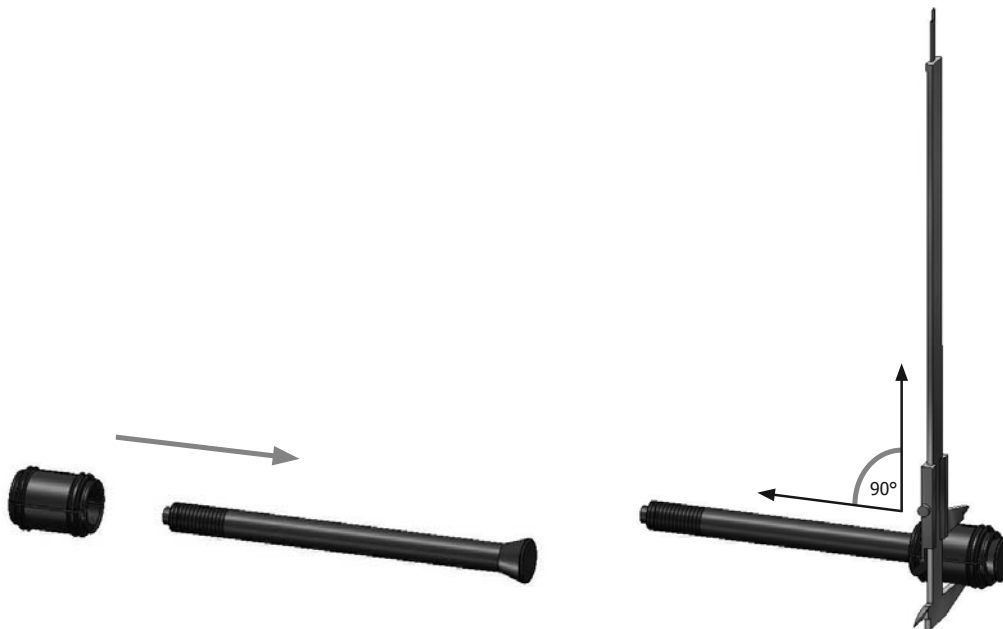


4. If the measurement contains fractions of a millimetre the method of reading the vernier calliper is slightly different. In this example, the major figure is 40mm (read in the same way as previously described). The minor figure is 7mm (read to the left of the zero). The fraction is 0.5mm (read from where the vernier scale lines up with the main scale). This gives a total measurement of 47.5mm.





6. Each tool in the Secure-Grip range comes with the appropriate sizes of collets for that tool. If the collet labelling is worn or missing then the collet can be measured to ensure that the correct size is selected. An accurate measurement can only be obtained with the collet mounted on the collet holder. To do this:
- remove the collet head assembly from the tool and disassemble (see section 6.3, page 11 for details)
 - slide the collet over the collet holder
 - measure the centre section of the collet with the vernier calliper
 - identify the collet using the chart below, and select the correct size for the flange



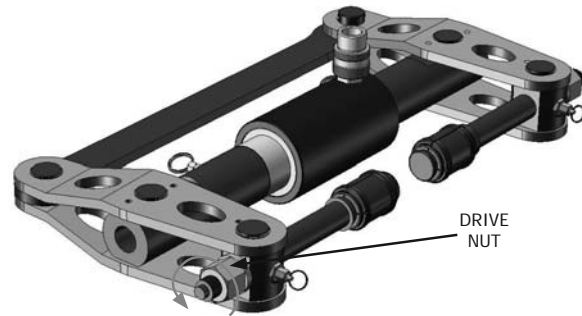
| Centre section Ø | Collet type | Min. bolt-hole Ø | Max. bolt-hole Ø | Metric coarse bolt | UNC bolt |
|------------------|-------------------|------------------|------------------|--------------------|----------|
| 36mm | M39 1 1/2" | 38mm | 42mm | M39 | 1 1/2" |
| 39mm | M42 1 5/8" | 41mm | 45mm | M42 | 1 5/8" |
| 40.5mm | M45 1 3/4" | 44mm | 49mm | M45 | 1 3/4" |
| 44.5mm | M48 1 7/8" | 47.5mm | 52mm | M48 | 1 7/8" |
| 47.5mm | M52 2" | 50.5mm | 56mm | M52 | 2" |
| 52.5mm | M56 2 1/4" | 55.5mm | 62mm | M56 | 2 1/4" |



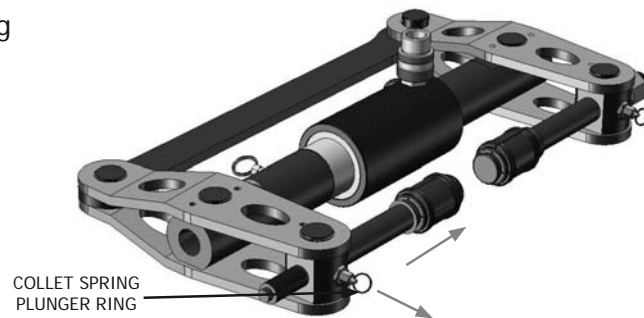
6.3 COLLET REMOVAL AND REPLACEMENT

Once the correct collet has been selected it may be necessary to change the collet on the tool:

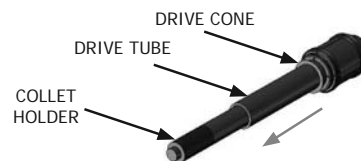
1. Place the tool on its side on a work bench or flat surface and unscrew and remove the drive nut



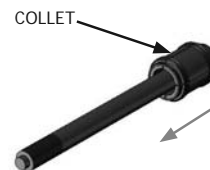
2. Pull the collet spring plunger ring out, and remove the collet head assembly from the tool



3. Slip the drive tube and drive cone off the collet holder



4. Remove the collet from the collet holder and replace it with the correct collet for the flange to be separated



5. Reverse the above procedure to re-assemble the tool. Care should be taken to ensure the slot in the collet holder is aligned with the collet spring plunger

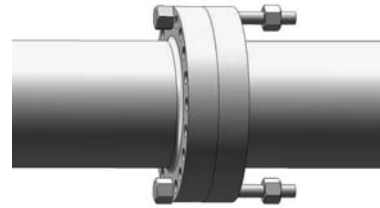


6.4 STANDARD INSTALLATION AND OPERATION

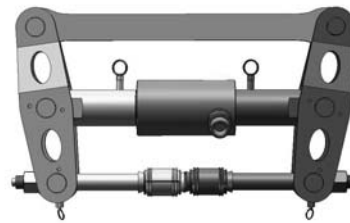
Once the correct collet has been selected and mounted, tool operation can commence



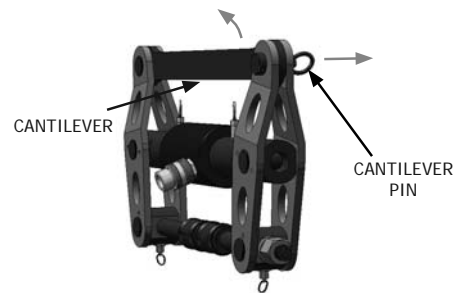
Before attaching the tool ensure at least two flange bolts remain in place 180 degrees apart with nuts loosened sufficiently enough for flange work to be carried out. These bolts will reduce lateral flange movement during flange spreading.



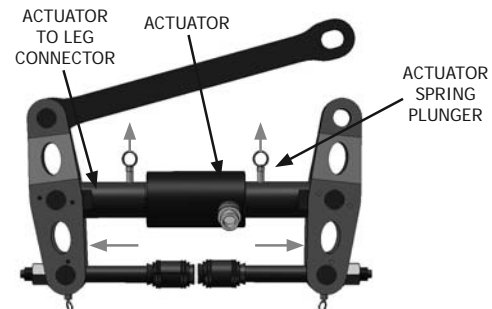
1. Before installation can begin the tool must be dismantled into three parts



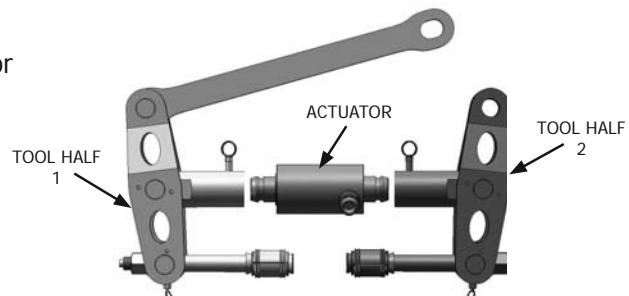
2. Lay the tool on a flat surface. Pull the cantilever pin out and rotate the cantilever out of position.



3. Pull on the left hand actuator spring plunger and pull the actuator from the actuator to leg connector. Repeat this on the right hand side

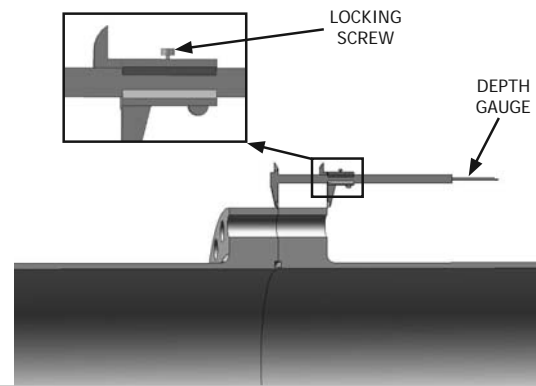


4. The tool should now be in three parts - two halves and the actuator

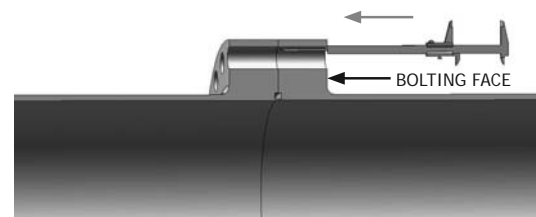




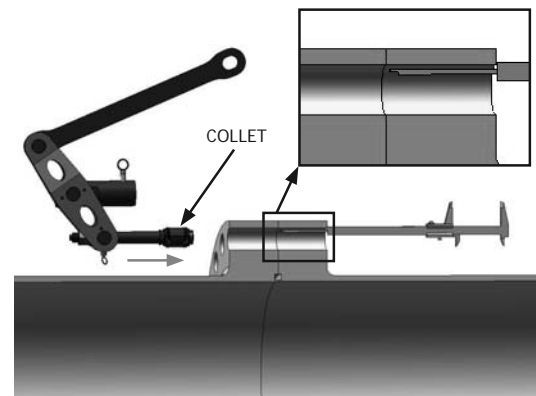
5. Measure the thickness of the flange using the vernier calliper provided. Lock the calliper in position by tightening the locking screw



