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STAINLESS STEEL

DESIGN & INSTALLATION GUIDE

STAINLESS STEEL TUBE AND PRESS FIT SYSTEM FOR WATER, GAS AND INDUSTRY

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KEMBLA STAINLESS TUBE AND KEMPRESS® STAINLESS FITTINGS, OFFERING ALL OF THE BENEFITS OF STAINLESS STEEL AND NOW EVEN EASIER TO INSTALL.

CONTENTS

SECTION 1
INTRODUCTION

MM Kembla has combined the experience and knowledge of nearly 100 years of Australian metal tube manufacturing with German engineering to produce the Kembla Stainless tube and KemPress® Stainless press-fit connection system. With a warranty of 25 years for potable water and fuel gas applications, and a design life of over 50 years, KemPress® Stainless offers you peace of mind and the simplicity that you want.

Kembla Stainless Steel Tube and KemPress® Stainless press fittings, have been optimised for combined use. When you need the highest quality stainless steel press-fit system, use Kembla Stainless steel tube, KemPress® Stainless fittings and the KemPress® press tools. Our press tools are of the highest quality, are the lightest on the market and have the longest intervals between servicing.

Fast and Easy to use

- Considerably faster than traditional jointing methods
- No need to drain water out of the system
- No waiting for adhesives to set

Safe, Heat-free, Flame-free connections

- No hot works permit required
- Ideal for retrofit projects

High Quality 316L stainless steel tube

- Low carbon (<0.03%) and a minimum 2.3% Molybdenum content ensures even higher corrosion resistance
- Sizes 15 – 108mm
- Compliant with AS 5200.053
- Watermark Approval # 23151

High Quality 316L stainless steel press fittings

- Compliant with AS3688
- 316L, material EN 1.4404 (press fittings)
- 316Ti, material EN 1.4571 (threaded parts)
- 316, material EN 1.4408 (precision cast parts)
- Watermark Approval # 23087 (EPDM and FKM O-rings)

Push and Stay and Leak Path Features

- Fitting is tight enough to complete the rough-in before securing placement by pressing for easier installation
- Leak Path ensures efficient checking of joint integrity, joints will leak if not pressed (Standard EPDM O-ring only)

High Quality, Lightweight KemPress® tools

- Same tools as used for the KemPress® Copper system, simply change the jaws, adaptors and slings to suit the materials and press profile as required.
- Slim, lightweight and ergonomic design
- One hand operation (KPS and KPL). Once the jaws are inserted the weight is balanced
- Smart Electronic controls
- Longest intervals between servicing
- KPXL 40,000 presses (15 – 108 mm)
- KPL 40,000 presses (15 – 54 mm)
- KPS 35,000 presses (15 – 28 mm)
- Loan tool provided while servicing
- Two powerful Li-ion batteries included
- Backed by MM Kembla's reputation for high quality products, service and customer care

AS 5200.053

23151

AS 3688

23087

"Push and Stay" and "Leak Path" Features

KemPress® Stainless press fittings are designed to provide a tight fit when pushed together to allow the rough-in to be completed prior to pressing. This ensures you have the right design and tube placement and allows you to make adjustments, if required, prior to pressing. This is especially beneficial for vertical installations.

KemPress® Stainless standard fittings, with EPDM O-rings, also feature a built-in leak path so they visibly leak prior to pressing, making the process of checking all joints are pressed and sealed more efficient.

Note: Due to potential movement between test fitting and pressing, it is important to check that you have full engagement of your fittings on the tube prior to pressing. See Section 3 "Installation Guidelines" for further details.

Press Profile

The KemPress® fittings are designed to deliver minimal deformation to the internal shape of the tube they are connecting to, reducing turbulence in the flow of the medium being conveyed.

The connection provides a rigid coupling with excellent resistance to torsional forces. This is particularly beneficial when connecting mechanical threaded connections.

Press Process

The objective of the press process is to deliver a permanent connection while achieving the required pullout strength according to AS3688. The KemPress® process presses the lip of the fitting and compresses the O-ring at the same time.

