

1.0	SPECIFICATION FOR REPAIR CLAMPS
2.0	SPECIFICATION FOR UNDER PRESSURE TAPPING TEES
3.0	SPECIFICATION FOR SMALL DIAMETER COUPLINGS AND FLANGE ADAPTORS (OD<350 MM)

TABLE OF CONTENTS

1.0	Specification for Repair Clamps	Page 1 - 2
2.0	Specification for Under Pressure Tapping Tees	Page 3 - 4
3.0	Specification for Small Diameter Couplings and Flange Adaptors (OD < 350 mm)	Page 5 - 9

1.0 SPECIFICATION FOR REPAIR CLAMPS

Specification for Repair Clamps

This specification covers Mechanical Sealing Repair Clamps, double band with EPDM rubber to repair holes, cracks or other damages on PE pipes.

1. Scope

2. General Requirements

Double Band Repair Clamps

a. Band or shell shall be of the O.D size range and length specified. Band shall be of Type 304 stainless steel.

b. Bolt retainer assembly or lugs shall be of a type 304 stainless steel and of a non-welded design. Lugs may be cast, forged or cold formed of type 304 stainless steel, and may include a high impact polycarbonate plastic, non-corrosive retainer. Lug design shall be such that the band fully compresses the gasket to the complete working width of the Repair Clamp without deformation of the band.

c. All nuts and bolts shall be 304- stainless steel and coated with an anti-seize coating such as a non-seize zinc coating to prevent galling.

d. Waflle Gasket or Seal shall provide a 360° sealing surface and of such size and shape to provide an adequate compressive force against the pipe after assembling to affect a positive seal under all combinations of joint and gasket tolerances. Materials shall be of elastomeric materials conform to BSEN 681-1 and material properties conforming to Table 2 of BSEN 681- 1.A heavy gauge Type 304 stainless Steel bridge plate shall be vulcanized into the gasket to span the lug area.

e. Bridge/spanner plate shall bend with radius according to the sealing sizes.

f. Stud shall be welded on the none threaded part.

g. Passivation treatment must be done on all welding area to avoid corrosion.

h. Design of the waflle rubber seal shall be with effective sealing and maximum grip especially when clamped around pipe with uneven surface when in compression.

i. Repair Clamp shall be suitable for usage up to 40° C temperature without any effect to the installed life of the product.

j. Pressure of small diameter Repair Clamp shall be of 16 bar for working and 24 bar for test pressures.

no marked drawings

3. Markings
Markings of the Repair Clamps should include the information listed in table -8 of ISO 4422-4

k. The Bidder shall provide ISO 9001: 2015 Quality Management System requirement certificate for the goods manufacturing factory from an accredited agency for all Repair Clamps. Accredited Agency shall be a member of International Accredited Forum (IAF) and shall have the authority for the accreditation of mentioned goods in their scope of accreditation. Scope of the production shall be clearly specified in the certificate. Manufacturer shall maintain the validity of this certificate during the supply and delivery of the materials for contract Period. If the supply is made from several factories, ISO 9001: 2015 certificates for quality management system requirement shall be submitted for each factory. This certificate shall clearly indicate the location of the place of manufacture of pipes, fittings and accessories, etc.

2.0 SPECIFICATION FOR UNDER PRESSURE TAPPING TEES

Specification for Under Pressure Tapping Tees for PE Pipes

1. Scope

This specification covers Mechanical Sealing Double Band under Pressure Tapping Tees with EPDM Rubber suitable for PE pipes.

2. General Requirements

Double Band Under Pressure Tapping Tees

- a. Band or shell shall be of the O.D size range and length specified. Band shall be of Type 304 stainless steel.
- b. Bolt retainer assembly or lugs shall be of a type 304 stainless steel and of a non-welded design. Lugs may be cast, forged or cold formed of type 304 stainless steel, and may include a high impact polycarbonate plastic, non-corrosive retainer. Lug design shall be such that the band fully compresses the gasket to the complete working width of the under pressure tapping tees without deformation of the band.
- c. All nuts and bolts shall be 304- stainless steel and coated with an anti-seize coating such as a non-seize zinc coating to prevent galling.
- d. Flange outlet shall be 304 stainless steel and flanges according to DIN 2576 or EN 1092.2. Flange drilling shall be PN 16.
- e. Waflle Gasket or Seal shall provide a 360° sealing surface and of such size and shape to provide an adequate compressive force against the pipe after assembling to affect a positive seal under all combinations of joint and gasket tolerances. Materials shall be of elastomeric materials conform to BSEN 681-1 and material properties conforming to Table 2 of BSEN 681- 1A heavy gauge Type 304 stainless Steel bridge plate shall be vulcanized into the gasket to span the lug area.
- f. Under Pressure Tapping Tees shall be suitable for usage up to 40° C temperature without any effect to the installed life of the product.
- g. Pressure of small diameter Under Pressure Tapping Tees shall be of 16bar for working and 24bar for test pressures.
- h. The Bidder shall provide ISO 9001: 2015 Quality Management System requirement certificate for Quality Assurance for the goods manufacturing factory from an accredited agency for Under Pressure Tapping Tees. Accredited Agency

3.