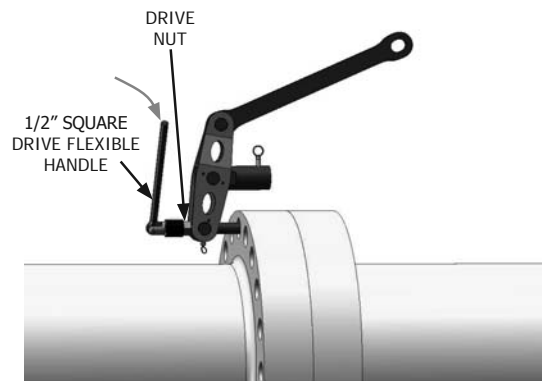
6. Select a suitable bolt-hole in which to attach the tool. Insert the depth gauge part of the vernier calliper into the bolt hole keeping the base of the calliper flush with the bolting face of the flange



7. Insert the collet on the first half of the tool into the the opposite end of the same bolt-hole until it touches the end of the depth gauge (so that the collet is fully through one flange but not entering the other)

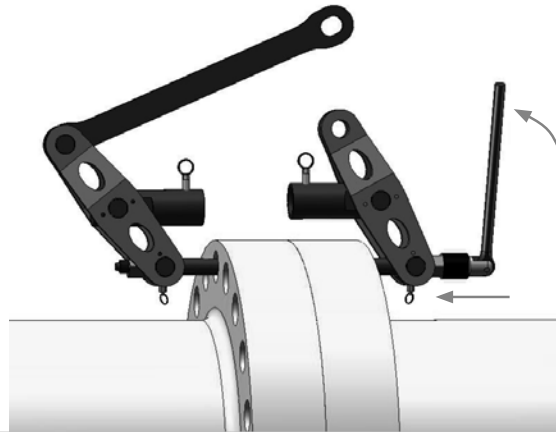


8. Tighten the drive nut with the 1/2" square drive flexible handle. The first half of the tool will now have a secure hold in the bolt-hole

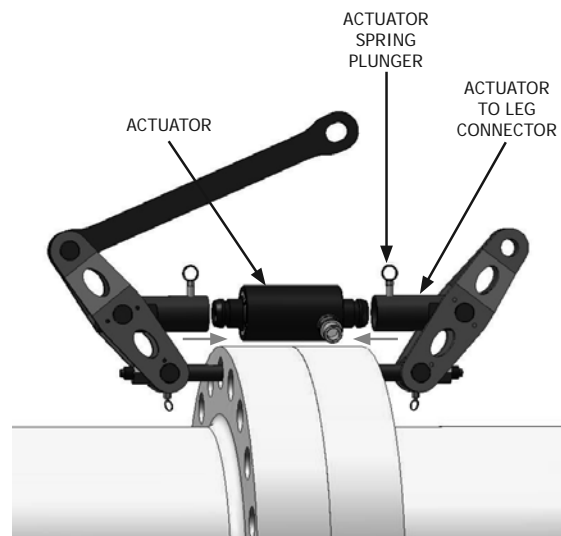




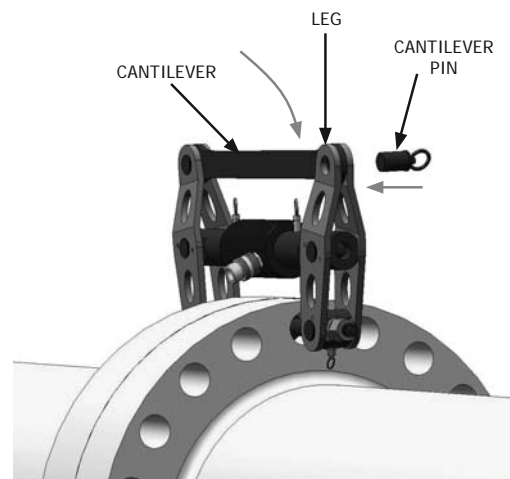
9. Insert the collet on the second half of the tool in to the bolt-hole until it touches the collet on the first half of the tool, and tighten the drive nut using the 1/2" square drive flexible handle. The second half of the tool will now have a secure hold in the bolt-hole



10. Insert one side of the actuator into each 'actuator to leg connector'. On both sides push the actuator until you feel the actuator spring plunger click.



11. Rotate the cantilever into position, and secure by sliding the cantilever pin (through the hole at the top of the leg and the hole in the cantilever) until fully home

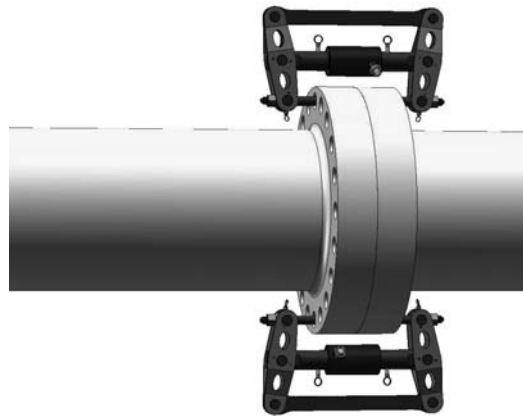




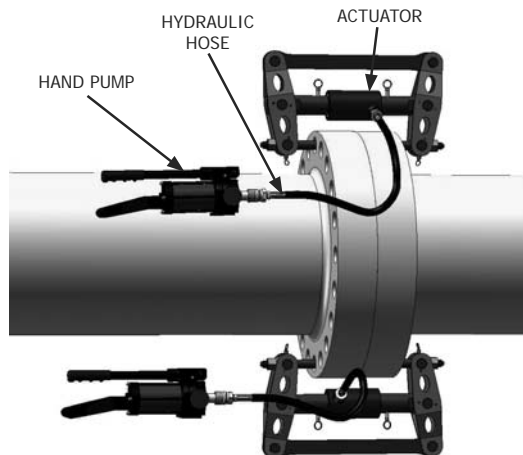
12. Select the bolt-hole 180° opposite the tool you have just attached and repeat steps 2 to 7 for the second tool



Note: If more than two tools are being used they should be attached at an equal spacing around the flange joint



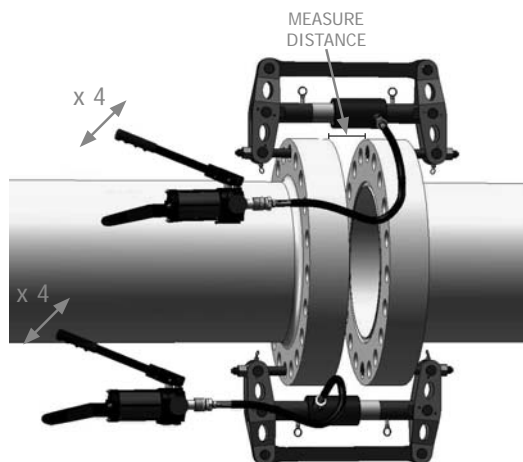
13. Connect the hand pumps to the hydraulic hoses, and the hydraulic hoses to the actuators on each tool. Ensure that all couplers are fully hand tightened and the release valves are closed hand tight



14. Flange spreading can now begin. Give the first tool four strokes on the hand pump, then give the same to the second. As the flange is separating, measure the gap at both tools, and if necessary adjust the number of strokes on one side to ensure the flange faces are kept parallel.



WARNING: Never place fingers in a joint held by an activated tool



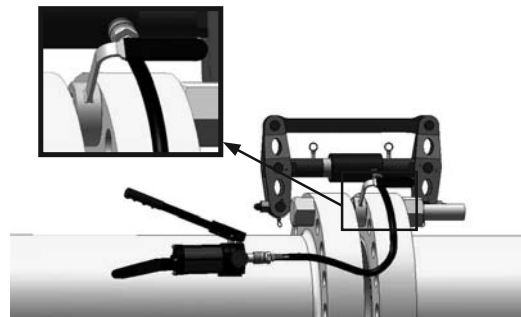
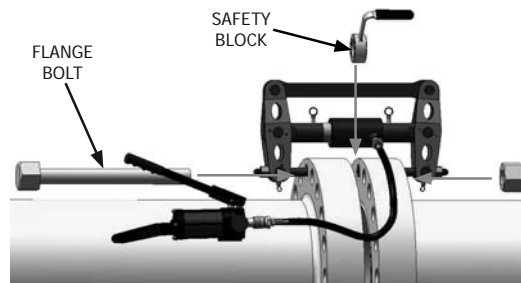


15. Continue spreading the flange until the access gap required is achieved, or until the maximum pressure or tool travel has been reached. If the flange does not spread refer to section 10

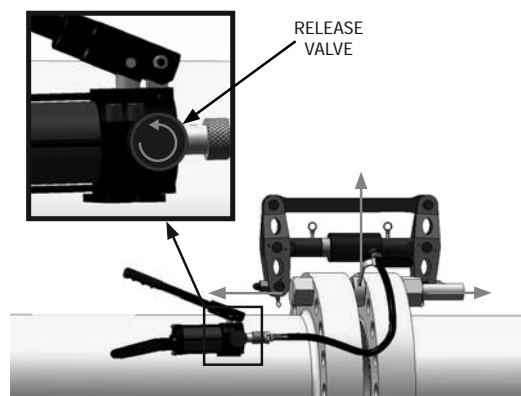
| Tool type | Max. distance |
|-----------|---------------|
| SG13TE | 115mm (4.53") |
| SG15TE | 100mm (3.94") |

| Pressure | Bar | 138 | 276 | 414 | 552 | 690 |
|------------------------|-----|------|------|------|------|--------|
| | psi | 2000 | 4000 | 6000 | 8000 | 10,000 |
| SG13TE spreading force | T | 2.6 | 5.2 | 7.8 | 10.4 | 13 |
| SG15TE spreading force | T | 3 | 6 | 9 | 12 | 15 |

16. Once the flange has been separated and prior to any maintenance works the safety blocks must be inserted between the flanges. These are held in position by replacing two of the flange bolts.



