ATUSA

COUPLINGS AND GROOVED FITTINGS

TECHNICAL MANUAL

COUPLINGS AND GROOVED FITTINGS

CONTENTS

1 GENERAL INFORMATION ABOUT THE PRODUCT

1.1. GROOVED SYSTEM

The jointing system by means of grooved ends provides a self-centring joint adapted to the requirements of pressure, vacuum and other external factors. It does not need special brackets and expansion joints.

The design of the grooved union is an efficient, compact, reliable, rapid, clean, safe, easy and economical installation method for pressurised systems.

It offers advantages such as its flexibility or rigidity, its capacity for vibration and noise reduction, easy assembly or disassembly and a clear suitability for rapid repairs since it can be installed on both thick and thin wall tubing.

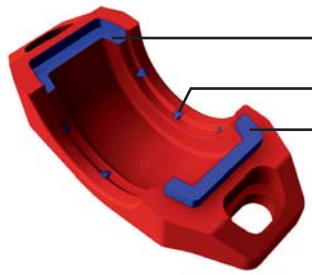
The system offers the choice between rigid and flexible couplings, facilitating the assembly of rigid joints (especially useful in vertical runs, pumping installations, etc.) or flexible joints (useful in installations where total control of all kinds of linear and angular movements is necessary).

FLEXIBLE COUPLING

The design of the bodies gives the joint linear and angular movement.

After the tightening, the contact between the bodies is superficial.

The stops of both bodies have no "teeth" and thus allow the joint full movement.

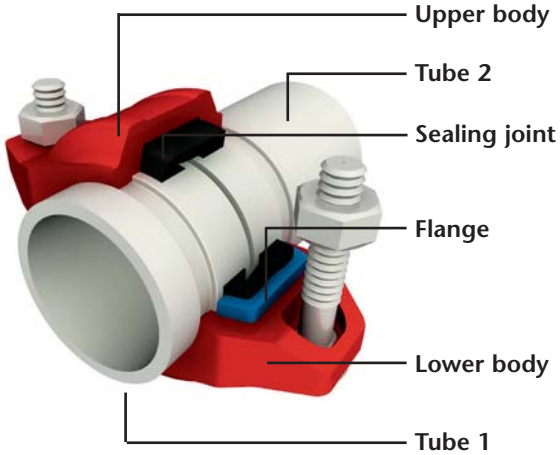


RIGID COUPLING

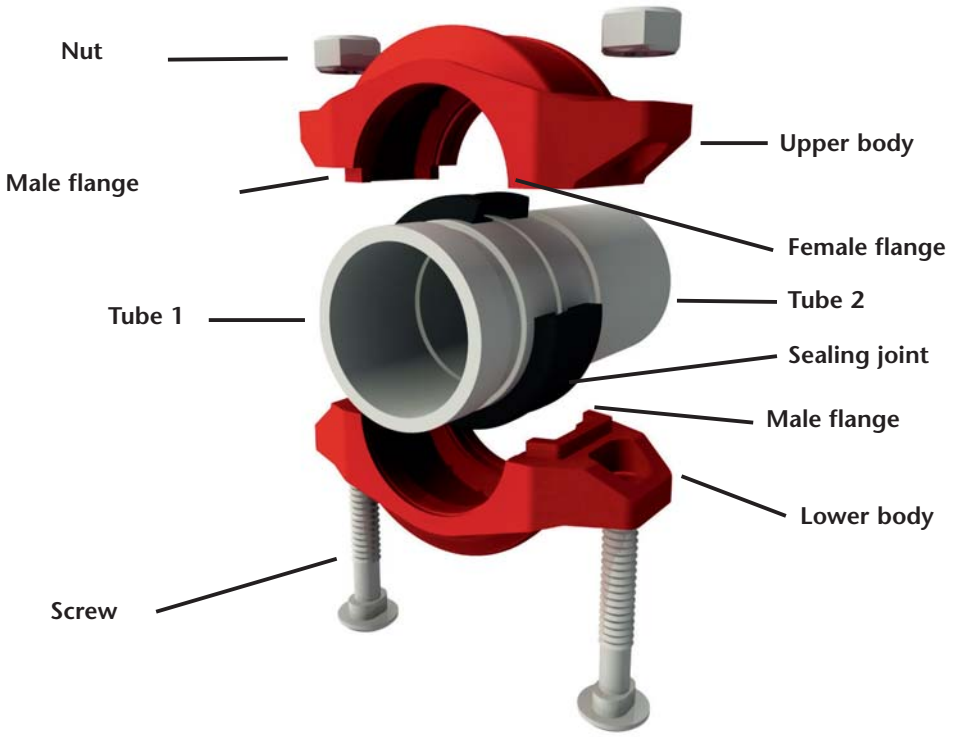
Design based on the "tongue (flange) – groove (coupling)" system.

After tightening, the flange and the coupling of each body overlap with their equivalents in the other body.

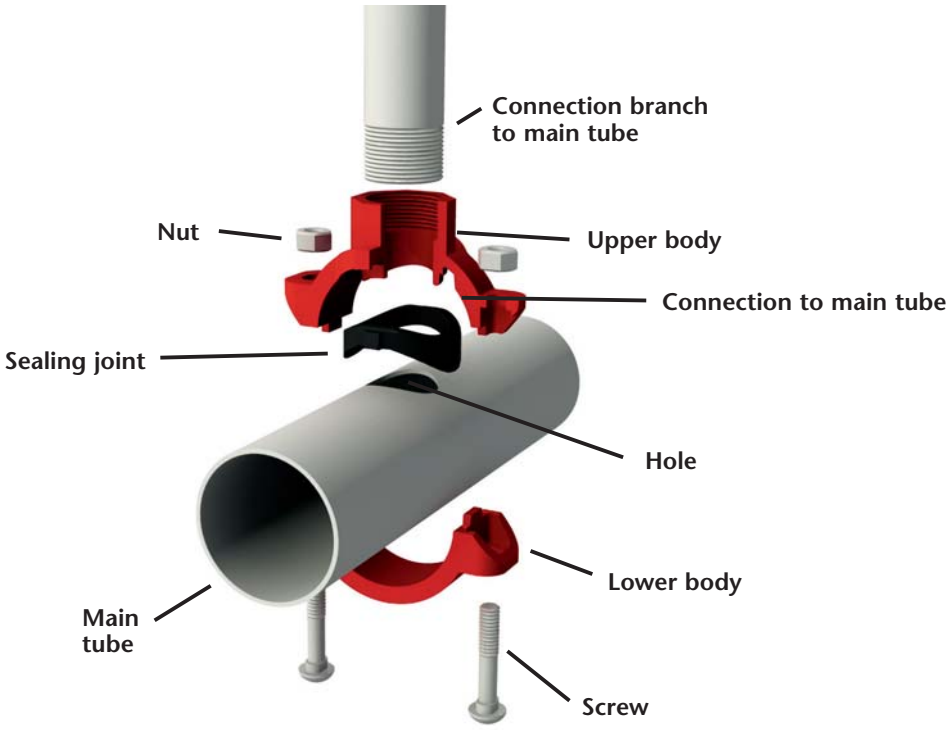
The "teeth" available in the interior stops of each body symmetrically grip both tubes causing its immobility.



EXAMPLE: GROOVED JOINT SYSTEM WITH RIGID COUPLING



EXAMPLE : THREADED BRANCH LINK

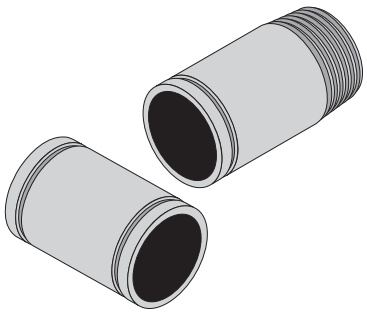


1.2. SYSTEM COMPONENTS

The jointing of the grooved elements (tubes/fittings) is achieved through the use of the appropriate overlap with the grooves of the corresponding couplings.

STEEL TUBING

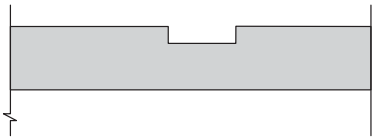
The steel tube ends to be joined must be adequately grooved, thus providing the system with a self-centring mechanical joint capable of resisting the tendency of the tubes to separate as a result of system pressure.



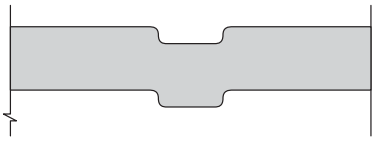
MAKING THE GROOVES AND THE DRILLED HOLES

- **Cutting (cut or milled):** produced for tubes with sufficient wall thickness. Metal is cut from the tube leaving the interior surface of the tube untouched and smooth. The edges of the groove are cut square thus permitting that the overlap provides an adequate fit with the couplings as far as expansion, contraction and movement are concerned, therefore giving little rigidity.

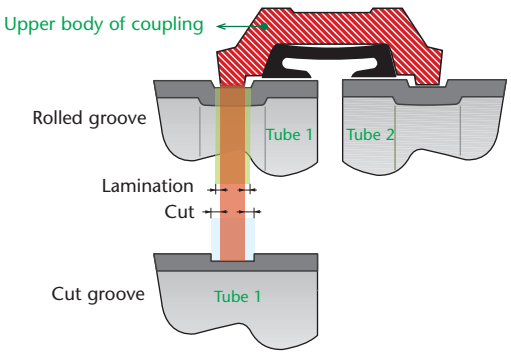
  If the groove is correctly prepared, the wall thickness of the tube in the grooved area should not present any operational problems.



- **Rolled:** produced for a large range of tubing with sufficiently resistant wall thickness. No metal is removed from the tube.Instead, it is "displaced" leaving rounded edges (the external and internal surfaces remain flattened). In this way, the internal flattening produces a small reduction in the internal bore causing some turbulence in the flow.



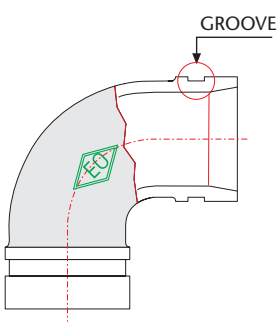
- **Comparing the liberty of linear movement:** By comparing the two resulting geometries, it can be appreciated that the freedom of movement with the groove obtained by rolling is more limited than that with the cut groove. In this way, the rolled groove offers a more rigid joint than the cut groove (reduction in freedom of linear and angular movement can be estimated at 50%).

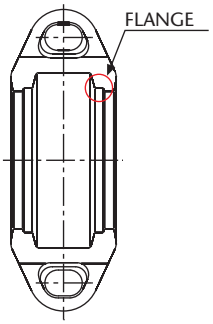


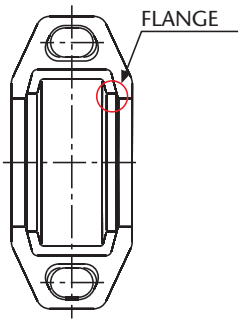
In the case of **branch links**, it is necessary to pierce the tube by **drilling** to obtain the correct diameter hole, located on the central line of the tube.