SECTION 2

DESIGN CONSIDERATIONS

2.1 KEMBLA STAINLESS STEEL TUBE

Kembla Stainless tube is 316L grade (EN 1.4404) complying with DIN EN 10088, fabricated according to DIN EN 10312 and DVGW - W 541 and is supplied as straight 6m lengths with outside diameters in the range 15mm – 108mm. It is compliant with AS 5200.053 and has Watermark Approval #23151. Kembla Stainless tubes combine low carbon, at less than 0.03%, with a minimum molybdenum content of 2.3% for improved corrosion resistance.

Low carbon, austenitic stainless steel is roll formed and then longitudinally plasma-inert gas-welded to precisely form the tubes. Kembla Stainless tubes are bright annealed and solution heat-treated, resulting in an attractive, hygienic and highly durable product.

AS 5200.053

23151

Table 1: Kembla Stainless Tube Specifications							
Nominal Size	Outside Diameter mm	Wall Thickness mm	Dry Weight kg/m	Wet Weight,filled with water kg/m	Volume l/m	Tube Length mm	6m Tube Mass kg
DN15	15	1.0	0.351	0.484	0.133	6000	2.11
DN20	22	1.2	0.625	0.928	0.302	6000	3.75
DN25	28	1.2	0.805	1.321	0.515	6000	4.83
DN32	35	1.5	1.258	2.064	0.804	6000	7.55
DN40	42	1.5	1.521	2.718	1.195	6000	9.13
DN50	54	1.5	1.972	4.017	2.043	6000	11.83
DN65	76.1	2.0	3.711	7.798	4.083	6000	22.27
DN100	108	2.0	5.308	13.810	8.495	6000	31.85

For designers familiar with designing with copper, Table 2 provides a quick reference comparing bore size and safe working pressures for Kembla Type B copper tube with KemPress® Copper press fittings and the KemPress® Stainless system.

Table 2: Comparison of Kembla Copper Type B KemPress® vs. Kembla Stainless KemPress® - Potable Water										
Kembla Copper Type B Tube with KemPress® Copper Fittings							Kembla Stainless Tube and KemPress® Stainless Fittings			
Nom Size	OD mm	WT mm	Bore mm	Tube Only SWP 50°C	KemPress® SWP# 50°C	KemPress® SWP# 120°C with EPDM Seal	OD mm	WT mm	Bore mm	SWP# up to 120°C with EPDM Seal
DN12	12.7	0.91	10.88	5290	1600	1600				
							15	1.00	13.00	4000#
DN18*	15.88	1.02	13.84	4810						
DN20	19.05	1.02	17.01	3970	1600	1600				
							22	1.20	19.60	4000#
DN25	25.4	1.22	22.96	3500	1600	1600				
							28	1.20	25.60	2500#
DN32	31.75	1.22	29.31	2780	1600	1600				
							35	1.50	32.00	2500#
DN40	38.1	1.22	35.66	2300	1600	1600				
							42	1.50	39.00	1600#
DN50	50.8	1.22	48.36	1710	1600	1370				
							54	1.50	51.00	1600#
DN65	63.5	1.22	61.06	1370	1370	1100				
DN80*	76.2	1.63	72.94	1520			76.1	2.00	72.10	1600#
DN90*	88.9	1.63	85.64	1300						
DN100*	101.6	1.63	98.34	1200						
							108	2.00	104.00	1600#

* Sizes not available in KemPress® Copper at time of publication # Higher pressures may be approved by MM Kembla and may require the use of high pressure pressing tools and special jaws and slings. Please contact MM Kembla for individual project assessment.

2.2 KEMPRESS® STAINLESS FITTINGS

KemPress® Stainless fittings are manufactured and quality controlled to AS3688, with 316L (material EN1.4404) for parts made from tube, 316Ti (material EN1.4571) for threaded fittings and 316 (material 1.4408) for precision cast fittings, all having Watermark Approval # 23087 for Standard (EPDM) and Industry (FKM) fittings.

All KemPress® fittings are optimally designed to ensure the most effective joint formation, achieving or exceeding the hydraulic and structural requirements of standards and are fully supported by the MM Kembla warranty of up to 25 years. KemPress® Stainless fittings up to and including 54mm have a leading lip, whereas, the 76.1 mm and 108 mm press fittings do not.