17. Following any maintenance works and prior to closing the flange joint, the safety block must be removed. The release valves on the hand pumps should now be turned anti-clockwise gently and evenly, adjusting as necessary to keep the flanges parallel until the flange is fully closed and there is no load on the tools. The tools can then be removed by reversing the installation procedure (steps 7 - 13)



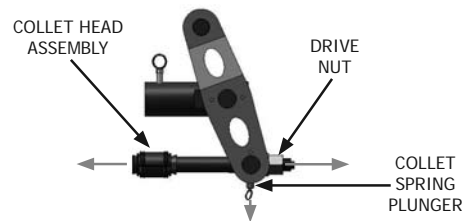


6.5 RESTRICTED ACCESS INSTALLATION AND OPERATION

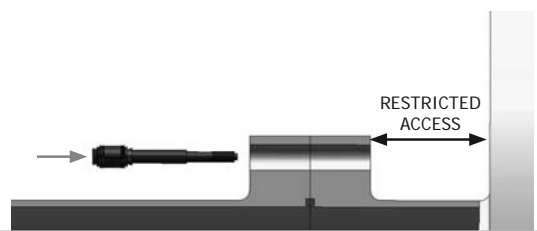
The Secure-Grip hydraulic tools are also ideal for use where access to the flange is restricted. As in the standard operation, two tools should be used in order to avoid flange distortion, with the tools positioned 180° from each other on the flange.

Before beginning the following procedure, complete steps 1 - 4 of the standard installation procedure (see section 6.4, pages 12-16)

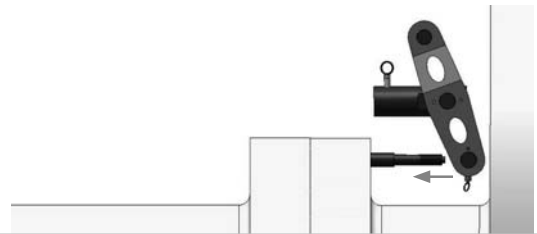
1. On one half of the tool unscrew and remove the drive nut. Pull the collet spring plunger ring out, and remove the collet head assembly from the tool



2. Pass the collet head assembly through both bolt-holes from the open access side



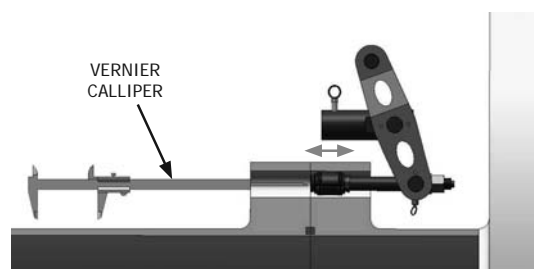
3. Refit the tool half on to the collet holder



4. Refit the drive nut



5. Measure the thickness of the flange with the vernier calliper provided and using the vernier calliper as a depth gauge, adjust the position of the collet until it touches the end of the depth gauge (so that the collet is fully through one flange but not entering the other)



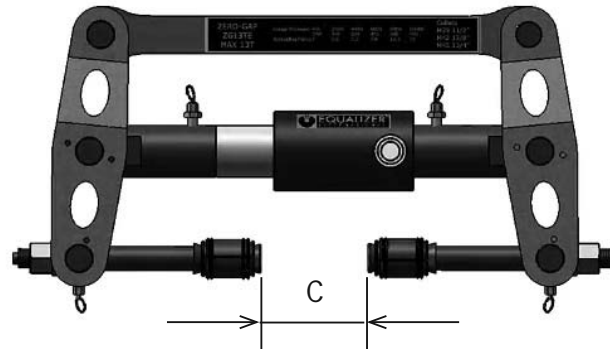
The procedure can now be completed by following steps 8 - 17 of the standard installation procedure (see section 6.4, pages 12-16)



6.6 VALVE, SPADE OR BLIND REMOVAL, INSTALLATION AND OPERATION

The Secure-Grip hydraulic tools are also ideal for the removal and insertion of blinds, spades and valves. Equalizer International can supply a short collet holder kit that will increase the relative stroke of the tool.

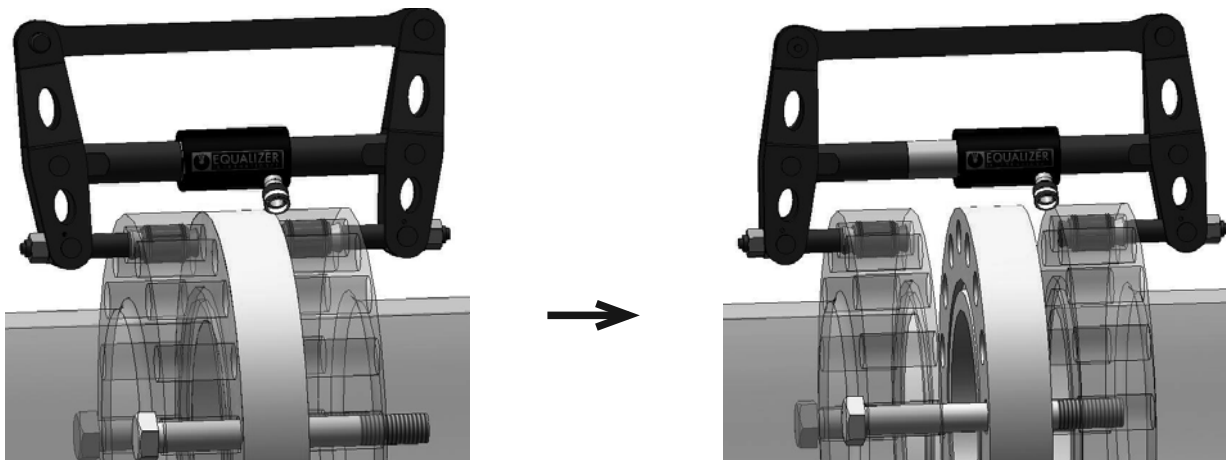
| TOOL | collet holder | C min | C Max |
|--------|---------------|--------------|---------------|
| SG13TE | standard | 0mm (0") | 115mm (4.5") |
| SG13TE | short | 60mm (2.36") | 175mm (6.89") |
| SG15TE | standard | 0mm (0") | 100mm (3.9") |
| SG15TE | short | 80mm (3.15") | 180mm (7.09") |



1. please refer to section 6.3 notes 1-4 for instruction on how to remove the standard collet holder and drive tube. These are then replaced with the short collet holders and short drive tube with the appropriate collet.



2. Please follow section 6.4 for instruction on how to attach and activated the secure-grip hydraulic tool.





7. MAINTENANCE AND LUBRICATION

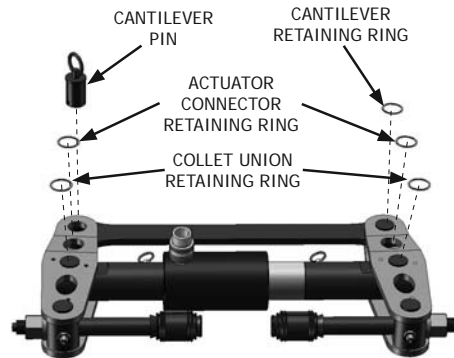
On return from each job and before allocation against subsequent work the completeness of the Equalizer Secure-Grip hydraulic tool kits must be established and items examined to ensure that they are serviceable.

At regular intervals and specifically after exposure to salt water Secure-Grip hydraulic tools should be dismantled and lubricated as follows:

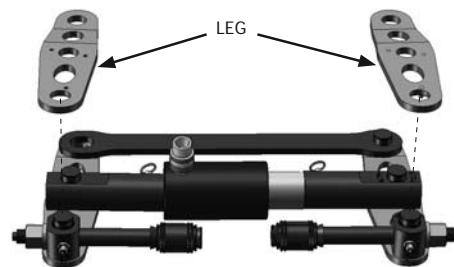
1. Lay the tool on a bench or flat surface



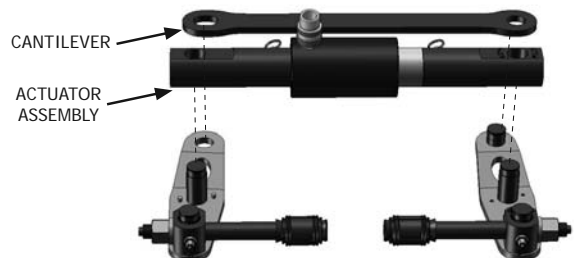
2. Remove the cantilever pin and remove the collet union, actuator connector and cantilever retaining rings. Care should be taken not to over stretch the retaining rings during removal or replacement



3. Lift the top leg on both sides from the tool

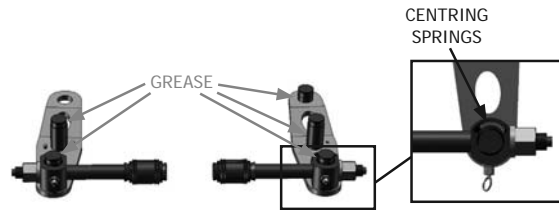


4. Lift the actuator assembly and the cantilever from the tool





5. The exposed parts of the tool can now be cleaned and lubricated. Care should be taken to ensure the centring springs do not jump out of their recess

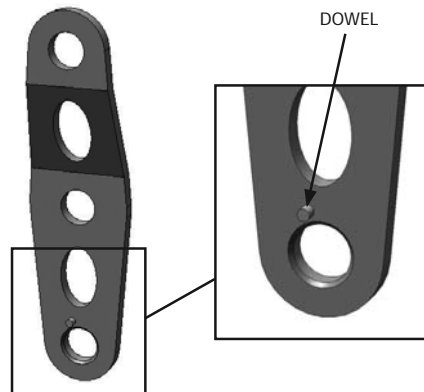


Note: it is recommended that the tool is wiped down with a clean rag and WD40 or similar cleaning fluid to remove any dirt or grit and then liberally greased with a high load bearing grease (Rocol sapphire high load 2 or similar) in the areas shown

6. The tool can now be reassembled by reversing the dismantling procedure



Note: care should be taken to ensure the dowel protruding from the right hand leg of the tool is engaged between the two centering springs