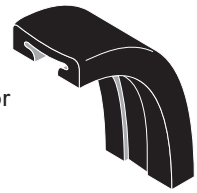
COUPLINGS AND GROOVED FITTINGS

As can be appreciated in the diagrams, the fittings and couplings are equipped with grooved tracks by means of which the joint is achieved.



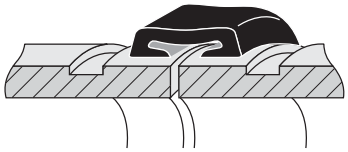




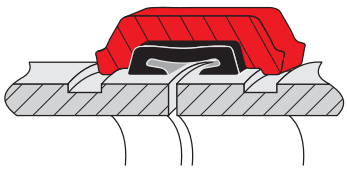


Sealing gaskets: designed to provide a pressure seal (negative or positive) without the need for external forces.

The design of their edges allows compression **against the curved surface of the tubes (not against the grooves).** In the figure the location of the gasket on the surface of the tubes to be joined can be seen.



In the figure the location of the coupling over the sealing gasket can be seen.



The positive internal pressure of the fluid acts against the internal surface of the gasket, thus increasing its contact with the body and thereby its sealing capacity.

The negative internal pressure of the fluid (vacuum) acts against the external surface of the gasket, thus increasing its contact with the tube and thereby its sealing capacity.

TIGHTENING ELEMENTS

Nuts and Bolts: grip the parts of the body between them. The bolts are designed so that they do not turn when the nuts are being tightened with a single spanner (swivel – oval design), both being compatible with the dimensions of the tightening tools being used.

1.3. BASIC TECHNICAL CHARACTERISTICS

The joining of threaded components (pipes/ fittings) is carried out using the convenient overlap with the flanges of the corresponding couplings.

MATERIALS

- **Body (fittings and couplings):** manufactured in ductile cast iron in accordance with ASTM A-536 standard (standard specification for Ductile Iron castings) grade 65-45-12, which means:
  - Minimum tensile strength 65,000 psi (448 MPa; 44,81 kg/mm^2)
  - Minimum yield strength : 45,000 psi (310 MPa ; 31,03 kg/mm^2)
  - Minimum elongation percentage : 12%

- **Sealing Gasket :** standard geometry polymeric gasket, manufactured in EPDM grade E (colour code : green) in accordance with ASTM D-2000 (Standard System for Rubber Products in Automotive Applications), recommended for the transportation of fluids such as water oil-free air and a broad range of chemical products (weak acids, alkaline solutions etc.) between -34ºC and +110ºC . It is not valid for use with petroleum derivatives (oils, petrol etc.) or with gases.

- **Bolts and Nuts:** Heat treated oval-necked bolts and hexagonal bolts in carbon steel in accordance with ASTM A183 (Standard Specification for Carbon Steel Track Bolts and Nuts) with minimum tension stress of 7,584 bar – 110,000 psi – and the surface area protected against corrosion (chrome, zinc electro plated).

- **Finish:** The bodies are supplied painted in red (code RAL 3000, lead-free anti-oxidant paint) or hot dip galvanized according to ISO 1460 (Metallic coatings, Hot dip galvanized coatings on ferrous materials) / ASTM A153 (Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware).

WORKING PRESSURES

For each reference consult the given table. However, in general:

- **Fittings:** the maximum service pressure for the fittings is:
  - Models 90, 120, 130, 130R, 240, 300, 315; : 500 psi (34.50 bar)
  - Models 905 and 1305 : 300 psi (20.70 bar)

- **Couplings:** the maximum service pressure for the couplings is:
  - Models RN and FN 500 psi (34.50 bar)
  - Models FR, RS, DS1, DS2, DA1 : 300 psi (20.70 bar)

- **Flanges (321):** the maximum service pressure for the flanges is 225 psi (16 bar).

BASIC DIMENSIONAL PARAMETERS

- **Fittings and Couplings:** Normal size (DN and inches).

- **Maximum working pressures:** expressed in bar and psi (based on the working pressure of standard tube with an average wall thickness with a standard groove executed in accordance with standard indications).
  Note: working pressure values are reduced by 50% for rolled groove tubes.

- **Separation distance between tube ends:** expressed in mm
  - For cut groove tubing, it is the minimum linear movement in the joint calculated as the difference between the maximum and minimum separation between the ends to be joined.
  - For rolled groove tubing the established values must be halved.

- **Desviación desde la línea central de la tubería:** expresada en grados (por acoplamiento) y en mm/m (para la tubería). Para tubo ranurado por laminado los valores establecidos hay que reducirlos a la mitad.

- **Nuts and Bolts:** number and dimension (mm and inches).

- **Weight:** approximate weight (kg) of the totally assembled coupling with all the components (joints, bolts and nuts).

- **Tubes:** outside diameter and wall thickness, with their tolerances (DN, mm and inches).

  Note : always check the eternal diameter of the tubing (sometimes the same designation is used for different values)

1.4. CERTIFICATION

Fm (Factory Mutual Research Corporation)
Approved for fire protection services in accordance with Standard FM Approvals 1920.

UL (Underwriter's Laboratories Inc.)
The products are listed for fire protection services under standard reference UL 213.

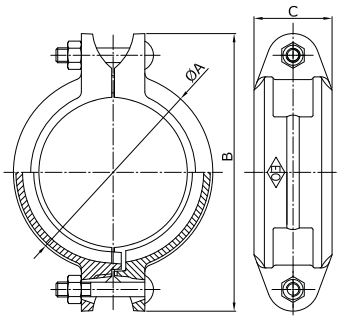
Vds (Vertrauen durch Sicherheit)
Approved for fire extinction services in accordance with Vds 2100-06 and Vds 2344 standards.

2 PRODUCT RANGE

3 DIMENSIONS

RN

RIGID COUPLING

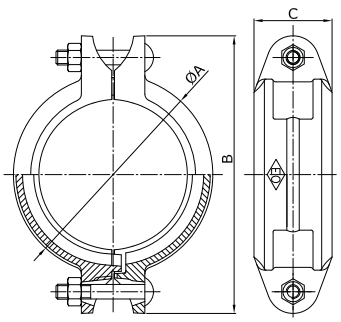


CODE	Steel Tube			Working pressure			Dimenssions			Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B mm)	C (mm)		
6RN2G2/505	25	1″	33.7	34.50	3.45	500	59	100	44	**2 - 3/8" x 55**	599
6RN2G2/506	32	1 1/4″	42.4	34.50	3.45	500	66	105	45	**2 - 3/8" x 55**	610
6RN2G2/507	40	1 1/2″	48.3	34.50	3.45	500	72	112	45	**2 - 3/8" x 55**	640
6RN2G2/508	50	2″	60.3	34.50	3.45	500	85	130	45	**2 - 3/8" x 55**	720
6RN2G2/50B	65	2 1/2″	76.1	34.50	3.45	500	101	145	45	**2 - 3/8" x 55**	837
6RN2G2/50A	80	3″	88.9	34.50	3.45	500	115	168	46	**2 - 1/2" x 70**	1252
6RN2G2/50C	100	4″	114.3	34.50	3.45	500	146	200	52	**2 - 1/2" x 70**	1876
6RN2G2/50H	125	5″	139.7	31.00	3.10	450	170	235	52	**2 - 5/8" x 85**	2542
6RN2G2/50K	150	6 -1/2″ O.D	165.1	31.00	3.10	450	198	262	52	**2 - 5/8" x 85**	2709
6RN2G2/50E	150	6″	168.3	31.00	3.10	450	202	265	52	**2 - 5/8" x 85**	2851
6RN2G2/50M	200	8″	219.1	31.00	3.10	450	260	342	62	**2 - 3/4" x 115**	5725
6RN2G2/50N	250	10″	273.0	20.70	2.07	300	327	420	63	**2 - 7/8" x 125**	9205
6RN2G2/50Q	300	12″	323.9	20.70	2.07	300	370	465	63	**2 - 7/8" x 140**	9769

2/5 - 2= Red - 5= Galvanized

RS

STANDARD RIGID COUPLING

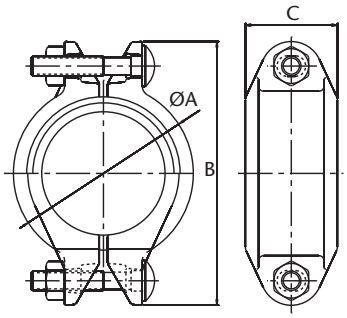


CODE	Steel Tube			Working pressure			Dimenssions			Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B (mm)	C (mm)		
6RS2G2/50B	65	2 1/2″	76.1	20.70	2.07	300	101	140	45	**2 - 3/8" x 55**	839
6RS2G2/50A	80	3″	88.9	20.70	2.07	300	115	160	45	**2 - 3/8" x 55**	1014
6RS2G2/50C	100	4″	114.3	20.70	2.07	300	140	187	50	**2 - 1/2" x 70**	1520
6RS2G2/50H	125	5″	139.7	20.70	2.07	300	168	225	50	**2 - 1/2" x 75**	1901
6RS2G2/50K	150	6 -1/2″ O.D	165.1	20.70	2.07	300	196	250	50	**2 - 1/2" x 75**	2270
6RS2G2/50E	150	6″	168.3	20.70	2.07	300	200	255	50	**2 - 1/2" x 75**	2252
6RS2G2/50M	200	8″	219.1	20.70	2.07	300	255	322	58	**2 - 5/8" x 85**	3832
6RS2G2/50N	250	10″	273.0	20.70	2.07	300	318	410	63	**2 - 3/4" x 120**	7790

2/5 - 2= Red - 5= Galvanized

FN

FLEXIBLE COUPLING

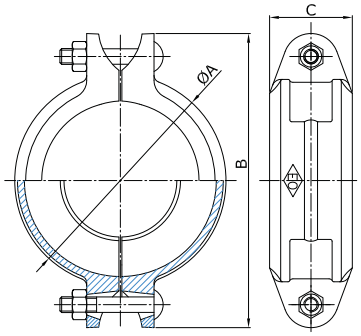


CODE	Steel Tube			Working pressure			Dimenssions			Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B (mm)	C (mm)		
6FN2G2/505	25	1″	33.7	34.50	3.45	500	55	92	42	**2 - 3/8" x 55**	455
6FN2G2/506	32	1 1/4″	42.4	34.50	3.45	500	65	104	44	**2 - 3/8" x 55**	563
6FN2G2/507	40	1 1/2″	48.3	34.50	3.45	500	70	110	44	**2 - 3/8" x 55**	605
6FN2G2/508	50	2″	60.3	34.50	3.45	500	83	124	44	**2 - 3/8" x 55**	653
6FN2G2/50B	65	2 1/2″	76.1	34.50	3.45	500	100	145	45	**2 - 3/8" x 55**	858
6FN2G2/50A	80	3″	88.9	34.50	3.45	500	115	160	45	**2 - 1/2" x 70**	1205
6FN2G2/50C	100	4″	114.3	34.50	3.45	500	145	198	50	**2 - 1/2" x 70**	1754
6FN2G2/50H	125	5″	139.7	31.00	3.10	450	170	230	52	**2 - 5/8" x 85**	2516
6FN2G2/50K	150	6 -1/2″ O.D	165.1	31.00	3.10	450	196	260	52	**2 - 5/8" x 85**	2654
6FN2G2/50E	150	6″	168.3	31.00	3.10	450	200	265	52	**2 - 5/8" x 85**	3087
6FN2G2/50M	200	8″	219.1	31.00	3.10	450	258	350	60	**2 - 3/4" x 115**	5435
6FN2G2/50N	250	10″	273.0	20.70	2.07	300	337	406	65	**2 - 7/8" x 140**	7646
6FN2G2/50Q	300	12″	323.9	20.70	2.07	300	372	460	64	**2 - 7/8" x 140**	9499