AS 3688

23087

KemPress® Stainless fittings up to and including 54 mm have a leading lip prior to the O-ring.

KemPress® Stainless fittings 76.1 mm and 108 mm do not have a leading lip prior to the O-ring.

2.3 KEMPRESS® STAINLESS O-RINGS

KemPress® Stainless press-fit fittings are available with three different O-rings depending on the application. Each type of O-ring is made of a different material, black coloured EPDM for Standard fittings, red coloured FKM for Industry fittings and yellow coloured HNBR for Gas fittings. Please reference the KemPress® Stainless Application Guide, available from MM Kembla, to determine the most appropriate fitting type for the application. Fittings without sealing elements, such as bends with plain tube ends and threaded adaptors with plain tube ends, may be used in combination with any of the fittings with elastomeric seals.

Industry press fittings are clearly marked on the fittings and also on the packaging with a distinctive red colour and the letters HT (high temperature). Gas press fittings are clearly marked on the fittings and also on the packaging with a distinctive yellow colour and the word GAS.

It is essential that the O-rings are correctly positioned in the press fitting O-ring recess and not contaminated or damaged by foreign material such as stainless steel swarf, or sharp metal at the tube ends following cutting. The O-rings are pre-lubricated and are ready to use. If additional lubricant is required it is recommended to use a small amount of silicone grease, ensuring it is PTFE-free.

KemPress® Stainless Standard O-Rings

Standard press fittings utilise a black EPDM (Ethylene Propylene Diene Monomer) O-ring. EPDM possesses excellent resistance to ozone, sunlight and weathering, has very good flexibility at low temperature and good chemical resistance, such as to many dilute acids and alkalis and polar solvents.

This O-ring is suitable for hot and cold potable water applications and some industrial applications. It is not suitable for aromatic hydrocarbons, di-ester based lubricants, halogenated solvents or petroleum based oils and greases.

For applications with temperatures exceeding 120°C and/or media other than potable water, please reference the KemPress® Stainless Application Guide, available from MM Kembla, to determine a suitable combination of tube and O-ring. Please contact MM Kembla for guidance if in doubt.

KemPress® Stainless Industry O-Rings

Industry press fittings utilise a FKM (Fluorocarbon) O-Ring. FKM has excellent resistance to high temperatures up to 200°C (depending on the medium), ozone, weather, oxygen, mineral oil, fuels, hydraulic fluids, aromatics and many organic solvents and chemicals.

It is ideal for petroleum products, fuels including those blended with ethanol or methanol, diesel, biodiesel, mineral oils and greases, silicone oils and greases, high vacuum, strong acids, ozone, weather and very high temperatures.

It isn't suitable for ketones, low molecular weight organic acids (e.g. formic and acetic), super heated steam, low molecular weight esters and ethers or phosphate based hydraulic fluids.

Industry fittings have a red coloured O-ring and are clearly marked with distinctive red HT symbol.

Please consult the KemPress® Stainless Application Guide to determine a suitable combination of tube and O-ring and contact MM Kembla for further guidance if in doubt.

KemPress® Stainless Gas O-Rings

Gas press fittings utilise a HNBR (Hydrogenated Nitrile Butadiene Rubber) O-ring sealing element. HNBR, compared to standard Nitrile, possesses superior mechanical properties and improved resistance to heat, ozone and chemicals.

HNBR has been used for decades in automotive and industrial applications. It is well suited to propane, butane and natural gas (methane). It is not suitable for drinking water.

Gas press fittings have a yellow O-ring and are clearly marked with a distinctive yellow colour and the word GAS.

Whilst fuel gas standards call for working temperatures of up to 70°C, the KemPress® Stainless HNBR gas O-ring is certified for operating temperatures up to 100°C.