7. Once the tool is rebuilt, flip the tool over and repeat the above procedure with the other side of the tool

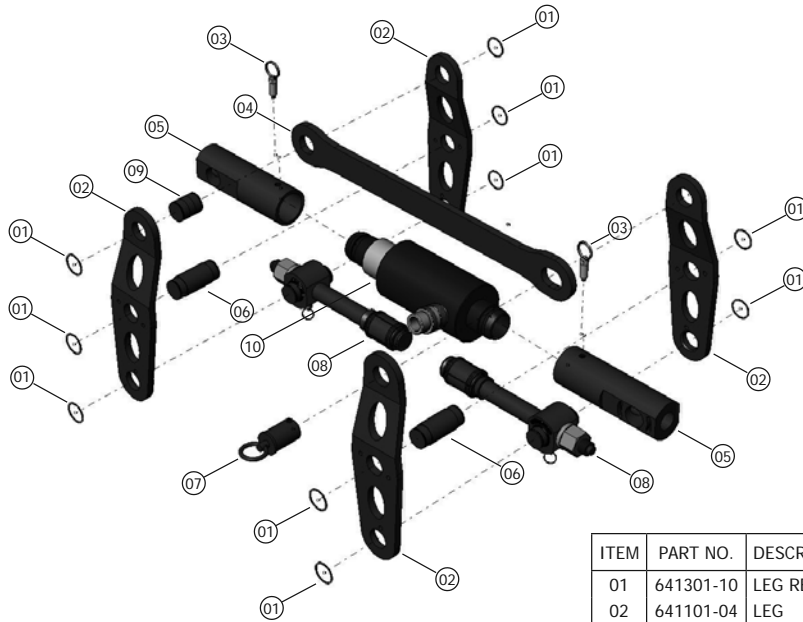


Note: if the actuator requires maintenance please refer to an authorised Equalizer distributor



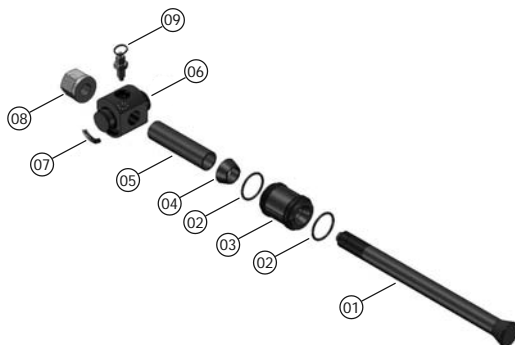
8. PARTS LISTS

SG13TE PARTS LIST



| ITEM | PART NO. | DESCRIPTION | QUANTITY |
|------|-----------|----------------------------|----------|
| 01 | 641301-10 | LEG RETAINING RING | 10 |
| 02 | 641101-04 | LEG | 04 |
| 03 | 900502-02 | M10 SPRING PLUNGER | 02 |
| 04 | 641501-01 | CANTILEVER | 01 |
| 05 | 641901-02 | ACTUATOR UNION | 02 |
| 06 | 641401-02 | ACTUATOR PIN | 02 |
| 07 | 641701-01 | PULL PIN | 01 |
| 08 | | SEE COLLET HEAD PARTS LIST | |
| 09 | 643201-01 | CANTILEVER PIN | 01 |
| 10 | 644001-01 | ACTUATOR ASSEMBLY | 01 |

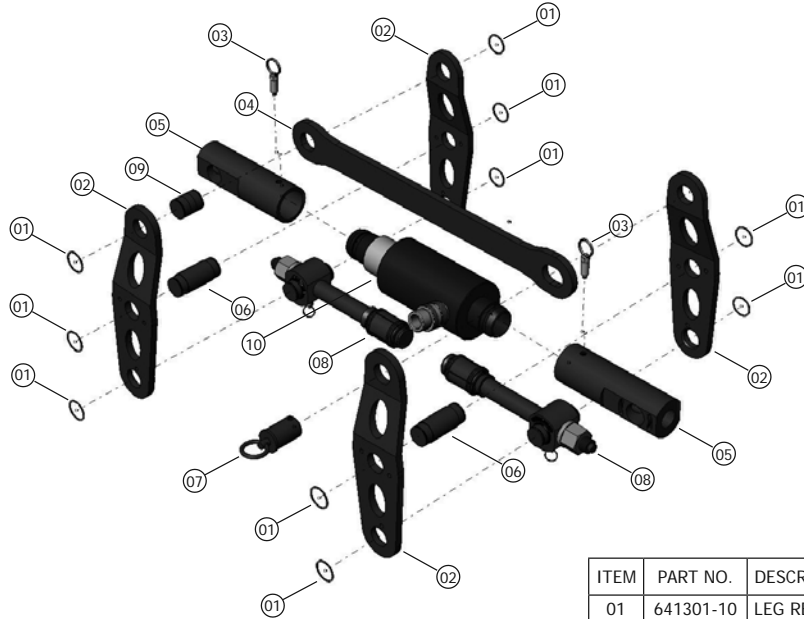
COLLET HEAD PARTS LIST



| ITEM | PART NO. | DESCRIPTION | QUANTITY |
|------|-----------|--------------------|----------|
| 01 | 640401-02 | COLLET HOLDER | 01 |
| 02 | 642201-04 | M39 SPRING RING | 04 |
| | 642401-04 | M42 SPRING RING | 04 |
| | 642601-04 | M45 SPRING RING | 04 |
| 03 | 640101-02 | M39 COLLET | 02 |
| | 640201-02 | M42 COLLET | 02 |
| | 640301-02 | M45 COLLET | 02 |
| 04 | 640501-02 | DRIVE CONE | 02 |
| 05 | 641601-02 | DRIVE TUBE | 02 |
| 06 | 640601-02 | COLLET UNION | 02 |
| 07 | 402201-02 | CENTRING SPRING 1 | 02 |
| 08 | 640901-02 | COLLET NUT | 02 |
| 09 | 641001-02 | M12 SPRING PLUNGER | 02 |

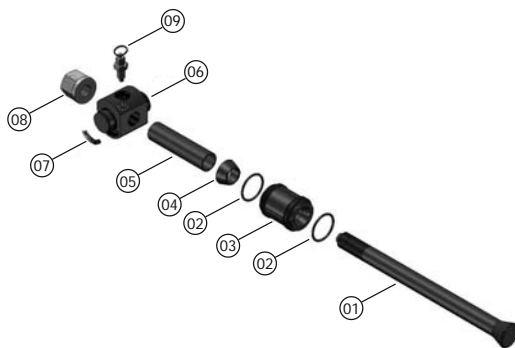


SG15TE PARTS LIST



| ITEM | PART NO. | DESCRIPTION | QUANTITY |
|------|-----------|----------------------------|----------|
| 01 | 641301-10 | LEG RETAINING RING | 10 |
| 02 | 651101-04 | LEG | 04 |
| 03 | 900502-02 | M10 SPRING PLUNGER | 02 |
| 04 | 651501-01 | CANTILEVER | 01 |
| 05 | 651901-02 | ACTUATOR UNION | 02 |
| 06 | 651401-02 | ACTUATOR PIN | 02 |
| 07 | 641701-01 | PULL PIN | 01 |
| 08 | | SEE COLLET HEAD PARTS LIST | |
| 09 | 643201-01 | CANTILEVER PIN | 01 |
| 10 | 644001-01 | ACTUATOR ASSEMBLY | 01 |

COLLET HEAD PARTS LIST



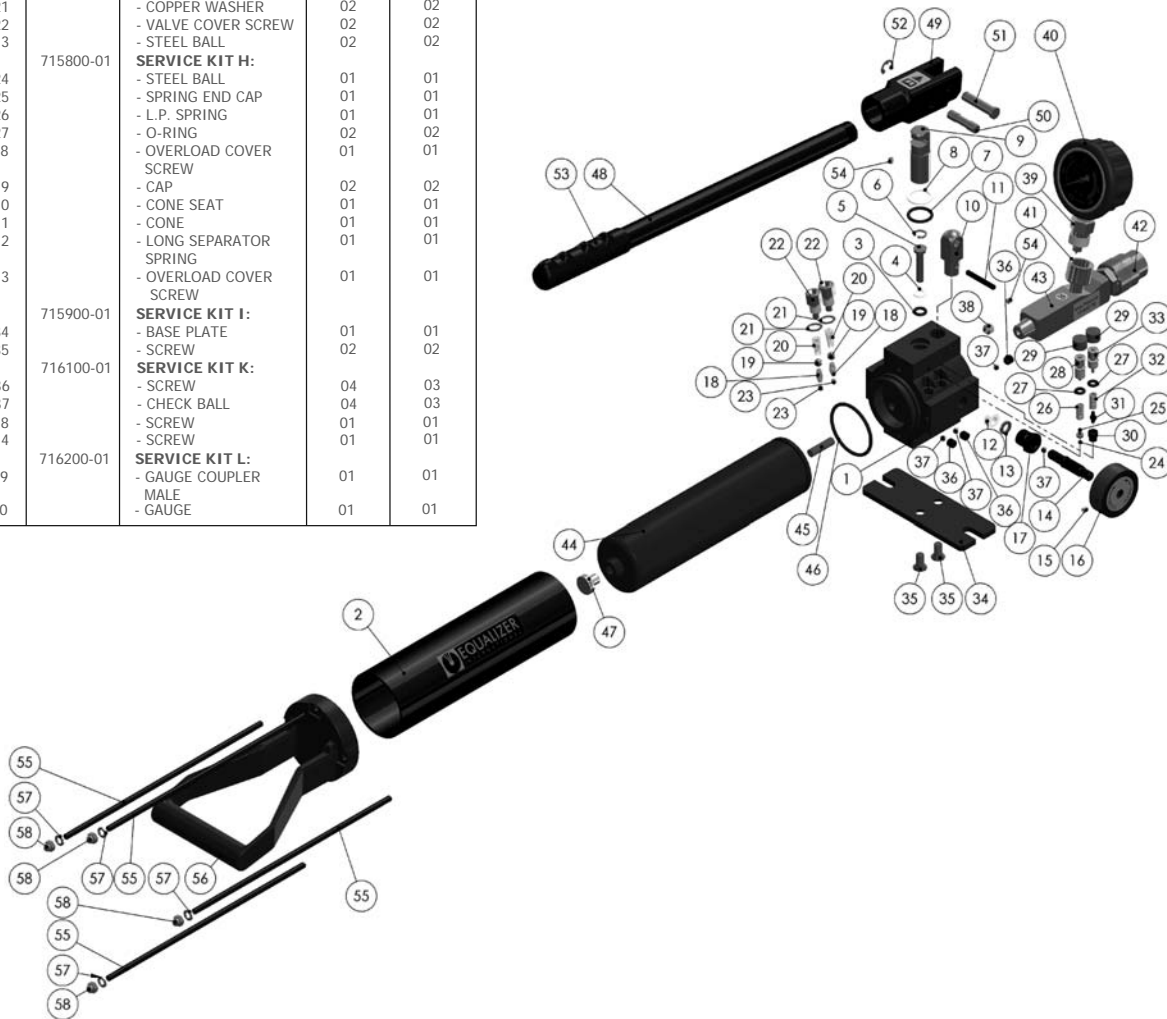
| ITEM | PART NO. | DESCRIPTION | QUANTITY |
|------|-----------|-----------------------|----------|
| 01 | 650401-01 | COLLET HOLDER | 01 |
| 02 | 652201-04 | M48 SPRING RING | 04 |
| | 652401-04 | M52 SPRING RING | 04 |
| | 652601-04 | M56 SPRING RING | 04 |
| 03 | 650101-02 | M48 COLLET | 02 |
| | 650201-02 | M52 COLLET | 02 |
| | 650301-02 | M56 COLLET | 02 |
| 04 | 650501-02 | DRIVE CONE | 02 |
| 05 | 651601-02 | DRIVE TUBE | 02 |
| 06 | 650601-02 | COLLET UNION | 02 |
| 07 | 402201-02 | CENTRING SPRING 1 | 02 |
| 08 | 650901-02 | COLLET NUT | 02 |
| 09 | 641001-02 | COLLET SPRING PLUNGER | 02 |