Markings

shall be a member of International Accredited Forum (IAF) and shall have the authority for the accreditation of mentioned goods in their scope of accreditation. Scope of the production shall be clearly specified in the certificate. Manufacturer shall maintain the validity of this certificate during the supply and delivery of the materials for contract Period. If the supply is made from several factories, ISO 9001: 2015 certificates for quality management system requirement shall be submitted for each factory. This certificate shall clearly indicate the location of the place of manufacture of pipes, fittings and accessories, etc.

Markings of the Under Pressure Tapping Tees should include the information listed in table - 8 of ISO 4422-4

**3.0 SPECIFICATION FOR SMALL DIAMETER COUPLINGS AND
FLANGE ADAPTORS (OD<350 MM)**

Specification for Small Diameter Couplings & Flange Adaptors (OD < 350 mm)

1.0 Small Diameter Couplings & Flange Adaptors (OD < 350 mm)

1.1 Scope

This specification covers small diameter Couplings & Flange Adaptors for PE piping systems. The Couplings & Flange Adaptors shall be with progressive gripping mechanism and pressure responsive sealing technology.

1.2 General Requirements

All small diameter Coupling & Flange Adaptors shall be manufactured in a factory which comply with ISO 9001: 2015 Quality Management System requirement and shall be certified by an accredited agency who is a member of International Accreditation Forum (IAF) and have been authorized to issue a certification in their scope. The Documentary Evidence for accreditation together with the scope of certification shall be provided.

1.3 Marking

The markings shall be casted in to metal components marking shall include the following information.

- i. Manufacturer's identification
- ii. Date of Manufacture
- iii. Standard to which it conform
- iv. Nominal size
- v. Maximum working pressure
- vi. Flange to flange dimension and overall adjustment length
- vii. Torque recommendation for long-term

1.4 Design

1.4.1 All fittings, and their components, shall be fit for the purpose for which they are to be used, and effect a completely leak-free seal under all specified working conditions.

EN 14525
2004

1.4.2

All fittings referred to in this specification shall comply with the requirements of the ANSI/AWWA C219 Standard for "Bolted, Sleeve-Type Couplings for Plain-Ended Pipe". This shall include the requirement for cold expansion of centre sleeves and end rings after welding. It shall also exclude the use of circumferential welding of the End Ring or Compression Flange.

1.5 Technical Requirements

1.5.1 Small diameter Couplings & Flange Adaptors shall comply with, ^{WIS 4-21-02} and ASTM F 1476 and shall be of PN 16 pressure rating unless otherwise stated. The test pressure shall be 24 bars (350 psi) and working pressure of 16 bars (232 psi).

Minimum Length (mm)	Pipe OD (mm)
144	63-160
195	180-200
205	225
208	250
209	315

ix) The minimum length of the small diameter Flange Adaptors shall be accordance with the following table.

Minimum Length (mm)	Pipe OD (mm)
257	63-160
382	180-200
395	225-315

viii) The minimum length of the small diameter Couplings shall be accordance with the following table.

vii) Intermediate ring from 180 mm and above shall be of Aluminium Alloy 6063 condition T6.

vi) Intermediate ring up to and including 160 mm shall be of ductile iron conform to BSEN 1563:2011

v) Gripper ring shall be of zinc alloy conform to BSEN 12844:1999 designation ZP3.

iv) The Center Sleeve /End rings shall be of ductile iron conforming to BS EN 1563:2011. Flange adaptor body shall be ductile iron conforming to BS EN 1563:2011

iii) All water contact materials shall have the approval for the use in portable water piping system.

ii) Maximum allowable expansion/contraction of couplings shall be 10 mm while 5 mm for flanged adaptors.