2/5 - 2= Red - 5= Galvanized

FR

REDUCING FLEXIBLE COUPLING

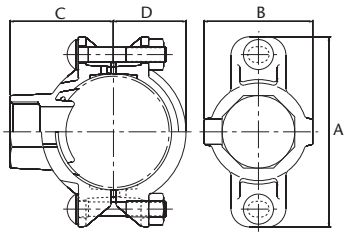


CODE	Steel Tube			Working pressure			Dimenssions			Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B (mm)	C (mm)		
6FR2G2/587	50x40	2″x1 1/2″	60.3x48.3	20.70	2.07	300	86	125	44	**2 - 3/8" x 55**	805
6FR2G2/5B8	65x50	2 1/2″x2″	76.1x60.3	20.70	2.07	300	102	140	45	**2 - 3/8" x 55**	959
6FR2G2/5A8	80x50	3″x2″	88.9x60.3	20.70	2.07	300	115	168	46	**2 - 1/2" x 70**	1618
6FR2G2/5AB	80x65	3″x2 1/2″	88.9x76.1	20.70	2.07	300	115	168	46	**2 - 1/2" x 70**	1531
6FR2G2/5C8	100x50	4″x2″	114.3x60.3	20.70	2.07	300	144	198	50	**2 - 1/2" x 70**	2270
6FR2G2/5CB	100x65	4″x2 1/2″	114.3x76.1	20.70	2.07	300	144	198	50	**2 - 1/2" x 70**	2151
6FR2G2/5CA	100x80	4″x3″	114.3x88.9	20.70	2.07	300	148	198	50	**2 - 1/2" x 70**	2152

2/5 - 2= Red - 5= Galvanized

DS1

MECHANICAL TEE THREADED

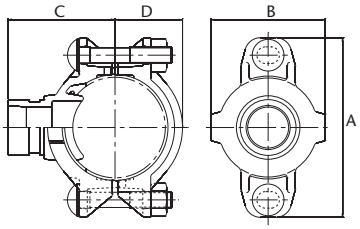


CODE	Steel Tube			Working pressure			Dimenssions				Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B (mm)	C (mm)	D (mm)		
6DS2T2/583	50x15	2″x1/2″	60.3x21.3	20.70	2.07	300	116	68	60	39	**2 - 3/8" x 55**	689
6DS2T2/584	50x20	2″x3/4″	60.3x26.9	20.70	2.07	300	116	68	60	39	**2 - 3/8" x 55**	664
6DS2T2/585	50x25	2″x1″	60.3x33.7	20.70	2.07	300	116	68	60	39	**2 - 3/8" x 55**	720
6DS2T2/586	50x32	2″x1 1/4″	60.3x42.4	20.70	2.07	300	116	76	65	39	**2 - 3/8" x 55**	829
6DS2T2/587	50x40	2″x1 1/2″	60.3x48.3	20.70	2.07	300	116	76	65	39	**2 - 3/8" x 55**	853
6DS2T2/5B3	65x15	2 1/2x1/2″	76.1x21.3	20.70	2.07	300	137	71	75	50	**2 - 1/2" x 70**	1091
6DS2T2/5B4	65x20	2 1/2x3/4″	76.1x26.9	20.70	2.07	300	137	71	75	50	**2 - 1/2" x 70**	1066
6DS2T2/5B5	65x25	2 1/2″x1″	76.1x33.7	20.70	2.07	300	137	71	75	50	**2 - 1/2" x 70**	1121
6DS2T2/5B6	65x32	2 1/2″x1 1/4″	76.1x42.4	20.70	2.07	300	137	85	75	50	**2 - 1/2" x 70**	1198
6DS2T2/5B7	65x40	2 1/2″x1 1/2″	76.1x48.3	20.70	2.07	300	137	85	75	50	**2 - 1/2" x 70**	1252
6DS2T2/5A3	80x15	3″x1/2″	88.9x21.3	20.70	2.07	300	152	73	80	57	**2 - 1/2" x 75**	1221
6DS2T2/5A4	80x20	3″x3/4″	88.9x26.9	20.70	2.07	300	152	73	80	57	**2 - 1/2" x 75**	1196
6DS2T2/5A5	80x25	3″x1″	88.9x33.7	20.70	2.07	300	152	73	80	57	**2 - 1/2" x 75**	1243
6DS2T2/5A6	80x32	3″x1 1/4″	88.9x42.4	20.70	2.07	300	152	86	80	57	**2 - 1/2" x 75**	1322
6DS2T2/5A7	80x40	3″x1 1/2″	88.9x48.3	20.70	2.07	300	152	86	80	57	**2 - 1/2" x 75**	1375
6DS2T2/5A8	80x50	3″x2″	88.9x60.3	20.70	2.07	300	152	98	80	57	**2 - 1/2" x 75**	1492
6DS2T2/5C3	100x15	4″x1/2″	114.3x21.3	20.70	2.07	300	188	79	90	70	**2 - 1/2" x 75**	1634
6DS2T2/5C4	100x20	4″x3/4″	114.3x26.9	20.70	2.07	300	188	79	90	70	**2 - 1/2" x 75**	1609
6DS2T2/5C5	100X25	4″x1″	114.3x33.7	20.70	2.07	300	188	79	93	70	**2 - 1/2" x 75**	1645
6DS2T2/5C6	100X32	4″x1 1/4″	114.3x42.4	20.70	2.07	300	188	89	95	70	**2 - 1/2" x 75**	1707
6DS2T2/5C7	100X40	4″x1 1/2″	114.3x48.3	20.70	2.07	300	188	89	97	70	**2 - 1/2" x 75**	1814
6DS2T2/5C8	100x50	4″x2″	114.3x60.3	20.70	2.07	300	188	105	100	70	**2 - 1/2" x 75**	1980
6DS2T2/5CB	100x65	4″x2 1/2″	114.3x76.1	20.70	2.07	300	188	105	102	70	**2 - 1/2" x 75**	2099
6DS2T2/5CA	100x80	4″x3″	114.3x88.9	20.70	2.07	300	188	124	102	70	**2 - 1/2" x 75**	2466
6DS2T2/5H8	125x60	5″x2″	139.7x60.3	20.70	2.07	300	222	112	115	84	**2 - 5/8" x 85**	2676
6DS2T2/5K8	150x50	6 1/2″O.Dx2″	165.1x60.3	20.70	2.07	300	244	113	129	98	**2 - 5/8" x 105**	3089
6DS2T2/5KB	150x65	6 1/2″O.Dx2 1/2″	165.1x76.1	20.70	2.07	300	244	113	129	98	**2 - 5/8" x 105**	3201
6DS2T2/5E6	150x32	6″x1 1/4″	168.3x42.4	20.70	2.07	300	247	95	130	99	**2 - 5/8" x 105**	3104
6DS2T2/5E7	150x40	6″x1 1/2″	168.3x48.3	20.70	2.07	300	247	95	122	99	**2 - 5/8" x 105**	2973
6DS2T2/5E8	150x50	6″x2″	168.3x60.3	20.70	2.07	300	247	113	132	99	**2 - 5/8" x 105**	3279
6DS2T2/5EA	150x80	6″x3″	168.3x88.9	20.70	2.07	300	247	132	140	99	**2 - 5/8" x 105**	4119
6DS2T2/5M8	200x50	8″x2″	219.1x60.3	20.70	2.07	300	322	117	160	125	**2 - 3/4" x 115**	4942

2/5 - 2= Red - 5= Galvanized

DS2

MECHANICAL TEE GROOVED

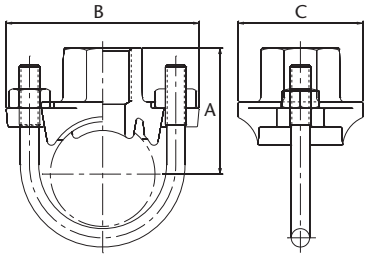


CODE	Steel Tube			Working pressure			Dimenssions				Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B (mm)	C (mm)	D (mm)		
6DS2G2/586	50x32	2″x1 1/4″	60.3x42.4	20.70	2.07	300	116	76	70	39	2 - 3/8" x 55	723
6DS2G2/587	50x40	2″x1 1/2″	60.3x48.3	20.70	2.07	300	116	76	70	39	2 - 3/8" x 55	767
6DS2G2/5B6	65x32	2 1/2″x1 1/4″	76.1x42.4	20.70	2.07	300	137	85	78	50	2 - 1/2" x 70	1101
6DS2G2/5B7	65x40	2 1/2″x1 1/2″	76.1x48.3	20.70	2.07	300	137	85	78	50	2 - 1/2" x 70	1125
6DS2G2/5A6	80x32	3″x1 1/4″	88.9x42.4	20.70	2.07	300	152	86	85	57	2 - 1/2" x 75	1247
6DS2G2/5A7	80x40	3″x1 1/2″	88.9x48.3	20.70	2.07	300	152	86	85	57	2 - 1/2" x 75	1270
6DS2G2/5A8	80x50	3″x2″	88.9x60.3	20.70	2.07	300	152	98	85	57	2 - 1/2" x 75	1408
6DS2G2/5C7	100x40	4″x1 1/2″	114.3x48.3	20.70	2.07	300	188	89	102	70	2 - 1/2" x 75	1697
6DS2G2/5C8	100x50	4″x2″	114.3x60.3	20.70	2.07	300	188	105	102	70	2 - 1/2" x 75	1833
6DS2G2/5CB	100x65	4″x2 1/2″	114.3x76.1	20.70	2.07	300	188	105	102	70	2 - 1/2" x 75	2058
6DS2G2/5CA	100x80	4″x3″	114.3x88.9	20.70	2.07	300	188	124	102	70	2 - 1/2" x 75	2231
6DS2G2/5H6	125x32	5″x1 1/4″	139.7x42.4	20.70	2.07	300	188	124	102	70	2 - 5/8" x 85	1944
6DS2G2/5H8	125x50	5″x2″	139.7x60.3	20.70	2.07	300	222	113	118	84	2 - 5/8" x 85	2538
6DS2G2/5HB	125x65	5″x2 1/2″	139.7x76.1	20.70	2.07	300	222	113	118	84	2 - 5/8" x 85	2955
6DS2G2/5E7	150x40	6″x1 1/2″	168.3x48.3	20.70	2.07	300	247	95	128	99	2 - 5/8" x 105	2925
6DS2G2/5E8	150x50	6″x2″	168.3x60.3	20.70	2.07	300	247	114	134	99	2 - 5/8" x 105	3149
6DS2G2/5EB	150x65	6″x2 1/2″	168.3x76.1	20.70	2.07	300	247	114	134	99	2 - 5/8" x 105	3282
6DS2G2/5EA	150x80	6″x3″	168.3x88.9	20.70	2.07	300	247	132	141	99	2 - 5/8" x 105	3435
6DS2G2/5EC	150x100	6″x4″	168.3x114.3	20.70	2.07	300	247	157	138	99	2 - 5/8" x 105	3979