Please reference the KemPress® Stainless Application Guide, available from MM Kembla, to determine a suitable combination of tube and O-ring and contact MM Kembla for further guidance if in doubt

Table 3: KemPress® Stainless O-Ring Specifications

Colour Code	Black	Red	Yellow
Fitting Type	Standard	Industry	Gas
Material Code	EPDM	FKM	HNBR
Material	Ethylene Propylene Diene Monomer	Fluorocarbon	Hydrogenated Nitrile Butadiene Rubber
Maximum Continuous Temperature Range °C	-30°C up to 120°C	-20°C up to 200°C (depending on the medium)	-20°C up to 100°C
Peak Short Term Max. Temp °C	150°C	280°C	100°C

2.4 DESIGN PRESSURES

Table 4: KemPress® Stainless Design Pressures Using Standard Tools, Jaws and Slings		
Application	**Pipe External Diameter**	**Safe Working Pressure**
Water and Aqueous Solutions	d ≤ 22mm	40 bar
	d = 28-35mm	25 bar
	d = 42-108mm	16 bar
Flammable/Fuel Gases	d ≤ 108mm	5 bar
Technical Gases & Compressed Air (Non-Toxic, Non-Flammable)	d ≤ 108mm	16 bar
Fire Sprinkler Systems*	d = 22-76.1mm	16 bar (EPDM & FKM for VdS) 12 bar (EPDM & FKM for FM)
	d = 108 mm	12.5 bar (EPDM only for VdS) 12 bar (EPDM & FKM for FM)

* For further information please refer to "Fire Systems" in Section 2.11 of this document

For applications other than flammable gases and technical gases, e.g. water and compressed air, pressures higher than those shown in Table 4 may be approved by MM Kembla. Depending on the application variables, including the medium being conveyed, pressures and temperatures, the use of high pressure pressing tools and special jaws and slings may be required to achieve these higher pressures. Please contact MM Kembla for project assessment and warranty information.

Vacuum Applications

KemPress® Stainless has been tested and approved to operate safely at up to -0.95 bar for vacuum applications.

2.5 SYSTEM PRESSURE LOSSES

System pressure losses are calculated by taking into consideration tube friction pressure losses and individual fittings pressure losses.

2.5.1 Kembla Stainless Tube Friction Pressure Losses

The friction pressure losses "R" (Pa/metre) and the flow velocity "v" (metres per second) depend on the flow rate "V" (litres per second) and the drinking water temperature "ϑ" (°C) for the Kembla Stainless tube. The average tube roughness of Kembla Stainless tube is K = 0.0015 mm.

The following tables provide estimates of friction pressure losses for Kembla Stainless tube with potable water at 10°C and at 60°C.

Table 5A: Kembla Stainless Tube Friction Pressure Loss at 10°C				
OD x WT (mm)	15 x 1		22 x 1.2	
Bore (mm)	13.0		19.6	
Volume (l/m)	0.13		0.30	
V (l/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)
0.07	397.2	0.53	57.4	0.23
0.08	499.6	0.60	72.1	0.27
0.09	612.1	0.68	88.1	0.30
0.10	734.2	0.75	105.5	0.33
0.12	1006.9	0.90	144.3	0.40
0.14	1316.3	1.05	188.2	0.46
0.16	1661.2	1.21	237.1	0.53
0.18	2040.8	1.36	290.7	0.60
0.20	2454.2	1.51	349.0	0.66
0.22	2900.7	1.66	412.0	0.73
0.24	3379.8	1.81	479.4	0.80
0.26	3891.0	1.96	551.2	0.86
0.28	4433.8	2.11	627.4	0.93
0.30	5007.7	2.26	707.9	0.99
0.32	5612.4	2.41	792.6	1.06
0.34	6247.6	2.56	881.5	1.13
0.36	6912.9	2.71	974.5	1.19
0.38	7608.1	2.86	1071.6	1.26
0.40	8332.7	3.01	1172.7	1.33
0.42	9086.7	3.16	1277.9	1.39
0.44	9869.8	3.31	1387.0	1.46
0.46	10681.7	3.47	1500.0	1.52
0.48	11522.3	3.62	1617.0	1.59
0.50	12391.3	3.77	1737.8	1.66
0.52	13288.6	3.92	1862.5	1.72
0.54	14214.0	4.07	1990.9	1.79
0.56	15167.3	4.22	2123.2	1.86
0.58	16148.3	4.37	2259.2	1.92
0.60	17157.0	4.52	2399.0	1.99
0.62	18193.2	4.67	2542.5	2.05
0.64	19256.6	4.82	2689.7	2.12
0.66	20347.4	4.97	2840.6	2.19
0.68	21465.1	5.12	2995.1	2.25
0.70			3153.3	2.32
0.75			3564.6	2.49
0.80			3998.2	2.65
0.85			4454.0	2.82
0.90			4931.7	2.98
0.95			5431.1	3.15
1.00			5952.0	3.31
1.05			6494.3	3.48
1.10			7057.8	3.65
1.15			7642.3	3.81
1.20			8247.6	3.98
1.30			9520.5	4.31
1.40			10875.4	4.64
1.50			12311.5	4.97