HP550S PARTS LIST

| ITEM | PART No. | DESCRIPTION | KIT QUANTITY | PUMP QUANTITY |
|------|-----------|-------------------------|--------------|---------------|
| 01 | 710101-01 | PUMP HOUSING | | 01 |
| 02 | 730601-01 | RESERVOIR | | 01 |
| | 715300-01 | SERVICE KIT C: | | |
| 03 | | - O-RING | 01 | 01 |
| 04 | | - BACK-UP RING | 01 | 01 |
| 05 | | - H.P. PISTON | 01 | 01 |
| 06 | | - SNAP RING | 01 | 01 |
| 07 | | - O-RING | 01 | 01 |
| 08 | | - BACK-UP RING | 01 | 01 |
| 09 | | - L.P. PISTON | 01 | 01 |
| 10 | 715500-01 | SERVICE KIT E: | | |
| 11 | | - YOKE BASE | 01 | 01 |
| | | - SPRING PIN | 01 | 01 |
| 12 | 715600-01 | SERVICE KIT F: | | |
| 13 | | - SEAL | 01 | 01 |
| 14 | | - WASHER | 01 | 01 |
| | | - RELEASE VALVE SCREW | 01 | 01 |
| 15 | | - SCREW | 01 | 01 |
| 16 | | - RELEASE KNOB | 01 | 01 |
| 17 | | - COUPLERS | 01 | 01 |
| 37 | | - CHECK BALL | 01 | 01 |
| 18 | 715700-01 | SERVICE KIT G: | | |
| 19 | | - SPRING | 02 | 02 |
| 20 | | - STEEL BALL | 02 | 02 |
| 21 | | - OUTLET BALL SPRING | 02 | 02 |
| 22 | | - COPPER WASHER | 02 | 02 |
| 23 | | - VALVE COVER SCREW | 02 | 02 |
| | | - STEEL BALL | 02 | 02 |
| 24 | 715800-01 | SERVICE KIT H: | | |
| 25 | | - STEEL BALL | 01 | 01 |
| 26 | | - SPRING END CAP | 01 | 01 |
| 27 | | - L.P. SPRING | 01 | 01 |
| 28 | | - O-RING | 02 | 02 |
| | | - OVERLOAD COVER SCREW | 01 | 01 |
| 29 | | - CAP | 02 | 02 |
| 30 | | - CONE SEAT | 01 | 01 |
| 31 | | - CONE | 01 | 01 |
| 32 | | - LONG SEPARATOR SPRING | 01 | 01 |
| 33 | | - OVERLOAD COVER SCREW | 01 | 01 |
| 34 | 715900-01 | SERVICE KIT I: | | |
| 35 | | - BASE PLATE | 01 | 01 |
| | | - SCREW | 02 | 02 |
| 36 | 716100-01 | SERVICE KIT K: | | |
| 37 | | - SCREW | 04 | 03 |
| 38 | | - CHECK BALL | 04 | 03 |
| 39 | | - SCREW | 01 | 01 |
| 54 | | - SCREW | 01 | 01 |
| 40 | 716200-01 | SERVICE KIT L: | | |
| | | - GAUGE COUPLER MALE | 01 | 01 |
| | | - GAUGE | 01 | 01 |

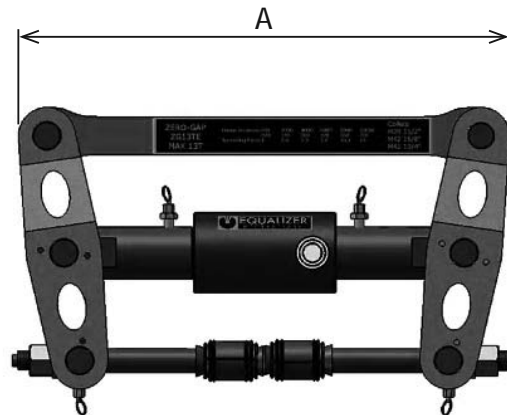
| ITEM | PART No. | DESCRIPTION | KIT QUANTITY | PUMP QUANTITY |
|------|-----------|------------------------|--------------|---------------|
| 41 | 716300-01 | SERVICE KIT M: | | |
| | | - GAUGE COUPLER FEMALE | 01 | 01 |
| 42 | | - COUPLER | 01 | 01 |
| 43 | | - PORT GAUGE ADAPTOR | 01 | 01 |
| 44 | 735100-01 | SERVICE KIT N: | | |
| 45 | | - RESERVOIR BLADDER | 01 | 01 |
| 46 | | - OIL FILTER | 01 | 01 |
| 47 | | - O-RING | 01 | 01 |
| | | - REFILLING PLUG | 01 | 01 |
| 48 | 735300-01 | SERVICE KIT O: | | |
| 49 | | - HANDLE | 01 | 01 |
| 50 | | - YOKE | 01 | 01 |
| 51 | | - PISTON PIN | 01 | 01 |
| 52 | | - YOKE PIN | 01 | 01 |
| 53 | | - RETAINING RING | 01 | 01 |
| 54 | | - HANDLE GRIP | 01 | 01 |
| | | - SCREW | 01 | 01 |
| 55 | 735200-01 | SERVICE KIT P: | | |
| 56 | | - SCREW | 04 | 04 |
| 57 | | - TAIL BASE | 01 | 01 |
| 58 | | - SPRING WASHER | 04 | 04 |
| | | - NUT | 04 | 04 |



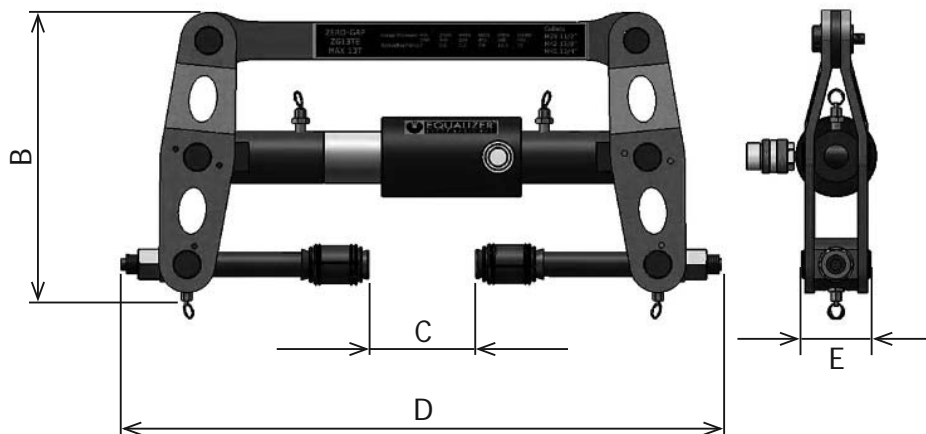


9. WEIGHTS AND DIMENSIONS

CLOSED TOOL DIMENSIONS



OPEN TOOL DIMENSIONS



| TOOL | A | B | C | D | E | TOOL WEIGHT | KIT WEIGHT |
|---------------|---------------|---------------|--------------|---------------|-------------|------------------|------------------|
| SG13TE | 516mm (20.3") | 314mm (12.4") | 115mm (4.5") | 630mm (24.8") | 72mm (2.9") | 21.5kg (47.3lbs) | 40.5kg (89.2lbs) |
| SG15TE | 600mm (23.6") | 380mm (15.0") | 100mm (3.9") | 720mm (28.4") | 80mm (3.2") | 26kg (57.3lbs) | 45kg (99.2lbs) |



10. TROUBLESHOOTING

Problem: Hoses are connected but the tool does not advance. The pressure on the pump handle is minimal.