2/5 - 2= Red - 5= Galvanized

DA1

BRANCH OUTLET

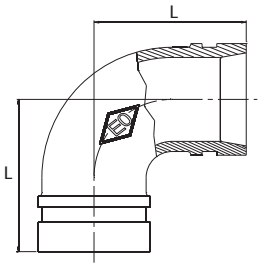


CODE	Steel Tube			Working pressure			Dimenssions			Tightening (nut x screw) nr - ″ x L (mm)	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	A (mm)	B (mm)	C mm)		
6DA2T2/563	32x15	1 1/4″x1/2″	42.4x21.3	20.70	2.07	300	54	89	57	U - 3/8″ x 73	401
6DA2T2/564	32x20	1 1/4″x3/4″	42.4x26.9	20.70	2.07	300	54	89	57	U - 3/8″ x 73	436
6DA2T2/565	32x25	1 1/4″x1″	42.4x33.7	20.70	2.07	300	58	89	57	U - 3/8″ x 73	480
6DA2T2/573	40x15	1 1/2″x1/2″	48.3x21.3	20.70	2.07	300	57	89	57	U - 3/8″ x 73	390
6DA2T2/574	40x20	1 1/2″x3/4″	48.3x26.9	20.70	2.07	300	57	89	57	U - 3/8″ x 73	424
6DA2T2/575	40x25	1 1/2″x1″	48.3x33.7	20.70	2.07	300	61	89	57	U - 3/8″ x 73	468
6DA2T2/583	50x15	2″x1/2″	60.3x21.3	20.70	2.07	300	63	95	57	U - 3/8″ x 90	403
6DA2T2/584	50x20	2″x3/4″	60.3x26.9	20.70	2.07	300	63	95	57	U - 3/8″ x 90	434
6DA2T2/585	50x25	2″x1″	60.3x33.7	20.70	2.07	300	67	95	57	U - 3/8″ x 90	477
6DA2T2/5B3	65x15	2 1/2″x1/2″	76.1x21.3	20.70	2.07	300	70	108	57	U - 3/8″ x 105	432
6DA2T2/5B4	65x20	2 1/2″x3/4″	76.1x26.9	20.70	2.07	300	70	108	57	U - 3/8″ x 105	464
6DA2T2/5B5	65x25	2 1/2″x1″	76.1x33.7	20.70	2.07	300	73	108	57	U - 3/8″ x 105	498

2/5 - 2= Red - 5= Galvanized

90

90º ELBOW

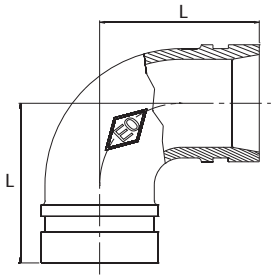


CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
609002/505	25	1″	33.7	34.50	3.45	500	57	237
609002/506	32	1 1/4″	42.4	34.50	3.45	500	70	414
609002/507	40	1 1/2″	48.3	34.50	3.45	500	70	483
609002/508	50	2″	60.3	34.50	3.45	500	83	652
609002/50B	65	2 1/2″	76.1	34.50	3.45	500	95	1153
609002/50A	80	3″	88.9	34.50	3.45	500	108	1607
609002/50C	100	4″	114.3	34.50	3.45	500	127	2661
609002/50H	125	5″	139.7	34.50	3.45	500	140	4091
609002/50K	150	6 1/2″ O.D	165.1	34.50	3.45	500	165	5992
609002/50E	150	6″	168.3	34.50	3.45	500	165	6069
609002/50M	200	8″	219.1	34.50	3.45	500	197	11118
609002/50N	250	10″	273.0	34.50	3.45	500	229	24580
609002/50Q	300	12"	323.9	34.50	3.45	500	254	35523

2/5 - 2= Red - 5= Galvanized

90 S

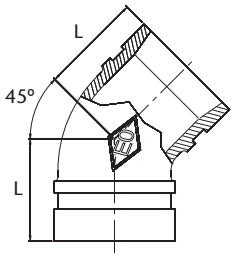
STANDARD 90º ELBOW



CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
6090S2/508	50	2″	60.3	20.70	2.07	300	70	578
6090S2/50B	65	2 1/2″	76.1	20.70	2.07	300	76	967
6090S2/50A	80	3″	88.9	20.70	2.07	300	86	1327
6090S2/50C	100	4″	114.3	20.70	2.07	300	101	2010
6090S2/50H	125	5″	139.7	20.70	2.07	300	124	3665
6090S2/50K	150	6 1/2″ O.D	165.1	20.70	2.07	300	140	4824
6090S2/50E	150	6″	168.3	20.70	2.07	300	140	4995
6090S2/50M	200	8″	219.1	20.70	2.07	300	175	8466

2/5 - 2= Red - 5= Galvanized

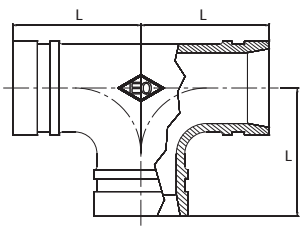
120 45º ELBOW



CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
612002/505	25	1″	33.7	34.50	3.45	500	45	204
612002/506	32	1 1/4″	42.4	34.50	3.45	500	45	304
612002/507	40	1 1/2″	48.3	34.50	3.45	500	45	351
612002/508	50	2″	60.3	34.50	3.45	500	51	481
612002/50B	65	2 1/2″	76.1	34.50	3.45	500	57	825
612002/50A	80	3″	88.9	34.50	3.45	500	64	1139
612002/50C	100	4″	114.3	34.50	3.45	500	76	1887
612002/50H	125	5″	139.7	34.50	3.45	500	83	2898
612002/50K	150	6 1/2″ O.D	165.1	34.50	3.45	500	89	3889
612002/50E	150	6"	168.3	34.50	3.45	500	89	3589
612002/50M	200	8″	219.1	34.50	3.45	500	108	6817
612002/50N	250	10″	273.0	34.50	3.45	500	121	14760
612002/50Q	300	12"	323.9	34.50	3.45	500	133	21675

2/5 - 2= Red - 5= Galvanized

130 TEE

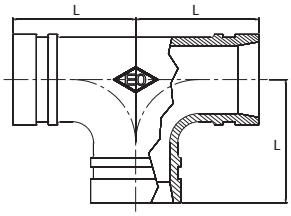


CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
613002/505	25	1″	33.7	34.50	3.45	500	57	356
613002/506	32	1 1/4″	42.4	34.50	3.45	500	70	634
613002/507	40	1 1/2″	48.3	34.50	3.45	500	70	722
613002/508	50	2″	60.3	34.50	3.45	500	83	990
613002/50B	65	2 1/2″	76.1	34.50	3.45	500	95	1727
613002/50A	80	3″	88.9	34.50	3.45	500	108	2415
613002/50C	100	4″	114.3	34.50	3.45	500	127	4012
613002/50H	125	5″	139.7	34.50	3.45	500	140	5975
613002/50K	150	6 1/2″ O.D	165.1	34.50	3.45	500	165	7810
613002/50E	150	6″	168.3	34.50	3.45	500	165	8728
613002/50M	200	8″	219.1	34.50	3.45	500	197	15544
613002/50N	250	10″	273.0	34.50	3.45	500	229	34090
613002/50Q	300	12″	323.9	34.50	3.45	500	254	47366

2/5 - 2= Red - 5= Galvanized

130 S

STANDARD TEE

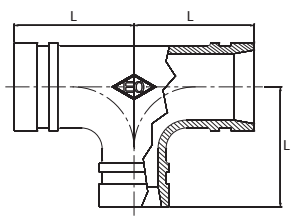


CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
6130S2/508	50	2"	60.3	20.70	2.07	300	70	877
6130S2/50B	65	2 1/2"	76.1	20.70	2.07	300	76	1353
6130S2/50A	80	3"	88.9	20.70	2.07	300	86	1859
6130S2/50C	100	4"	114.3	20.70	2.07	300	101	2745
6130S2/50H	125	5"	139.7	20.70	2.07	300	124	5142
6130S2/50K	150	6 -1/2" O.D	165.1	20.70	2.07	300	140	7077
6130S2/50E	150	6"	168.3	20.70	2.07	300	140	7092
6130S2/50M	200	8"	219.1	20.70	2.07	300	175	11426

2/5 - 2= Red - 5= Galvanized

130 R

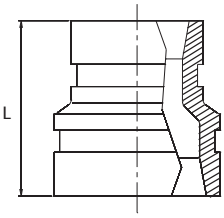
REDUCING TEE



CODE	Medida Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
613002/585	50x25	2"x1"	60.3x33.7	34.50	3.45	500	70	757
613002/587	50x40	2"x1 1/2"	60.3x48.3	34.50	3.45	500	70	794
613002/5B7	65x40	2 1/2"x1 1/2"	76.1x48.3	34.50	3.45	500	76	1332
613002/5B8	65x50	2 1/2"x2"	76.1x60.3	34.50	3.45	500	76	1356
613002/5A5	80x25	3"x1"	88.9x33.7	34.50	3.45	500	108	2388
613002/5A8	80x50	3"x2"	88.9x60.3	34.50	3.45	500	86	1679
613002/5AB	80x65	3"x 2 1/2"	88.9x76.1	34.50	3.45	500	86	1846
613002/5C7	100x40	4"x 1 1/2"	114.3x48.3	34.50	3.45	500	101	2670
613002/5C8	100x50	4"x2"	114.3x60.3	34.50	3.45	500	101	2685
613002/5CB	100x65	4"x 2 1/2"	114.3x76.1	34.50	3.45	500	101	2854
613002/5CA	100x80	4"x3"	114.3x88.9	34.50	3.45	500	101	2858
613002/5HC	125x100	5"x4"	139.7x114.3	34.50	3.45	500	124	4882
613002/5K8	150x50	6 1/2" O.D x2"	165.1x60.3	34.50	3.45	500	140	6293
613002/5KC	150x100	6 1/2" O.D x4"	165.1x114.3	34.50	3.45	500	140	6562
613002/5E8	150x50	6"x2"	168.3x60.3	34.50	3.45	500	140	6634
613002/5EA	150x80	6"x3"	168.3x88.9	34.50	3.45	500	140	6825
613002/5EC	150x100	6"x4"	168.3x114.3	34.50	3.45	500	140	6904