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Table 5B: Kembla Stainless Tube Friction Pressure Loss at 10°C								
OD x WT (mm)	28 x 1.2		35 x 1.5		42 x 1.5		54 x 1.5	
Bore (mm)	25.6		32.0		39.0		51.0	
Volume (l/m)	0.51		0.80		1.19		2.04	
V (l/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)
0.25	145.0	0.49	50.4	0.31	19.8	0.21	5.59	0.12
0.30	199.1	0.58	69.1	0.37	27.1	0.25	7.64	0.15
0.35	260.5	0.68	90.4	0.44	35.4	0.29	9.95	0.17
0.40	329.0	0.78	114.0	0.50	44.6	0.33	12.53	0.20
0.45	404.4	0.87	140.0	0.56	54.8	0.38	15.36	0.22
0.50	486.5	0.97	168.3	0.62	65.8	0.42	18.44	0.24
0.55	575.2	1.07	198.9	0.68	77.7	0.46	21.76	0.27
0.60	670.5	1.17	231.6	0.75	90.4	0.50	25.31	0.29
0.65	772.1	1.26	266.6	0.81	104.0	0.54	29.10	0.32
0.70	880.1	1.36	303.7	0.87	118.4	0.59	33.11	0.34
0.75	994.2	1.46	342.9	0.93	133.7	0.63	37.35	0.37
0.80	1114.5	1.55	384.2	0.99	149.7	0.67	41.81	0.39
0.85	1240.8	1.65	427.6	1.06	166.6	0.71	46.49	0.42
0.90	1373.1	1.75	473.0	1.12	184.2	0.75	51.38	0.44
0.95	1511.4	1.85	520.4	1.18	202.6	0.80	56.49	0.47
1.00	1655.5	1.94	569.8	1.24	221.8	0.84	61.81	0.49
1.25	2462.7	2.43	846.3	1.55	328.9	1.05	91.50	0.61
1.50	3410.2	2.91	1170.3	1.87	454.3	1.26	126.21	0.73
1.75	4494.0	3.40	1540.3	2.18	597.4	1.46	165.76	0.86
2.00	5710.8	3.89	1955.3	2.49	757.6	1.67	210.01	0.98
2.25	7057.7	4.37	2414.1	2.80	934.7	1.88	258.84	1.10
2.50	8532.7	4.86	2916.0	3.11	1128.3	2.09	312.17	1.22
2.75	10133.6	5.34	3460.3	3.42	1338.0	2.30	369.92	1.35
3.00			4046.3	3.73	1563.6	2.51	431.99	1.47
3.25			4673.5	4.04	1805.0	2.72	498.34	1.59
3.50			5341.4	4.35	2061.9	2.93	568.90	1.71
3.75			6049.5	4.66	2334.1	3.14	643.63	1.84
4.00			6797.6	4.97	2621.4	3.35	722.46	1.96
4.25			7585.1	5.28	2923.8	3.56	805.37	2.08
4.50					3241.0	3.77	892.31	2.20
4.75					3573.0	3.98	983.24	2.33
5.00					3919.7	4.19	1078.12	2.45
5.25					4280.8	4.39	1176.94	2.57
5.50					4656.4	4.60	1279.64	2.69
5.75					5046.3	4.81	1386.22	2.81
6.00					5450.5	5.02	1496.64	2.94
6.25					5868.8	5.23	1610.87	3.06
6.50							1728.89	3.18
6.75							1850.69	3.30
7.00							1976.23	3.43
7.25							2105.50	3.55
7.50							2238.48	3.67
8.00							2515.48	3.92
8.50							2807.12	4.16
9.00							3113.24	4.41
9.50							3433.75	4.65
10.00							3768.53	4.90