- The release valve is in the retract (open) position
- Close the release valve

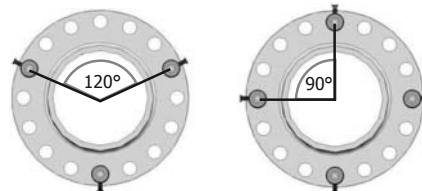


Problem: Hoses are connected and the pump quickly reaches maximum pressure but the tool has not advanced

- One or more of the connectors are not fully tightened and the hydraulic oil cannot pass through from the pump to the cylinder
- Check all connectors are fully tightened and the release valve is in the fully closed position

Problem: Hoses are connected and the tool advances with maximum pressure on the pump handle but the joint will not spread

- The pressure required to spread the joint is greater than that of the two tools you are using
- Add another one or two tools and distribute them equally around the joint (120° apart with 3 tools and 90° apart with 4 tools) and try again



Problem: Hoses are connected and the tool advances but there is minimal pressure on the pump handle and the handle is rising back of its own accord

- There is dirt or a damaged valve seat within the pump unit
- The pump should be sent to an authorised Equalizer distributor for repair



Problem: Hoses are connected and the tool advances as the pump is primed but the pressure on the pump handle is minimal and feels spongy

→ Air could be present in the hydraulic system

→ Use the airlock removal procedure as follows:

1. Connect the hand pump to the tool with the hydraulic hose
2. Close the release valve on the pump, and prime the pump until the hydraulic cylinder is fully extended and a small pressure is achieved
3. With the hand pump held above the tool and the tool in an upright position, open the release valve causing any air that is within the system to be forced up through the pump and vented into the oil reservoir
4. Repeat steps 1 - 3 three or four times to ensure that all air is removed from the system and the tool will reach full working pressure
5. Disconnect the hand pump from the hydraulic hose, grip the baseplate of the hand pump body in a vice with the pump body vertical and the main handle at the top
6. Remove the four nuts holding the main handle and lift off
7. Grip the refilling plug with pliers and extract it by pulling and twisting simultaneously. Ensure the reservoir body is held down when removing the refilling plug as pulling up on the reservoir body will release the bladder within, and oil will spill out.
8. Fill the reservoir to the top with a good quality hydraulic oil of the grade 15 cSt
9. Reinsert the refilling plug, wipe away any oil, and reassemble by reversing the disassembly process



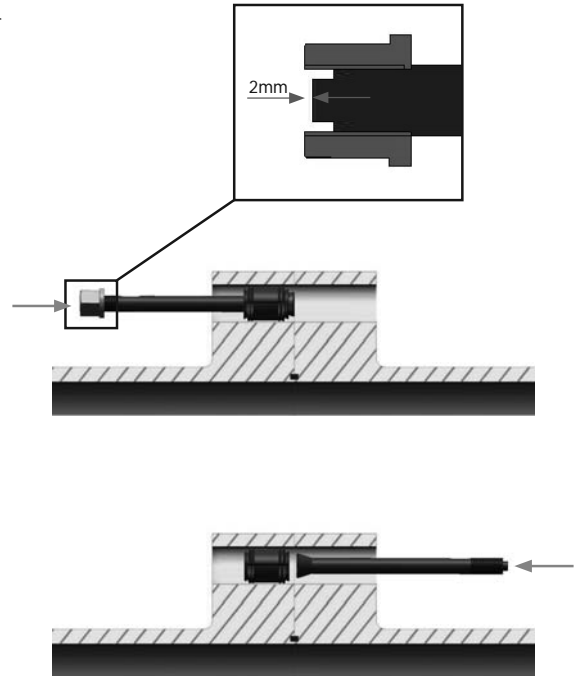


Problem: One collet is jammed in a bolt-hole

→ A collet which is too small or large has been selected, or the collet has been inserted into a damaged or non-round bolt-hole

→ Removal can be achieved as follows:

1. Pull the collet spring plunger ring out, and remove the rest of the tool, leaving the collet head assembly in the bolt hole
2. Unscrew the drive nut and remove the drive cone and collet cone
3. Screw the drive nut back onto the collet holder until it is 1-2mm off the end
4. Using a hammer and a suitable drift, move the collet holder until the drive nut is against the flange
5. Remove the drive nut and push the collet holder through the flange and out of the other end of the bolt-hole
6. Drive the collet out using the collet holder





Problem: A pair of collets are jammed in a bolt-hole

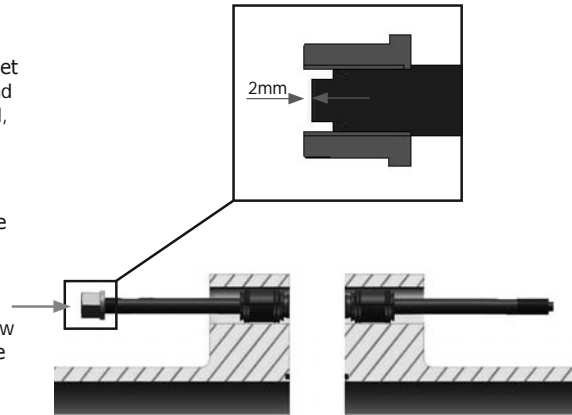
↳ A collet which is too small or large has been selected, or the collet has been inserted into a damaged or non-round bolt-hole

➔ The flange must be spread before removal can be attempted. This can be done using another pair of Secure-Grip tools, or another method if available. Removal can then be achieved as follows:

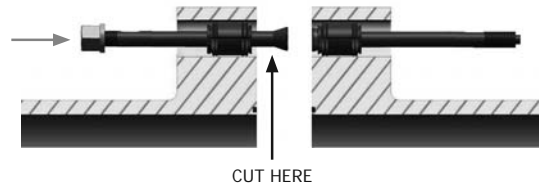
1. On both sides, pull the collet spring plunger ring out, and remove the rest of the tool, leaving the collet head assemblies in the bolt-hole

2. On both sides, unscrew the drive nut and remove the drive cone and collet cone

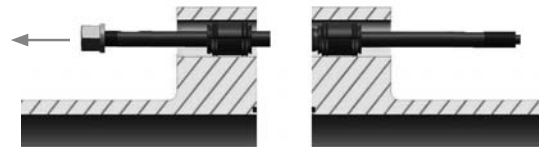
3. On the left-hand side, screw the drive nut back onto the collet holder until it is 1-2mm off the end



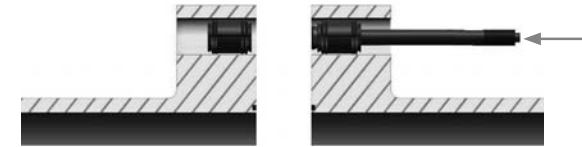
4. Using a hammer and a suitable drift, move the collet holder until it is possible to cut off the tapered end of the collet holder



5. Cut off the tapered end with a hack saw or other cutting tool

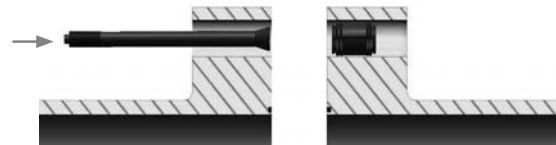


6. Withdraw the collet holder from the bolt-hole



7. Using a hammer and a suitable drift, move the collet holder on the right-hand side up to the left-hand side collet and drive it out

8. Drive the right-hand side collet out using the collet holder





11. SECURE-GRIP TOOL RANGE

| Collet identification | Tool type | Operation type | SWL (ton) | Min. bolt-hole diameter | Max. bolt-hole diameter |
|-----------------------|-----------|-------------------|-----------|-------------------------|-------------------------|
| M16 5/8" | SG4TM | manual | 4 | 17.5 | 19.5 |
| M20 3/4" | SG4TM | manual | 4 | 20.5 | 23 |
| M24 7/8" | SG6TM | manual | 6 | 24 | 26.5 |
| M27 1" | SG6TM | manual | 6 | 27.5 | 30 |
| M30 1 1/8" | SG11TM | manual | 11 | 30 | 33 |
| M33 1 1/4" | SG11TM | manual | 11 | 32 | 36 |
| M36 1 3/8" | SG11TM | manual | 11 | 35 | 39 |
| M39 1 1/2" | SG13TE | hydraulic | 13 | 38 | 42 |
| M42 1 5/8" | SG13TE | hydraulic | 13 | 41 | 45 |
| M45 1 3/4" | SG13TE | hydraulic | 13 | 44 | 49 |
| M48 1 7/8" | SG15TE | hydraulic | 15 | 47.5 | 52 |
| M52 2" | SG15TE | hydraulic | 15 | 50.5 | 56 |
| M56 2 1/4" | SG15TE | hydraulic | 15 | 55.5 | 62 |
| M60 | SG18TE | in-line hydraulic | 18 | 59.5 | 63 |
| M64 2 1/2" | SG18TE | in-line hydraulic | 18 | 63 | 69 |
| M70 2 3/4" | SG18TE | in-line hydraulic | 18 | 69 | 75 |
| M76 3" | SG25TE | in-line hydraulic | 25 | 75 | 81 |
| M80 3 1/4" | SG25TE | in-line hydraulic | 25 | 79 | 86 |
| M84 | SG25TE | in-line hydraulic | 25 | 83 | 88 |
| M90 3 1/2" | SG25TE | in-line hydraulic | 25 | 88 | 94 |
| M95 3 3/4" | SG25TE | in-line hydraulic | 25 | 94 | 101 |
| M100 4" | SG25TE | in-line hydraulic | 25 | 99 | 107 |



12. RANGE OF APPLICATION CHARTS

Use the charts on the following pages to determine which Secure-Grip tool (and which collet size) is suitable for a particular flange.

The charts are categorised as per flange type.

| | | | |
|-------------|------------------------------|---|-------------|
| SPO | | → | see page 29 |
| ANSI | compact | → | see page 30 |
| | orifice | → | see page 30 |
| | reducing | → | see page 31 |
| DIN | blind | → | see page 32 |
| | threaded | → | see page 32 |
| | weldneck | → | see page 33 |
| | flat | → | see page 33 |
| | lapped | → | see page 33 |
| ASME | series A weld neck | → | see page 34 |
| | series A lapped | → | see page 35 |
| | series A socket welded | → | see page 35 |
| | series B weld neck and blind | → | see page 35 |
| API | 6B weld neck | → | see page 36 |
| | 6B blind and threaded | → | see page 36 |
| | 6BX weld neck | → | see page 36 |
| | 6BX blind and test | → | see page 36 |
| BS | | → | see page 37 |



SPO

| Nominal pipe size | Class | | | | | | | | | | | | | | | |
|-------------------|----------|-------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|------------|--------|--------|
| | 150 | | 300 | | 600 | | 900 | | 1500 | | 2500 | | 4500i | | | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | | |
| 1 1/2" | | | | | | | | | | | | | | M16 5/8" | SG4TM | |
| 2" | | | | | | | | | | | | | | M16 5/8" | SG4TM | |
| 2 1/2" | | | | | | | | | | | | | | M20 3/4" | SG4TM | |
| 3" | | | | | | | | | | | | | | M24 7/8" | SG6TM | |
| 4" | | | | | | | | | | | | | | M27 1" | SG6TM | |
| 5" | | | | | | | | | | | | | | M30 1 1/8" | SG11TM | |
| 6" | | | | | | | | | | | | | | M33 1 1/4" | SG11TM | |
| 8" | | | | | | | | | | | | | | M39 1 1/2" | SG13TE | |
| 10" | | | | | | | | | | | | | | M48 1 7/8" | SG15TE | |
| 12" | | | | | | | | | | | | | | M52 2" | SG15TE | |
| 14" | | | | | | | | | | | | | | M60 | SG18TE | |
| 16" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M84 | SG25TE |
| 18" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M84 | SG25TE |
| 20" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M84 | SG25TE |
| 22" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M84 | SG25TE |
| 24" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M60 | SG18TE | M70 2 3/4" | SG18TE | | |
| 26" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M60 | SG18TE | M70 2 3/4" | SG18TE | | |
| 28" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M60 | SG18TE | M70 2 3/4" | SG18TE | | |
| 30" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M60 | SG18TE | M70 2 3/4" | SG18TE | | |
| 32" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M60 | SG18TE | M70 2 3/4" | SG18TE | | |
| 34" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M60 | SG18TE | M70 2 3/4" | SG18TE | | |
| 36" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |
| 38" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |
| 40" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |
| 42" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |
| 44" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |
| 46" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |
| 48" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M60 | SG18TE | M84 | SG25TE | | | | | | |