2/5 - 2= Red - 5= Galvanized

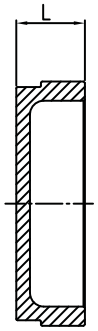
240 CONCENTRIC REDUCER



CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
624002/565	32x25	1 1/4"x1"	42.4x33.7	34.50	3.45	500	65	198
624002/575	40x25	1 1/2"x1"	48.3x33.7	34.50	3.45	500	65	234
624002/576	40x32	1 1/2"x1 1/4"	48.3x42.4	34.50	3.45	500	64	260
624002/585	50x25	2"x1"	60.3x33.7	34.50	3.45	500	64	279
624002/586	50x32	2"x1 1/4"	60.3x42.4	34.50	3.45	500	65	306
624002/587	50x40	2"x1 1/2"	60.3x48.3	34.50	3.45	500	65	316
624002/5B6	65x32	2 1/2"x1 1/4"	76.1x42.4	34.50	3.45	500	66	470
624002/5B7	65x40	2 1/2"x1 1/2"	76.1x48.3	34.50	3.45	500	66	480
624002/5B8	65x50	2 1/2"x2"	76.1x60.3	34.50	3.45	500	66	492
624002/5A7	80x40	3"x1 1/2"	88.9x48.3	34.50	3.45	500	65	542
624002/5A8	80x50	3"x2"	88.9x60.3	34.50	3.45	500	64	556
624002/5AB	80x65	3"x 2 1/2"	88.9x76.1	34.50	3.45	500	66	718
624002/5C8	100x50	4"x2"	114.3x60.3	34.50	3.45	500	77	843
624002/5CB	100x65	4"x 2 1/2"	114.3x76.1	34.50	3.45	500	77	953
624002/5CA	100x80	4"x3"	114.3x88.9	34.50	3.45	500	77	933
624002/5HC	125x100	5"x4"	139.7x114.3	34.50	3.45	500	90	1687
624002/5KA	150x80	6 1/2" O.D x3"	165.1x88.9	34.50	3.45	500	103	1851
624002/5KC	150x100	6 1/2" O.D x4"	165.1x114.3	34.50	3.45	500	103	2076
624002/5E8	150x50	6"x2"	168.3x60.3	34.50	3.45	500	102	2133
624002/5EB	150x65	6"x2 1/2"	168.3x76.1	34.50	3.45	500	102	2228
624002/5EA	150x80	6"x3"	168.3x88.9	34.50	3.45	500	102	2552
624002/5EC	150x100	6"x4"	168.3x114.3	34.50	3.45	500	102	2598
624002/5MC	200x100	8"x4"	219.1x114.3	34.50	3.45	500	127	4900
624002/5MK	200x150	8"x6 1/2" O.D	219.1x165.1	34.50	3.45	500	129	3789
624002/5ME	200x150	8"x6"	219.1x168.3	34.50	3.45	500	128	3753

2/5 - 2= Red - 5= Galvanized

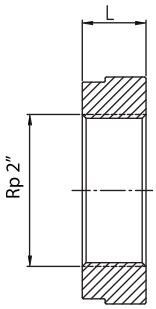
300 CAP



CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
630002/505	25	1"	33.7	34.50	3.45	500	23	89
630002/506	32	1 1/4"	42.4	34.50	3.45	500	24	120
630002/507	40	1 1/2"	48.3	34.50	3.45	500	23	158
630002/508	50	2"	60.3	34.50	3.45	500	23	220
630002/50B	65	2 1/2"	76.1	34.50	3.45	500	24	392
630002/50A	80	3"	88.9	34.50	3.45	500	26	476
630002/50C	100	4"	114.3	34.50	3.45	500	26	935
630002/50H	125	5"	139.7	34.50	3.45	500	27	1409
630002/50K	150	6 1/2" O.D	165.1	20.70	2.07	300	27	1596
630002/50E	150	6"	168.3	20.70	2.07	300	25	2078
630002/50M	200	8"	219.1	20.70	2.07	300	30	3887
630002/50N	250	10"	273.0	20.70	2.07	300	32	6976
630002/50Q	300	12"	323.9	20.70	2.07	300	32	9401

2/5 - 2= Red - 5= Galvanized

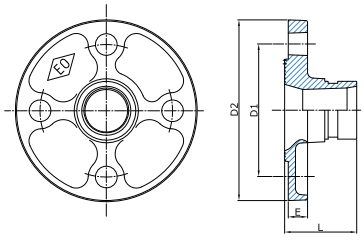
315 THREADED CAP



CODE	Steel Tube			Working pressure			Dimenssions	Weight approx. (grs)
	DN	Inches	ext (mm)	Bar	Mpa	PSI	L (mm)	
631502/5B8	65x50	2 1/2"x2"	76.1x60.3	34.50	3.45	500	23	326
631502/5A8	80x50	3"x2"	88.9x60.3	34.50	3.45	500	23	602
631502/5C8	100x50	4"x2"	114.3x60.3	34.50	3.45	500	26	919
631502/5H8	125x50	5"x2"	139.7x60.3	34.50	3.45	500	27	1525
631502/5K8	150x50	6 1/2" O.D x2"	165.1x60.3	20.70	2.07	300	27	2044
631502/5E8	150x50	6"x2"	168.3X60.3	20.70	2.07	300	27	2022

2/5 - 2= Red - 5= Galvanized

321 ADAPTING FLANGE



CODE	Steel Tube measure			Dimenssions				Nr. Hole.- Metric	Weight approx. (grs)
	DN	Inches	ext (mm)	L (mm)	D1 (mm)	D2 (mm)	E (mm)		
632102/505	25	1"	33.7	61	85	115	16	4-M12	847
632102/506	32	1 1/4"	42.4	61	100	140	16	4-M16	1164
632102/507	40	1 1/2"	48.3	61	110	150	16	4-M16	1294
632102/508	50	2"	60.3	65	125	165	16	4-M16	1688
632102/50B	65	2 1/2"	76.1	65	145	185	16	4-M16	2006
632102/50A	80	3"	88.9	65	160	200	16	8-M16	2098
632102/50C	100	4"	114.3	70	180	220	16	8-M16	2412
632102/50H	125	5"	139.7	70	210	250	18	8-M16	3233
632102/50K	150	6 1/2"- O.D	165.1	70	240	285	18	8-M20	3737
632102/50E	150	6"	168.3	70	240	285	18	8-M20	4047
632102/50M	200	8"	219.1	80	295	340	19	12-M20	6357
632102/50N	250	10"	273.0	85	355	405	21	12-M24	9744
632102/50Q	300	12"	323.9	90	410	460	24	12-M24	12841

2/5 - 2= Red - 5= Galvanized

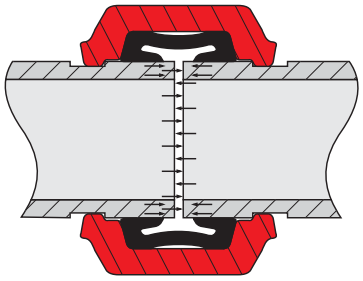
4 DESIGN FACTORS

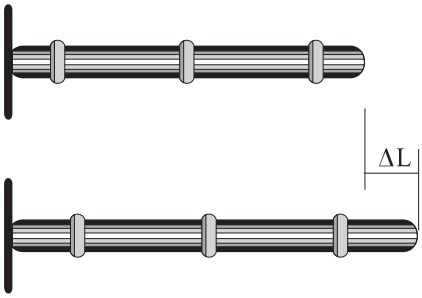
SELF-CENTRING

The flanges of the couplings fit into the grooves in the fittings/tubes, completely enclosing the diameter and thus avoiding their separation as a result of pressure and other external forces across the full working pressure range of the coupling.

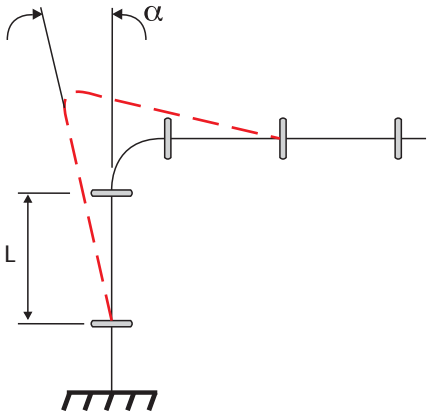
The relative position between the coupling and the groove can vary until the circulating fluid has steadied, at which time the joint will be centred.

In the case of anticipated pressure surges, it will be necessary to make adequate arrangements in the system (accommodation of linear and angular movements).





Example: provision for the increase in length of the system



Example: provision for the movement in a bent joint.

RIGIDITY OR FLEXIBILITY

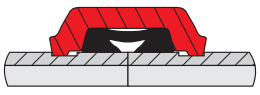
Depending on the requirements, two designs types are available.

The rigid couplings have a series of teeth in the flange that “grip” the tube and fix the joint in a determined position.

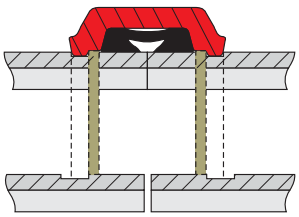
Flexible couplings allow linear and angular movement between the joined tubes so that:

- The use of expansion joints is limited.
- The existence of free spaces between the elements to be joined (fittings/couplings/tubes) is allowed, enabling **linear movements** – expansion and contraction – in the tubing resulting from temperature changes or other forces inherent in the system (pressure surges….) whose scale depends on the type of groove, the dimension of the tube in question and the tolerances of the grooves in the make-up of the elements involved in the joint.

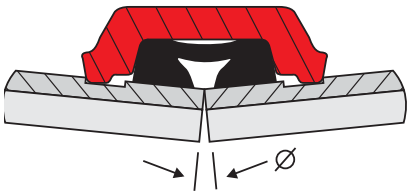
EXPANSION



CONTRACTION

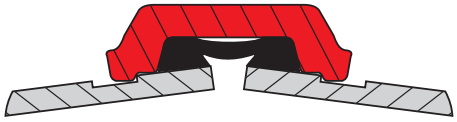


- **Angular displacements** of the tubing are possible as a result of the space which exists between the coupling/fitting flange and the geometry of the groove, allowing the alignment of the tubing to adapt itself to situations in which certain changes of direction are required (walls, broken ground etc.) the angle permitted varies according to the size and type of coupling and needs to take into account the tolerances of the grooves when assembling the various constituents of the joint.



Angular movement (angle Ø)

- The stresses caused by the surfaces on which the tubing is located are absorbed and eliminated.



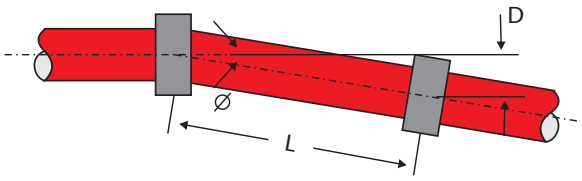
The design also permits a limited capacity for mixed movement (the maximum values for linear and angular movement can never be reached simultaneously).