1.5.2	Materials and their relevant standards	<ul style="list-style-type: none"> • Centre Sleeve, End Ring and Adaptor Body Ductile Iron to BS EN 1563:2011 Symbol EN GJS-450-10 ✓ • Gripper Ring Zinc alloy to BS EN 12844:1999 Designation ZP3 ✓ • Intermediate Ring Up to and including 160mm: Ductile Iron to BS EN 1563:2011 Symbol EN GJS-450-10 ✓ • Bolts 180mm and over Aluminium alloy 6063 condition T6 • BS EN ISO 898-1:2013 Property class 8.8 Stainless Steel BS EN ISO3506-1:2009 Grade A4 Property Class 70 • Nuts (M97) Steel to BS EN 20898-2:1994 Property Class 8 ✓ • Stainless Steel BS EN ISO3506-2:2009 Grade A4 Property Class 70 ✓ • Washers (M42) BS 1449: Part 2:1983 Grade 304S15 ✓ • Gasket (EPDM) BS EN 681-1:1996, Type WA/ BS 6920 hardness to 70 IRHD ✓ • Coatings Centre Sleeve, end ring, flange adaptor body and intermediate ring: Rilsan Nylon 11 ✓ Gripper: Cataphoretic coating ✓ Bolts, nuts: Sheraplex to WIS-4-52-03 ✓
1.5.3	Material	<p>All materials in contact with the fluid in the pipe shall be listed in the current Water Research Centre (WRC) List of materials approved for use in contact with portable water. All materials shall comply with the latest editions of any relevant codes of practice or standard.</p>
1.5.4	Coatings	<p>Centre Sleeve, end ring, body and intermediate ring shall be coated with Rilsan Nylon II. Gripper shall be of Cataphoretic coating, nuts, bolts shall be of Sheraplex coated in conformity with WIS 4-52-03. ✓</p>
1.5.5	Gaskets & Rubber Rings	<p>Gaskets & rubber rings shall be of EPDM. The physical properties shall comply with EN 681-1:1996 or ISO 4633:2015. The preferable hardness range for gaskets is 76-84 IRHD. ✓</p> <p>All elastomeric gaskets shall be suitable for contact with portable water. ✓</p>

Manufacturers shall identify from which compound gaskets are fabricated and shall mark the gasket by colour flash, or other visual means, the grade of gasket, the standard applicable and adequate size information to ensure correct gaskets are used.

1.5.6 Nuts & Bolts

Bolts shall conform to ISO 898-1:2013 property class 8.8. If the bolts are with stainless steel, it shall conform to ISO 3506-1:2009 Grade A4 property class 70. Nuts shall conform to EN 20898-2:1994 property class 8. If the nuts are with stainless steel, it shall conform to ISO 3506-1:2009 Grade A4 property class 70.

Washers shall conform to BS 1449: Part II 1983 Grade 304 S15.

Design life expectancy of Couplings/ Flange Adaptors shall be 50 years.

Adequate washers of an approved material shall be provided to avoid damage to coatings.

1.5.7 Performance

1.5.7.1 Angular Deflection

All fittings shall be capable of allowing angular deflection of the pipes about their axes within the centre sleeve, without leakage and distortion of any metallic component of the fitting. The amount is a function of diameter as detailed below:

Couplings Flange Adaptors

Up to DN450 nominal bore	± 6°	± 3°
DN450 to DN600 nominal bore	± 5°	± 2.5°
DN600 to DN750 nominal bore	± 4°	± 2°
DN750 to DN1200 nominal bore	± 3°	± 1.5°
DN1200 to DN1800 nominal bore	± 2°	± 1°
Over DN1800 nominal bore	± 1°	± 0.5°

1.5.7.2 Expansion/Contraction

All fittings shall be capable of accommodating the total of 10 mm expansion or contraction for Couplings and 5mm expansion or contraction for Flange Adaptors due to longitudinal pipe movement without leakage.

1.5.7.3

The Couplings and Flange Adaptors shall be suitable for use on pipes of PE100 material with SDR11, 17 or 21 without the need for a support liner for the pipe.

1.5.8 Sampling & Testing

1.5.8.1 Production quality testing shall be carried out to comply with the sampling plan of BS 6001-Part 1:1999.

1.5.8.2 Following type tests shall be carried out by the manufacturer and test reports shall be submitted.

- i. Short term internal hydrostatic pressure test
- ii. Short term negative pressure test
- iii. Bolt load relaxation test
- iv. Leak-tightness test under angular deflection
- v. Resistance to differential pressure movement test
- vi. Resistance to shear test
- vii. Leak tightness test under axial draw

1.5.8.3 Quality control tests for the following characteristics shall be carried out by the Manufacturer and test reports shall be submitted.

- i. Short term internal hydrostatic pressure
- ii. Short term negative pressure

1.5.8.3 (i) Short term internal hydrostatic pressure test

The pipe/fittings assembly shall be connected to a suitable device capable of applying and maintaining the relevant internal hydrostatic pressure as specified in table 7 of this specification, and held at a constant temperature. Each jointed assembly shall withstand the applied pressure for a minimum of one hour at ambient temperature without signs of leakage.

1.5.8.3 (ii) Short term negative pressure test

The pipe/fitting assembly shall be connected to a suitable device capable of applying and maintaining the relevant negative pressure as specified in Table 7 of this specification and held at a constant temperature. Each jointed assembly shall withstand the applied pressure for a minimum of one hour at ambient temperature. Fittings shall be tested with the test pipes withdrawn to the manufacturer's maximum recommended gap.

Table 7 – Test Pressure

Test pressure		Size Ranges
Short-term Hydrostatic Pressure at 1 hour (bar)	Short-term Negative pressure (bar)	
PN x 1.5	0.8 (0.2*)	DN 40-600
PN + 3		DN > 600
* Absolute pressure (i.e. below atmospheric)		