ANSI compact

| Nominal pipe size | Class | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | 300 | | 600 | | 900 | | 1500 | | 2500 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool |
| 1" | no flange | | no flange | | no flange | | no flange | | no flange | |
| 1 1/2" | | | | | | | | | | |
| 2" | | | | | | | | | M16 5/8" | SG4TM |
| 2 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM |
| 3" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 4" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 5" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM |
| 6" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM |
| 8" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M36 1 3/8" | SG11TM |
| 10" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M45 1 3/4" | SG13TE |
| 12" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE |
| 14" | M20 3/4" | SG4TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE |
| 16" | M20 3/4" | SG4TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M52 2" | SG15TE |
| 18" | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE |
| 20" | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M52 2" | SG15TE | M64 2 1/2" | SG18TE |
| 24" | M30 1 1/8" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M64 2 1/2" | SG18TE |
| 30" | M27 1" | SG6TM | M42 1 5/8" | SG13TE | M56 2 1/4" | SG15TE | M70 2 3/4" | SG18TE | | |
| 36" | M30 1 1/8" | SG11TM | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M76 3" | SG25TE | | |
| 40" | M30 1 1/8" | SG11TM | M52 2" | SG15TE | M64 2 1/2" | SG18TE | M84 | SG25TE | | |

ANSI orifice

| Nominal pipe size | Class | | | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | 300 | | 400 | | 600 | | 900 | | 1500 | | 2500 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | | |
| 1" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 1 1/2" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 2 1/2" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM |
| 3" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM |
| 4" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE |
| 6" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE |
| 8" | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M52 2" | SG15TE |
| 10" | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE |
| 12" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE | M70 2 3/4" | SG18TE |
| 14" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M56 2 1/4" | SG15TE | | |
| 16" | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M64 2 1/2" | SG18TE | | |
| 18" | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | | |
| 20" | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M52 2" | SG15TE | M76 3" | SG25TE | | |
| 24" | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M90 3 1/2" | SG25TE | | |



ANSI reducing

| Nominal pipe size | Class | | | | | | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|-----------|------------|-----------|------------|-----------|-------|
| | 150 | | 300 | | 400 | | 600 | | 900 | | 1500 | | 2500 | | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | |
| 1/2" | | | | | | | | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 3/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | |
| 1" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | |
| 1 1/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM | |
| 1 1/2" | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM | |
| 2 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | |
| 3" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | |
| 3 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | no flange | no flange | no flange | no flange | no flange | no flange | |
| 4" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | |
| 5" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | |
| 6" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE | |
| 8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M52 2" | SG15TE | |
| 10" | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | |
| 12" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE | M70 2 3/4" | SG18TE | |
| 14" | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M56 2 1/4" | SG15TE | | | |
| 16" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M64 2 1/2" | SG18TE | | | |
| 18" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | | | |
| 20" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M52 2" | SG15TE | M76 3" | SG25TE | | | |
| 22" | no flange | | no flange | | no flange | | no flange | | no flange | | no flange | | | | |
| 24" | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M90 3 1/2" | SG25TE | | | |
| 26" | M33 1 1/4" | SG11TM | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | | | | | |
| 28" | M33 1 1/4" | SG11TM | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M52 2" | SG15TE | M76 3" | SG25TE | | | | | |
| 30" | M33 1 1/4" | SG11TM | M45 1 3/4" | SG13TE | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M76 3" | SG25TE | | | | | |
| 32" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M56 2 1/4" | SG15TE | M84 | SG25TE | | | | | |
| 34" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 36" | M39 1 1/2" | SG13TE | M52 2" | SG15TE | M52 2" | SG15TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 38" | M39 1 1/2" | SG13TE | M39 1 1/2" | SG13TE | M39 1 1/2" | SG13TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 40" | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 42" | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 44" | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M95 3 3/4" | SG25TE | | | | | |
| 46" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M56 2 1/4" | SG15TE | M100 4" | SG25TE | | | | | |
| 48" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | M100 4" | SG25TE | | | | | |



DIN blind

| Nominal pipe size | Class | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | PN16 | | PN25 | | PN40 | | PN64 | | PN100 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool |
| 3/4" | | | | | | | no flange | | no flange | |
| 1" | | | | | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 1 1/4" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 1 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 2 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 3" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 4" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 5" | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM |
| 6" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM |
| 7" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM |
| 8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM |
| 10" | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM |
| 12" | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE |
| 14" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE |
| 16" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | | |
| 20" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | | | | |

DIN threaded

| Nominal pipe size | Class | | | | | | | | | |
|-------------------|----------|-------|----------|-------|----------|-------|------------|--------|------------|--------|
| | PN16 | | PN25 | | PN40 | | PN64 | | PN100 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool |
| 3/4" | | | | | | | | | M16 5/8" | SG4TM |
| 1" | | | | | | | | | M16 5/8" | SG4TM |
| 1 1/4" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 1 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 2 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 3" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 4" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 5" | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM |
| 6" | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM |



DIN weldneck

| Nominal pipe size | Class | | | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | PN16 | | PN25 | | PN40 | | PN64 | | PN100 | | PN160 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool |
| 1" | | | | | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 1 1/4" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | | | | | | |
| 1 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 2 1/2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 3" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 4" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M27 1" | SG6TM |
| 5" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM |
| 6" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM |
| 7" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M20 3/4" | SG4TM | M30 1 1/8" | SG11TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM |
| 8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M20 3/4" | SG4TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM |
| 10" | M24 7/8" | SG6TM | M27 1" | SG6TM | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE |
| 12" | M24 7/8" | SG6TM | M27 1" | SG6TM | M24 7/8" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M39 1 1/2" | SG13TE |
| 14" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M24 7/8" | SG6TM | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE | | |
| 16" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M27 1" | SG6TM | M39 1 1/2" | SG13TE | | | | |
| 18" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M27 1" | SG6TM | | | | | | |
| 20" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M30 1 1/8" | SG11TM | | | | | | |
| 24" | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | | | | | | | | |
| 28" | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | | | | | | | | |
| 32" | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE | | | | | | | | |
| 36" | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE | | | | | | | | |
| 40" | M39 1 1/2" | SG13TE | M52 2" | SG15TE | | | | | | | | |
| 48" | M45 1 3/4" | SG13TE | | | | | | | | | | |
| 56" | M45 1 3/4" | SG13TE | | | | | | | | | | |
| 64" | M52 2" | SG15TE | | | | | | | | | | |
| 72" | M52 2" | SG15TE | | | | | | | | | | |
| 80" | M56 2 1/4" | SG15TE | | | | | | | | | | |

DIN flat

| Nominal pipe size | Class | | | |
|-------------------|----------|-------|----------|-------|
| | PN6 | | PN10 | |
| | collet | tool | collet | tool |
| 1 1/4" | | | M16 5/8" | SG4TM |
| 1 1/2" | | | M16 5/8" | SG4TM |
| 2" | | | M16 5/8" | SG4TM |
| 2 1/2" | | | M16 5/8" | SG4TM |
| 3" | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 4" | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 5" | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 6" | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 8" | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 10" | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 12" | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 14" | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 16" | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 18" | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 20" | M20 3/4" | SG4TM | M24 7/8" | SG6TM |

DIN lapped

| Nominal pipe size | Class | | | |
|-------------------|----------|-------|------------|--------|
| | PN6 | | PN10 | |
| | collet | tool | collet | tool |
| 1 1/4" | | | M16 5/8" | SG4TM |
| 1 1/2" | | | M16 5/8" | SG4TM |
| 2" | | | M16 5/8" | SG4TM |
| 2 1/2" | | | M16 5/8" | SG4TM |
| 3" | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 4" | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 5" | M16 5/8" | SG4TM | M16 5/8" | SG4TM |
| 6" | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 8" | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 10" | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 12" | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 14" | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 16" | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 18" | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 20" | M20 3/4" | SG4TM | M24 7/8" | SG6TM |
| 24" | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 28" | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 32" | M27 1" | SG6TM | M30 1 1/8" | SG11TM |
| 36" | M27 1" | SG6TM | | |
| 40" | M27 1" | SG6TM | | |



ASME series A weld neck

| Nominal pipe size | Class | | | | | | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|----------|------------|----------|------------|----------|-------|
| | 150 | | 300 | | 400 | | 600 | | 900 | | 1500 | | 2500 | | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | |
| 1/2" | | | | | | | | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 3/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | |
| 1" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | |
| 1 1/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM | |
| 1 1/2" | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM | |
| 2 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | |
| 3" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | |
| 3 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | | | | | | | |
| 4" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | |
| 5" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | |
| 6" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE | |
| 8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M52 2" | SG15TE | |
| 10" | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | |
| 12" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE | M70 2 3/4" | SG18TE | |
| 14" | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M56 2 1/4" | SG15TE | | | |
| 16" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M64 2 1/2" | SG18TE | | | |
| 18" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | | | |
| 20" | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M52 2" | SG15TE | M76 3" | SG25TE | | | |
| 22" | | | | | | | | | | | | | | | |
| 24" | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE | M90 3 1/2" | SG25TE | | | |
| 26" | M33 1 1/4" | SG11TM | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | | | | | |
| 28" | M33 1 1/4" | SG11TM | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M52 2" | SG15TE | M76 3" | SG25TE | | | | | |
| 30" | M33 1 1/4" | SG11TM | M45 1 3/4" | SG13TE | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M76 3" | SG25TE | | | | | |
| 32" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M56 2 1/4" | SG15TE | M84 | SG25TE | | | | | |
| 34" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 36" | M39 1 1/2" | SG13TE | M52 2" | SG15TE | M52 2" | SG15TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 38" | M39 1 1/2" | SG13TE | M39 1 1/2" | SG13TE | M39 1 1/2" | SG13TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 40" | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 42" | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M42 1 5/8" | SG13TE | M56 2 1/4" | SG15TE | M90 3 1/2" | SG25TE | | | | | |
| 44" | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M95 3 3/4" | SG25TE | | | | | |
| 46" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M56 2 1/4" | SG15TE | M100 4" | SG25TE | | | | | |
| 48" | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M48 1 7/8" | SG15TE | M70 2 3/4" | SG18TE | M100 4" | SG25TE | | | | | |