The design allows the partial adaptation of certain rotational movements caused by thermal expansion, vibration etc. but does not allow any form of constant pivotal articulation.

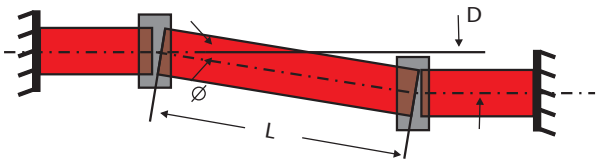
MISALIGNMENT

The capacity for angular movement allows the assembly of joints between non-aligned tubes (sinuous layouts) so that it will be possible to install curved alignments using straight tubing subject to prior calculation of the bend radius and the suitable lengths.

- The curves in the tubing (whether this is linear on the same plane or lateral on different planes) can be adequately adjusted (always subject to the angle of deviation not exceeding the maximum value foreseen for the coupling) by means of the location of the number of necessary fittings.



- The tubing, subject to the stresses or deformation of the pressure or the temperature of the fluid, will tend, without securing to prevent it, to straighten itself. Therefore, if the curve is to be maintained, the tubes must be anchored at necessary points in order to resist the lateral forces and thus to maintain the joint.



Thus, the length of misalignment (D), expressed in mm., can be calculated as follows

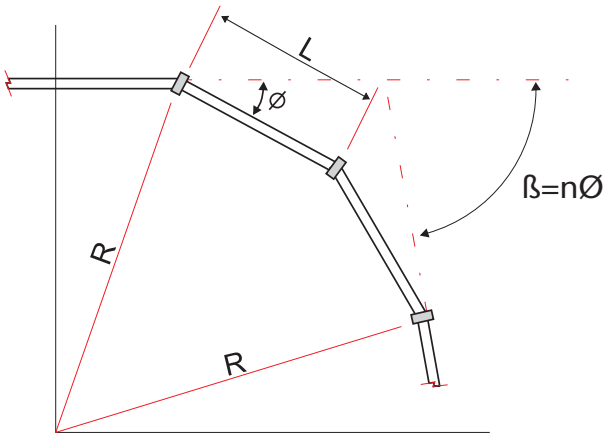
$$D = L \text{ Sen } Ø$$

With :

L = Length of the tube in question, expressed in mm.

Ø = maximum angle, expressed in degrees, between the axes of the tubes in question.

CURVED ALIGNMENT



The alignment of curved runs using straight tubing and couplings is achievable owing to the possibility of the aforementioned misalignment.

Thus, taking into account the factors which determine the alignment of a curve are:

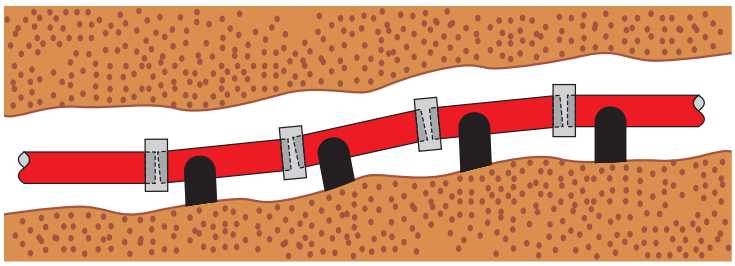
- the length of the tubing runs to be joined: L (mm)
- the angular deviation required with respect to a central line of reference : Ø (º)
- the angular deviation resulting from the assembly : ß (º)
- the radius of the curve of the run : R (m)
- the number of couplings in the run : n

the equation resulting from these is :

$$R = L / 2 \cdot Sen (Ø/2)$$

con: ß = nØ

This possibility of curved runs means that the couplings make a very useful tool for special installations such as trunking which has to be placed underground and must therefore adapt itself to the irregularities of the terrain.

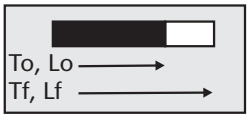


THERMAL EXPANSION

As a result of the interchange of heat between the interior and the exterior of the system (owing to their different temperatures), the joint can be subject to expansion or contraction making it necessary to determine the number of joints necessary in any given run length in order to compensate this phenomenon.

Linear Expansion
The change in length ***(ΔL= Lf - Lo)*** is proportional to the temperature change ***(ΔT = Tf - To)*** and to the initial (Lo) length of the tubing. The coefficient of proportionality, also known as coefficient of **linear expansion** (specific for each material), is named α.

$$\Delta L = (Lf - Lo) = \alpha . Lo . \Delta T$$



ΔL = increase in the length of the tubing (mm)
Lf = final length of the tubing (m)
Lo = initial length of the tubing (m)
ΔT = increase in temperature (ºC)
α = coefficient of linear expansion (ºC $^{-1}$)
α for steel = 1,2 x 10^{-5} (between 0 and 100ºC)
α copper = 1,7 x 10^{-5} (between 0 and 100ºC)

Example:
Initial tube length= 6m
Increase in T= 30ºC
Decrease in T= 20ºC
} increase in length= 2,16 mm
decrease in length = 1,44 mm

SECURING THE TUBES

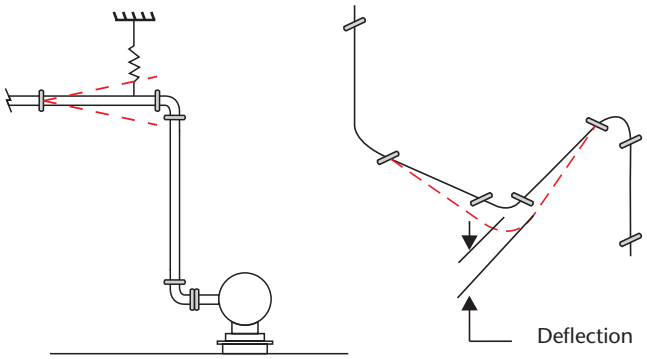
The design of a grooved joint installation must take the following into account:

- The weight of the components (tubes, couplings, fittings, fluid content).
- Adequate protection against the existing stresses on the joints.
- Dynamic factors of the system, both internal (pressure surges, temperature changes) and external (earth movements etc.).
- Characteristics of the brackets and fixings (the use of those which allow the movement on various planes)

The space to leave between two brackets will be, as a general approximation:

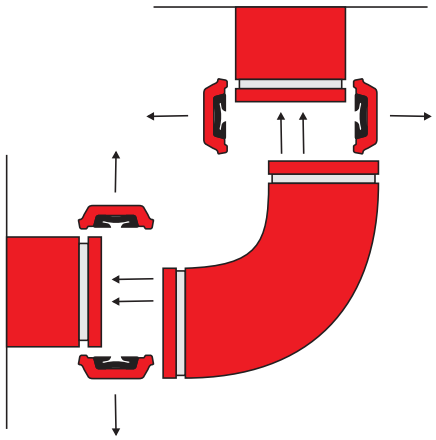
Tube	Space (m)
Up to 1"	2.0
1 1/4" to 2 1/2"	3.0
2 1/2" to 4"	3.5
5" to 8"	4.0
10" to 12"	4.5

The spacing of the brackets will depend on the particular characteristics of each installation. Nevertheless, one must establish the way in which deflections (arising from, for example, the weight of the fluid) can be avoided and adequate absorption of vibration and cyclic variation (for example in pumping installations), etc. can be performed.



SUBSTITUTION OF TUBES

The couplings can be easily disassembled for maintenance purpose (repair and substitution of tubing, periodic rotation of tubes with the aim of spreading the internal wear and tear arising from residual liquids and other abrasive materials and thus increasing the life-span of the tubing….) Clearly, in order to avoid injuring people and damaging installations, prior to handling the joints, the system must be turned off and internal pressure discharged.



Substitution of tubing component

NOISE, VIBRATION AND INSULATION

The elastomer gaskets and the scheduled separation between tubes help to insulate and absorb noise and vibration as well as minimizing their transmission. The tubes must be insulated using traditional methods.

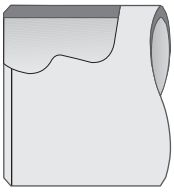
5 SYSTEM APPLICATIONS AND ASSEMBLY INSTRUCTIONS

Throughout their lifetime, grooved joint systems have demonstrated proven efficiency in countless applications, some of which are:

- Fire prevention systems.
- Heating and air-conditioning systems.
- Industrial installations (compressed air, hot and cold water supply, steam, storage installations , various piping networks, etc.).
- Civil engineering projects.
- Pumping installations.
- Construction.
- Petroleum industry.
- Processing plants.

In order to obtain a joint with guaranteed sealing, the assembly must be in accordance with the following guidelines:

1. Correctly cut the tubes perpendicularly to their axes. Check the tubes with the object of ensuring that they contain no dirt, oil, burr, etc. the maximum length of the chamber must not exceed 1.5mm.

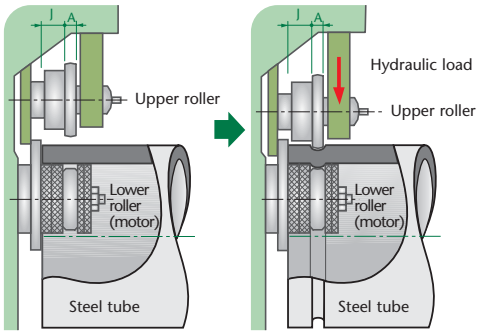


Note: In soldered pipes the weld of the soldering at the ends must be removed in order to prevent the soldering machine from jumping (rolled).

2. Using a suitable machine, make the appropriate grooves at the end of the tubes to be joined. The geometry of the resulting groove must comply with the dimensions specified in tables 6.1 and 6.2 whether it is cut or rolled.. If this is not done, the joint will not be safe. The grooves produced must be kept perfectly clean and free of any irregularity which might produce leakage.

Groove machine

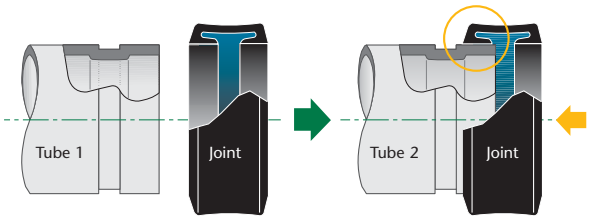
Rolled Groove



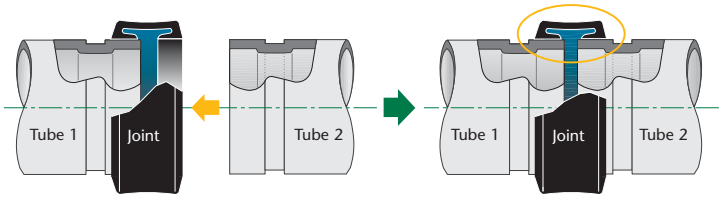
3. Unscrew the screws of the coupling and remove the sealing gasket. For some couplings it is enough to unscrew only one of the ends.