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Table 5C: Kembla Stainless Tube Friction Pressure Loss at 10°C				
OD x WT (mm)	76.1 x 2		108 x 2	
Bore (mm)	72.1		104.0	
Volume (l/m)	4.08		8.49	
V (l/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)
1.50	24.3	0.37	4.25	0.18
1.75	31.8	0.43	5.57	0.21
2.00	40.2	0.49	7.04	0.24
2.25	49.5	0.55	8.65	0.26
2.50	59.7	0.61	10.41	0.29
2.75	70.7	0.67	12.32	0.32
3.00	82.5	0.73	14.36	0.35
3.50	108.4	0.86	18.85	0.41
4.00	137.5	0.98	23.88	0.47
4.50	169.7	1.10	29.42	0.53
5.00	204.8	1.22	35.48	0.59
5.50	242.8	1.35	42.03	0.65
6.00	283.7	1.47	49.07	0.71
6.50	327.5	1.59	56.60	0.77
7.00	374.0	1.71	64.60	0.82
7.50	423.4	1.84	73.07	0.88
8.00	475.4	1.96	82.00	0.94
8.50	530.2	2.08	91.39	1.00
9.00	587.6	2.20	101.24	1.06
9.50	647.8	2.33	111.53	1.12
10.00	710.5	2.45	122.27	1.18
11.00	843.8	2.69	145.07	1.29
12.00	987.4	2.94	169.61	1.41
13.00	1141.2	3.18	195.87	1.53
14.00	1305.0	3.43	223.81	1.65
15.00	1478.8	3.67	253.43	1.77
16.00	1662.4	3.92	284.70	1.88
17.00	1855.7	4.16	317.60	2.00
18.00	2058.7	4.41	352.12	2.12
19.00	2271.3	4.65	388.26	2.24
20.00	2493.4	4.90	425.98	2.35
21.00	2725.0	5.14	465.28	2.47
22.00	2966.0	5.39	506.15	2.59
23.00			548.58	2.71
24.00			592.56	2.83
25.00			638.08	2.94
26.00			685.12	3.06
27.00			733.68	3.18
28.00			783.76	3.30
29.00			835.34	3.41
30.00			888.41	3.53
32.00			999.02	3.77
34.00			1115.53	4.00
36.00			1237.89	4.24
38.00			1366.05	4.47
40.00			1499.98	4.71
42.50			1675.44	5.00

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Table 6A: Kembla Stainless Tube Friction Pressure Loss at 60°C				
OD x WT (mm)	15 x 1		22 x 1.2	
Bore (mm)	13.0		19.6	
Volume (l/m)	0.13		0.30	
V (l/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)
0.07	298.1	0.53	42.4	0.23
0.08	376.7	0.60	53.5	0.27
0.09	463.3	0.68	65.7	0.30
0.10	557.8	0.75	78.9	0.33
0.12	769.7	0.90	108.6	0.40
0.14	1011.3	1.05	142.4	0.46
0.16	1281.9	1.21	180.1	0.53
0.18	1580.9	1.36	221.7	0.60
0.20	1907.7	1.51	267.1	0.66
0.22	2261.8	1.66	316.2	0.73
0.24	2643.0	1.81	368.9	0.80
0.26	3050.7	1.96	425.3	0.86
0.28	3484.8	2.11	485.2	0.93
0.30	3944.9	2.26	548.6	0.99
0.32	4430.8	2.41	615.4	1.06
0.34	4942.2	2.56	685.7	1.13
0.36	5479.0	2.71	759.3	1.19
0.38	6041.0	2.86	836.4	1.26
0.40	6627.9	3.01	916.7	1.33
0.42	7239.7	3.16	1000.4	1.39
0.44	7876.2	3.31	1087.4	1.46
0.46	8537.2	3.47	1177.6	1.52
0.48	9222.7	3.62	1271.0	1.59
0.50	9932.4	3.77	1367.7	1.66
0.52	10666.3	3.92	1467.5	1.72
0.54	11424.3	4.07	1570.6	1.79
0.56	12206.3	4.22	1676.8	1.86
0.58	13012.1	4.37	1786.1	1.92
0.60	13841.8	4.52	1898.6	1.99
0.62	14695.2	4.67	2014.2	2.05
0.64	15572.1	4.82	2132.9	2.12
0.66	16472.7	4.97	2254.6	2.19
0.68	17396.7	5.12	2379.5	2.25
0.70			2507.4	2.32
0.75			2840.5	2.49
0.80			3192.4	2.65
0.85			3563.1	2.82
0.90			3952.4	2.98
0.95			4360.1	3.15
1.00			4786.2	3.31
1.05			5230.5	3.48
1.10			5692.9	3.65
1.15			6173.3	3.81
1.20			6671.6	3.98
1.30			7721.8	4.31
1.40			8842.8	4.64
1.50			10034.0	4.97