ASME series A lapped

| Nominal pipe size | Class | | | | | | | | | | | | | |
|-------------------|----------|-------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | 150 | | 300 | | 400 | | 600 | | 900 | | 1500 | | 2500 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool |
| 1/2" | | | | | | | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 3/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM |
| 1" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 1 1/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 1 1/2" | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 2 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM |
| 3" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM |
| 3 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | no flange | | no flange | | no flange | |
| 4" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE |
| 5" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE |
| 6" | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE |
| 8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M52 2" | SG15TE |
| 10" | M24 7/8" | SG6TM | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE | M64 2 1/2" | SG18TE |
| 12" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M52 2" | SG15TE | M70 2 3/4" | SG18TE |

ASME series A socket welded

| Nominal pipe size | Class | | | | | | | |
|-------------------|----------|-------|----------|-------|----------|-------|----------|-------|
| | 150 | | 300 | | 600 | | 1500 | |
| | collet | tool | collet | tool | collet | tool | collet | tool |
| 1/2" | | | | | | | M20 3/4" | SG4TM |
| 3/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M20 3/4" | SG4TM |
| 1" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM |
| 1 1/4" | | | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM |
| 1 1/2" | | | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM |
| 2" | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M16 5/8" | SG4TM | M24 7/8" | SG6TM |
| 2 1/2" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | M27 1" | SG6TM |
| 3" | M16 5/8" | SG4TM | M20 3/4" | SG4TM | M20 3/4" | SG4TM | | |

ASME series B weld neck and blind

| Nominal pipe size | Class | | | | | | | | | |
|-------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | 150 | | 300 | | 400 | | 600 | | 900 | |
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool |
| 26" | M20 3/4" | SG4TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE | M64 2 1/2" | SG18TE |
| 28" | M20 3/4" | SG4TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE | M45 1 3/4" | SG13TE | M70 2 3/4" | SG18TE |
| 30" | M20 3/4" | SG4TM | M36 1 3/8" | SG11TM | M39 1 1/2" | SG13TE | M48 1 7/8" | SG15TE | M76 3" | SG25TE |
| 32" | M20 3/4" | SG4TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M52 2" | SG15TE | M76 3" | SG25TE |
| 34" | M24 7/8" | SG6TM | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | M56 2 1/4" | SG15TE | M80 3 1/4" | SG25TE |
| 36" | M24 7/8" | SG6TM | M42 1 5/8" | SG13TE | M45 1 3/4" | SG13TE | M56 2 1/4" | SG15TE | M76 3" | SG25TE |
| 42" | M27 1" | SG6TM | M45 1 3/4" | SG13TE | | | | | | |
| 48" | M30 1 1/8" | SG11TM | M48 1 7/8" | SG15TE | | | | | | |
| 54" | M30 1 1/8" | SG11TM | M48 1 7/8" | SG15TE | | | | | | |
| 60" | M33 1 1/4" | SG11TM | M56 2 1/4" | SG15TE | | | | | | |



API 6B weld neck

| Nominal pipe size | Class | | | | | |
|-------------------|--------------------|--------|--------------------|--------|--------------------|--------|
| | 138 bar (2000 psi) | | 207 bar (3000 psi) | | 345 bar (5000 psi) | |
| | collet | tool | collet | tool | collet | tool |
| 2 1/16" | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 2 9/16" | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM |
| 3 1/8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM |
| 4 1/16" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM |
| 5 1/8" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE |
| 7 1/16" | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM |
| 9" | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE |
| 11" | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE |

API 6B blind and threaded

| Nominal pipe size | Class | | | | | |
|-------------------|--------------------|--------|--------------------|--------|--------------------|--------|
| | 138 bar (2000 psi) | | 207 bar (3000 psi) | | 345 bar (5000 psi) | |
| | collet | tool | collet | tool | collet | tool |
| 2 1/16" | M16 5/8" | SG4TM | M24 7/8" | SG6TM | M24 7/8" | SG6TM |
| 2 9/16" | M20 3/4" | SG4TM | M27 1" | SG6TM | M27 1" | SG6TM |
| 3 1/8" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM |
| 4 1/16" | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM | M33 1 1/4" | SG11TM |
| 5 1/8" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M39 1 1/2" | SG13TE |
| 7 1/16" | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM |
| 9" | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M42 1 5/8" | SG13TE |
| 11" | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | M48 1 7/8" | SG15TE |
| 13 5/8" | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM | | |
| 16 3/4" | M39 1 1/2" | SG13TE | M42 1 5/8" | SG13TE | | |
| 21 1/4" | M42 1 5/8" | SG13TE | M52 2" | SG15TE | | |

API 6BX weld neck

| Nominal pipe size | Class | | | | | |
|-------------------|---------------------|--------|----------------------|--------|----------------------|--------|
| | 690 bar (10000 psi) | | 1035 bar (15000 psi) | | 1380 bar (20000 psi) | |
| | collet | tool | collet | tool | collet | tool |
| 1 13/16" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 2 1/16" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM |
| 2 9/16" | M24 7/8" | SG6TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM |
| 3 1/16" | M27 1" | SG6TM | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM |
| 4 1/16" | M30 1 1/8" | SG11TM | M36 1 3/8" | SG11TM | M45 1 3/4" | SG13TE |
| 5 1/8" | M30 1 1/8" | SG11TM | | | | |
| 7 1/16" | M39 1 1/2" | SG13TE | M39 1 1/2" | SG13TE | M52 2" | SG15TE |
| 9" | M39 1 1/2" | SG13TE | | | | |
| 11" | M45 1 3/4" | SG13TE | | | | |
| 13 5/8" | M48 1 7/8" | SG15TE | | | | |
| 16 3/4" | M48 1 7/8" | SG15TE | | | | |

API 6BX blind and test

| Nominal pipe size | Class | | | | | |
|-------------------|---------------------|--------|----------------------|--------|----------------------|--------|
| | 690 bar (10000 psi) | | 1035 bar (15000 psi) | | 1380 bar (20000 psi) | |
| | collet | tool | collet | tool | collet | tool |
| 1 13/16" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M27 1" | SG6TM |
| 2 1/16" | M20 3/4" | SG4TM | M24 7/8" | SG6TM | M30 1 1/8" | SG11TM |
| 2 9/16" | M24 7/8" | SG6TM | M27 1" | SG6TM | M33 1 1/4" | SG11TM |
| 3 1/16" | M27 1" | SG6TM | M33 1 1/4" | SG11TM | M36 1 3/8" | SG11TM |
| 4 1/16" | M30 1 1/8" | SG11TM | M42 1 5/8" | SG13TE | M45 1 3/4" | SG13TE |



BS APPLICATION CHART

| Nominal pipe size | A | | D | | E | | F | | H | | J | | K | | R | | S | | T | | |
|-------------------|--------|------|--------|------|--------|------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--|
| | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | collet | tool | |
| 1/2" | | | | | | | | | | | | | | | | | | | | | |
| 3/4" | | | | | | | | | | | | | | | | | | | | | |
| 1" | | | | | | | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | |
| 1 1/4" | | | | | | | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | |
| 1 1/2" | | | | | | | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | |
| 2" | | | | | | | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | | M20 3/4" | | M20 3/4" | | M20 3/4" | |
| 2 1/2" | | | | | | | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | |
| 3" | | | | | | | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | |
| 3 1/2" | | | | | | | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | |
| 4" | | | | | | | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M27 1" | | M27 1" | |
| 4 1/2" | | | | | | | | M16 5/8" | | M16 5/8" | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M27 1" | | M27 1" | |
| 5" | | | | | | | | M16 5/8" | | M20 3/4" | | M24 7/8" | | M24 7/8" | | M24 7/8" | | M24 7/8" | | M30 1 1/8" | |
| 6" | | | | | | | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | | M24 7/8" | | M27 1" | | M30 1 1/8" | |
| 7" | | | | | | | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M30 1 1/8" | |
| 8" | | | | | | | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M33 1 1/4" | |
| 8 1/2" | | | | | | | | M20 3/4" | | M20 3/4" | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M33 1 1/4" | |
| 9" | | | | | | | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M27 1" | | M27 1" | | M30 1 1/8" | |
| 10" | | | | | | | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M27 1" | | M27 1" | | M30 1 1/8" | |
| 11" | | | | | | | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M27 1" | | M27 1" | | M33 1 1/4" | |
| 12" | | | | | | | | M24 7/8" | | M24 7/8" | | M27 1" | | M27 1" | | M27 1" | | M27 1" | | M33 1 1/4" | |
| 13" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 14" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 15" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 16" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 17" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 18" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 19" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 20" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 21" | | | | | | | | M24 7/8" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 22" | | | | | | | | M27 1" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 23" | | | | | | | | M27 1" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 24" | | | | | | | | M27 1" | | M27 1" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M30 1 1/8" | | M39 1 1/2" | |
| 26" | | | | | | | | no flange | | no flange | | no flange | | no flange | | no flange | | no flange | | M52 2" | |
| 27" | | | | | | | | M30 1 1/8" | | M30 1 1/8" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 29" | | | | | | | | M30 1 1/8" | | M30 1 1/8" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 30" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 33" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 35" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 36" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 39" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 42" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 45" | | | | | | | | M39 1 1/2" | | M39 1 1/2" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M33 1 1/4" | | M39 1 1/2" | |
| 48" | | | | | | | | M64 2 1/2" | | M64 2 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 54" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 60" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 66" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 72" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 78" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 84" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 96" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 108" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |
| 120" | | | | | | | | M90 3 1/2" | | M90 3 1/2" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M36 1 3/8" | | M39 1 1/2" | |