4. Position the gasket in one of the tubing ends ensuring that it does not enter the groove.

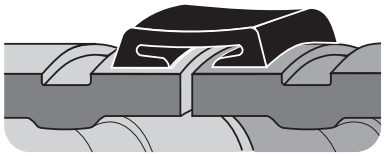
Note: In tubes with big diameters it might be advisable to totally introduce the gasket in the 1st tube, pass it into the 2nd tube and then push it along the 2nd tube in such a way that it is equally divided between both tubes.



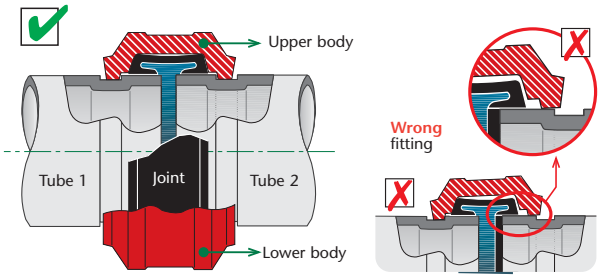
5. Bring the two tubes together, line them up and assemble the sealing gasket at the other end of the tube.



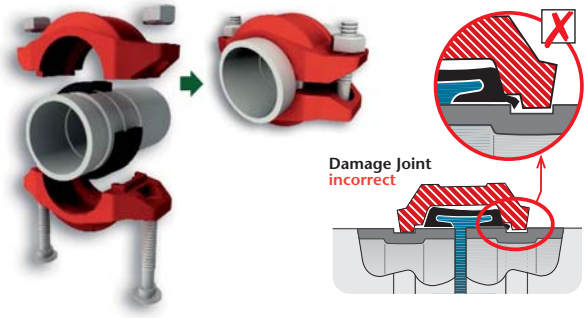
6. Reposition the gasket so that it is centred between the two tubes. It must sit on the surface of both tubes and under no circumstances, even partially, must it touch the grooved area.



7. Next, mount the bodies of the couplings. To do so, place the lower body on the gasket and then locate the upper body on top of it.



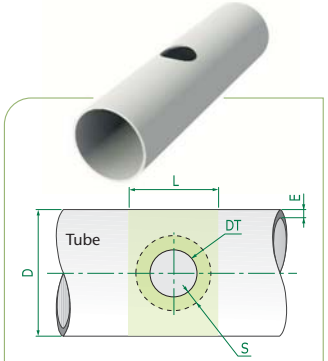
8. Once placed symmetrically, with a suitable tool start to tighten the nuts alternatively. Bear in mind that if the tightening is not done uniformly, there is a chance that the gasket will be nipped.



9. Recommended torque values:

- Up to 2": 40 - 60 Nm
- Between 2" y 4": 105 - 135 Nm
- Between 4" y 6": 135 - 175 Nm
- Between 6" y 8": 175 - 245 Nm
- Between 8" y 12": 245 - 325 Nm

Note: it is advisable to reach metal on metal contact between the bodies of the flexible couplings.

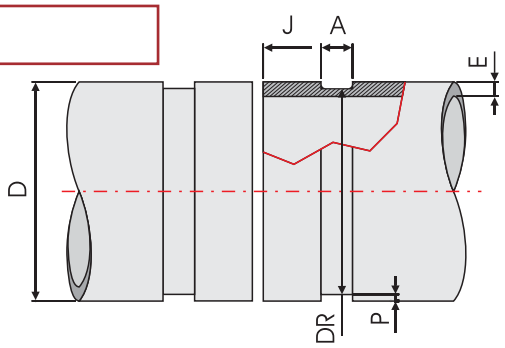


Key:

DT: Diameter of hole
L: Lenght of the seat of the branch
S: Width of the area of the hole (zone of the sealing joint seat)
D: Exterior diameter of steel tube
E: Thickness of wall of steel tube

Care should be taken to maintain the area of around 16mm outside the hole (quota s), along with the section of the tube of length L, free of burr, grease, dirt etc., with the aim of achieving total sealing. The coupling should sit perfectly.

6.1. CUT GROOVE



The diameters of the grooves must have exact dimensions

Table 6.1

Φ	D			J	A	DR		P	E
(DN / ")	(mm / ")			(mm / ")	(mm / ")	(mm / ")		(mm / ")	(mm / ")
Designation of the tube	Exterior diameter of the tube			POSITION of the union (start of the groove)	WIDTH of the groove	Exterior diameter of the groove		Depth of the groove	Minimum thickness of the tube
	Valor Nominal	Tolerances				Nominal value	Tolerances		
		positive	negative				+ 0.000 / + 0.000		
25	33.7	0.33	-0.33	15.88	7.95	30.23	-0.38	1.6	3.38
1"	1.327	0.013	-0.013	0.625	0.313	1.190	-0.015	0.063	0.133
32	42.4	0.41	-0.41	15.88	7.95	38.99	-0.38	1.6	3.56
1 1/4"	1.669	0.016	-0.016	0.625	0.313	1.535	-0.015	0.063	0.14
40	48.3	0.48	-0.48	15.88	7.95	45.09	-0.38	1.6	3.68
1 1/2"	1.900	0.019	-0.019	0.625	0.313	1.779	-0.015	0.063	0.145
50	60.3	0.61	-0.61	15.88	7.95	57.15	-0.38	1.6	3.91
2"	2.375	0.024	-0.024	0.625	0.313	2.250	-0.015	0.063	0.154
65	76.1	0.76	-0.76	15.88	7.95	72.26	-0.46	1.98	4.78
2 1/2"	3.000	0.030	-0.030	0.625	0.313	2.845	-0.018	0.078	0.188
80	88.9	0.89	-0.79	15.88	7.95	84.94	-0.46	1.98	4.78
3"	3.500	0.035	-0.031	0.625	0.313	3.344	-0.018	0.078	0.188
100	114.3	1.14	-0.79	15.88	9.53	110.08	-0.51	2.11	5.16
4"	4.500	0.045	-0.031	0.625	0.375	4.334	-0.020	0.083	0.203
125	139.7	1.42	-0.79	15.88	9.53	135.48	-0.51	2.11	5.16
5"	5.500	0.056	-0.031	0.625	0.375	5.334	-0.020	0.083	0.203
150	165.1	1.6	-0.79	15.88	9.53	160.78	-0.56	2.16	5.56
6 1/2" OD	6.500	0.063	-0.031	0.625	0.375	6.330	-0.022	0.085	0.219
150	168.3	1.6	-0.79	15.88	9.53	163.96	-0.56	2.16	5.56
6"	6.625	0.063	-0.031	0.625	0.375	6.455	-0.022	0.085	0.219
200	219.1	1.60	-0.79	19.05	11.13	214.40	-0.64	2.34	6.05
8"	8.625	0.063	-0.031	0.750	0.438	8.441	-0.025	0.092	0.238
250	273.0	1.6	-0.79	19.05	12.7	268.28	-0.69	2.39	6.35
10"	10.750	0.063	-0.031	0.750	0.500	10.562	-0.027	0.094	0.25
300	323.9	1.60	-0.79	19.05	12.7	318.29	-0.76	2.77	7.09
12"	12.750	0.063	-0.031	0.750	0.500	12.531	-0.030	0.109	0.279

Φ Diameter of the tubing: designated in terms of Nominal Diameter (DN) and inches.

D Exterior diameter of the tubing:
maximum ovulation of 1%.
A square cut end tube without bevel is recommended.
In order not to damage the rollers of the grooves any dirt on the surface must be removed.

J Distance from the end of the tube to the beginning of the groove:
This is the surface where the half of the sealing gasket is gong to sit.
This surface should be perfectly clean and without obstruction. If otherwise, the gasket might not sit perfectly and this could give rise to a **risk of leakage**.

A Width of the Groove:
Its value is fundamental for correct expansion, contraction and angular deviation of the couplings. At the deep end of the groove the maximum radius must not exceed 3.75 mm.

DR Groove Diameter:
This must be perfectly concentric with the outside diameter of the tube and uniform in all its circumvallation.

Note 1: all the measurements are in millimetres (mm) and inches (")
Nota 2: the tolerance for the measurements J and A are :
from 1" a 3" : ± 0.76 mm / ± 0.03"
from 4" a 6" : ± 1.14 mm / ± 0.045"
from 8" a 12" : ± 1.52 mm / ± 0.06"

6.2. ROLLED GROOVE

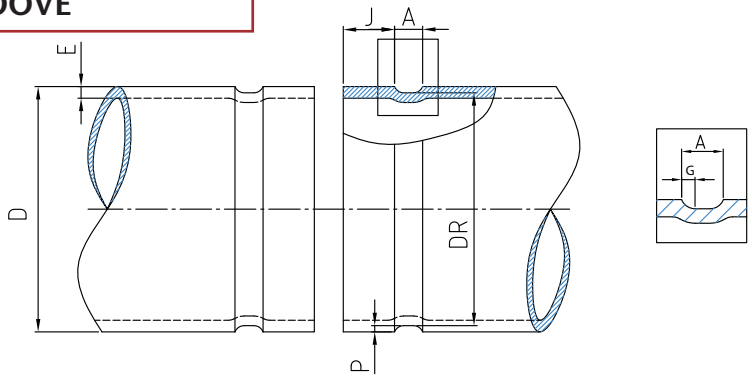


Table 6.2

The diameters of the grooves must have exact dimensions

Φ	D			J	A	DR		P	E	F	G
(DN / ")	(mm / ")			(mm / ")	(mm / ")	(mm / ")		(mm / ")	(mm / ")	(mm / ")	(mm / ")
Designation of the tube	Exterior diameter of the tube			POSITION of the union (start of the groove)	WIDTH of the groove	Exterior diameter of the groove		Depth of the groove	Minimum thickness of the tube	Maximum expansion "flare"	Maximum curve
	Valor Nominal	Tolerances				Nominal value	Tolerances				
		positive	negative				+ 0.000 / + 0.000				
25	33.7	0.33	-0.33	15.88	7.14	30.23	-0.38	1.6	1.65	36.3	2,0
1"	1.327	0.013	-0.013	0.625	0.281	1.190	-0.015	0.063	0.065	1.43	0,079
32	42.4	0.41	-0.41	15.88	7.14	38.99	-0.38	1.6	1.65	45	2,0
1 1/4"	1.669	0.016	-0.016	0.625	0.281	1.535	-0.015	0.063	0.065	1.77	0,079
40	48.3	0.48	-0.48	15.88	7.14	45.09	-0.38	1.6	1.65	51.1	2,0
1 1/2"	1.900	0.019	-0.019	0.625	0.281	1.779	-0.015	0.063	0.065	2.01	0,079
50	60.3	0.61	-0.61	15.88	8.74	57.15	-0.38	1.6	1.65	63	2,0
2"	2.375	0.024	-0.024	0.625	0.344	2.250	-0.015	0.063	0.065	2.48	0,079
65	76.1	0.76	-0.76	15.88	8.74	72.26	-0.46	1.99	2.11	78.7	2,0
2 1/2"	3.000	0.030	-0.030	0.625	0.344	2.845	-0.018	0.078	0.083	3.1	0,079
80	88.9	0.89	-0.79	15.88	8.74	84.94	-0.46	1.98	2.11	91.4	2,0
3"	3.500	0.035	-0.031	0.625	0.344	3.344	-0.018	0.078	0.083	3.6	0,079
100	114.3	1.14	-0.79	15.88	8.74	110.08	-0.51	2.11	2.11	116.8	2,0
4"	4.500	0.045	-0.031	0.625	0.344	4.334	-0.020	0.083	0.083	4.6	0,079
125	139.7	1.42	-0.79	15.88	8.74	135.48	-0.51	2.11	2.77	142.2	2,0
5"	5.500	0.056	-0.031	0.625	0.344	5.334	-0.020	0.083	0.109	5.6	0,079
150	165.1	1.6	-0.79	15.88	8.74	160.78	-0.56	2.16	2.77	167.6	2,0
6 1/2" OD	6.500	0.063	-0.031	0.625	0.344	6.330	-0.022	0.085	0.109	6.6	0,079
150	168.3	1.6	-0.79	15.88	8.74	163.96	-0.56	2.16	2.77	170.9	2,0
6"	6.625	0.063	-0.031	0.625	0.344	6.455	-0.022	0.085	0.109	6.73	0,079
200	219.1	1.60	-0.79	19.05	11.91	214.40	-0.64	2.34	2.77	223.5	1,5
8"	8.625	0.063	-0.031	0.750	0.469	8.441	-0.025	0.092	0.109	8.8	0,059
250	273.0	1.6	-0.79	19.05	11.91	268.28	-0.69	2.39	3.4	277.4	1,5
10"	10.750	0.063	-0.031	0.750	0.469	10.562	-0.027	0.094	0.134	10.92	0,059
300	323.9	1.60	-0.79	19.05	11.91	318.29	-0.76	2.77	3.96	328.2	1,5
12"	12.750	0.063	-0.031	0.750	0.469	12.531	-0.030	0.109	0.156	12.92	0,059

Φ Diameter of the tubing: designated in terms of Nominal Diameter (DN) and inches.

D Exterior diameter of the tubing:
maximum ovulation of 1%.
A square cut end tube without bevel is recommended.
In order not to damage the rollers of the grooves any dirt on the surface must be removed.

J Distance from the end of the tube to the beginning of the groove:
This is the surface where the half of the sealing gasket is gong to sit.
This surface should be perfectly clean and without obstruction. If otherwise, the gasket might not sit perfectly and this could give rise to a **risk of leakage**.

A Width of the Groove:
Its value is fundamental for correct expansion, contraction and angular deviation of the couplings. At the deep end of the groove the maximum radius must not exceed 3.75 mm.

DR Groove Diameter:
Debe ser perfectamente concéntrico con el diámetro exterior del tubo y uniforme en toda su circunvalación.

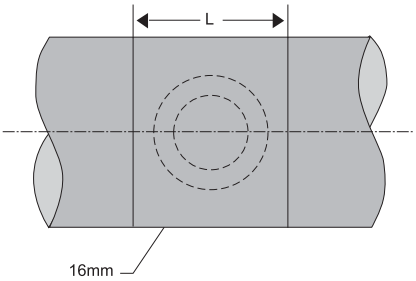
F maximum expansion:
Maximum diameter of the average flare at the end of the tube ("flare Diameter").

Note 1: all the measurements are in millimetres (mm)and inches (").
Note 2: the tolerance for the measurements J and A are :
from 1" to 3" : ± 0.76 mm / ± 0.03"
from 4" to 6" : ± 1.14 mm / ± 0.045"
from 8" to 12" : ± 1.52 mm / ± 0.06"

6.3. PIERCING THE TUBES

When it is necessary to perform a deviation, the hole produced should comply with the tolerances specified below and be correctly situated on the central line of the tube.

In the section of length L and in an area of 16mm around the hole, the surface must be perfectly clean and smooth so that the gasket is perfectly seated. Never flame drill.



DA1 (Branch for sprinkler)

Main tube	Required branch	Hole to execute		Length L (mm)
		Nominal diameter (mm - Inches)	Maximum diameter (mm - Inches)	
DN32 (1 1/4") (Φ ext = 42,4 mm)	DN15 (1/2" - 21,3 mm)	30 - 1.18	31.6 - 1.24	89
	DN20 (3/4" - 26,9 mm)	30 - 1.18	31.6 - 1.24	89
	DN25 (1" - 33,4 mm)	30 - 1.18	31.6 - 1.24	89
DN40 (1 1/2") (Φ ext = 48,3 mm)	DN15 (1/2" - 21,3 mm)	30 - 1.18	31.6 - 1.24	89
	DN20 (3/4" - 26,9 mm)	30 - 1.18	31.6 - 1.24	89
	DN25 (1" - 33,4 mm)	30 - 1.18	31.6 - 1.24	89
DN50 (2") (Φ ext = 60,3 mm)	DN15 (1/2" - 21,3 mm)	30 - 1.18	31.6 - 1.24	89
	DN20 (3/4" - 26,9 mm)	30 - 1.18	31.6 - 1.24	89
	DN25 (1" - 33,4 mm)	30 - 1.18	31.6 - 1.24	89
DN65 (2 1/2") (Φ ext = 76,1 mm)	DN15 (1/2" - 21,3 mm)	30 - 1.18	31.6 - 1.24	89
	DN20 (3/4" - 26,9 mm)	30 - 1.18	31.6 - 1.24	89
	DN25 (1" - 33,4 mm)	30 - 1.18	31.6 - 1.24	89

DS1 and DS2 (Mechanical tee threaded and grooved)

Main tube	Required branch	Hole to execute		Length L (mm)
		Nominal diameter (mm - Inches)	Maximum diameter (mm - Inches)	
DN50 (2") (Φ ext = 60,3 mm)	DN15 (1/2" - 21,3 mm)	38 -1.50	39.6 -1.56	89
	DN20 (3/4" - 26,9 mm)	38 -1.50	39.6 -1.56	89
	DN25 (1" - 33,4 mm)	38 -1.50	39.6 -1.56	89
	DN32 (11/4" - 42,4 mm)	45 -1.75	46.6 -1.83	102
	DN40 (11/2" - 48,3 mm)	45 -1.75	46.6 -1.83	102
DN65 (2 1/2") (Φ ext = 76,1 mm)	DN15 (1/2" - 21,3 mm)	38 -1.50	39.6 -1.56	89
	DN20 (3/4" - 26,9 mm)	38 -1.50	39.6 -1.56	89
	DN25 (1" - 33,4 mm)	38 -1.50	39.6 -1.56	89
	DN32 (11/4" - 42,4 mm)	51 -2.00	52.6 -2.07	102
	DN40 (11/2" - 48,3 mm)	51 -2.00	52.6 -2.07	102
DN80 (3") (Φ ext = 88,9 mm)	DN15 (1/2" - 21,3 mm)	38 -1.50	39.6 -1.56	89
	DN20 (3/4" - 26,9 mm)	38 -1.50	39.6 -1.56	89
	DN25 (1" - 33,4 mm)	38 -1.50	39.6 -1.56	89
	DN32 (11/4" - 42,4 mm)	51 -2.00	52.6 -2.07	102
	DN40 (11/2" - 48,3 mm)	51 -2.00	52.6 -2.07	102
	DN50 (2" - 60,3 mm)	64 -2.50	65.6 -2.58	114
DN100 (4") (Φ ext = 114,3 mm)	DN15 (1/2" - 21,3 mm)	38 -1.50	39.6 -1.56	89
	DN20 (3/4" - 26,9 mm)	38 -1.50	39.6 -1.56	89
	DN25 (1" - 33,4 mm)	38 -1.50	39.6 -1.56	89
	DN32 (11/4" - 42,4 mm)	51 -2.00	52.6 -2.07	102
	DN40 (11/2" - 48,3 mm)	51 -2.00	52.6 -2.07	102
	DN50 (2" - 60,3 mm)	64 -2.50	65.6 -2.58	114
	DN65 (21/2" - 76,1mm)	70 -2.75	71.6 -2.82	120
	DN80 (3" - 88,9 mm)	89 -3.50	90.6 -3.57	140
DN125 (5") (Φ ext = 139,7 mm)	DN32 (11/4" - 42,4 mm)	51 -2.00	52.6 -2.07	102
	DN40 (11/2" - 48,3 mm)	51 -2.00	52.6 -2.07	102
	DN50 (2" - 60,3 mm)	64 -2.50	65.6 -2.58	114
	DN65 (21/2" - 76,1mm)	70 -2.75	71.6 -2.82	120
DN150 (61/2" OD) (Φ ext = 165,1 mm)	DN50 (2" - 60,3 mm)	64 -2.50	65.6 -2.58	114
	DN65 (21/2" - 76,1mm)	70 -2.75	71.6 -2.82	120
DN150 (6") (Φ ext = 168,3 mm)	DN32 (11/4" - 42,4 mm)	51 -2.00	52.6 -2.07	102
	DN40 (11/2" - 48,3 mm)	51 -2.00	52.6 -2.07	102
	DN50 (2" - 60,3 mm)	64 -2.50	65.6 -2.58	114
	DN65 (21/2" - 76,1mm)	70 -2.75	71.6 -2.82	120
	DN80 (3" - 88,9 mm)	89 -3.50	90.6 -3.57	140
	DN100 (4" - 114,3 mm)	114 -4.50	115.6 -4.55	165
DN200 (8") (Φ ext = 219,1 mm)	DN50 (2" - 60,3 mm)	64 -2.50	65.6 -2.58	114

6.4. LINEAR AND ANGULAR MOVEMENT

Nominal diameter of the tube DN / inchees	Separation between the tube ends (mm)
de 25 a 80 de 1" a 3"	0 a 3.2
de 100 a 300 de 4" a 12"	3.2 a 6.4

The maximum value of linear movement is the difference between the maximum and the minimum separation between the tubes and the joint. When the groove has been produced by rolling, the specified value must be reduced by 50%.

The angle of curve with respect to the central line of the tubing is calculated using the following formula:

Ø = Arc tan (resulting linear movement / outside diameter).

Note 1: the resulting linear movement is that specified in the previous section.
Note 2: in rolled groove tubes the previous value must be reduced by 50%.

Example:
- 3" tubing: outside diameter of 88.9mm
- Permitted margin of movement 0 – 3.2 mm
- Linear movement adjustment: 50%
- Resulting linear movement 3.2 x 0.5 = 1.6mm
- Approximate angle of curve permitted:

Ø = Arc tan (resulting linear movement / outside diameter) = $\tan^{-1}$ (1.6/88.9) = 1.03º

6.5. ELECTRICAL CONTINUITY

Special attention must be given to the electrical continuity since, with the existence of joints with rubber gaskets, this could be interrupted. Therefore continuity and earthing must be tested or consult your supplier.

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