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Table 6B: Kembla Stainless Tube Friction Pressure Loss at 60°C								
OD x WT (mm)	28 x 1.2		35 x 1.5		42 x 1.5		54 x 1.5	
Bore (mm)	25.6		32.0		39.0		51.0	
Volume (l/m)	0.51		0.80		1.19		2.04	
V (l/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)
0.25	110.7	0.49	38.2	0.31	14.9	0.21	4.17	0.12
0.30	152.8	0.58	52.7	0.37	20.5	0.25	5.73	0.15
0.35	200.9	0.68	69.2	0.44	26.9	0.29	7.51	0.17
0.40	254.7	0.78	87.6	0.50	34.1	0.33	9.49	0.20
0.45	314.2	0.87	108.0	0.56	42.0	0.38	11.68	0.22
0.50	379.2	0.97	130.2	0.62	50.6	0.42	14.06	0.24
0.55	449.6	1.07	154.3	0.68	59.9	0.46	16.63	0.27
0.60	525.3	1.17	180.1	0.75	69.9	0.50	19.40	0.29
0.65	606.4	1.26	207.8	0.81	80.6	0.54	22.35	0.32
0.70	692.6	1.36	237.2	0.87	91.9	0.59	25.49	0.34
0.75	784.0	1.46	268.3	0.93	104.0	0.63	28.81	0.37
0.80	880.5	1.55	301.2	0.99	116.6	0.67	32.30	0.39
0.85	982.0	1.65	335.8	1.06	130.0	0.71	35.98	0.42
0.90	1088.5	1.75	372.0	1.12	143.9	0.75	39.83	0.44
0.95	1200.0	1.85	409.9	1.18	158.6	0.80	43.85	0.47
1.00	1316.4	1.94	449.5	1.24	173.8	0.84	48.05	0.49
1.25	1971.1	2.43	671.7	1.55	259.3	1.05	71.55	0.61
1.50	2744.4	2.91	933.6	1.87	359.9	1.26	99.16	0.73
1.75	3633.7	3.40	1234.1	2.18	475.2	1.46	130.75	0.86
2.00	4636.7	3.89	1572.5	2.49	604.9	1.67	166.22	0.98
2.25	5751.8	4.37	1948.1	2.80	748.6	1.88	205.50	1.10
2.50	6977.6	4.86	2360.3	3.11	906.2	2.09	248.50	1.22
2.75	8313.0	5.34	2808.8	3.42	1077.5	2.30	295.18	1.35
3.00			3293.0	3.73	1262.3	2.51	345.48	1.47
3.25			3812.7	4.04	1460.3	2.72	399.36	1.59
3.50			4367.5	4.35	1671.6	2.93	456.77	1.71
3.75			4957.2	4.66	1896.0	3.14	517.69	1.84
4.00			5581.6	4.97	2133.4	3.35	582.07	1.96
4.25			6240.3	5.28	2383.6	3.56	649.89	2.08
4.50					2646.7	3.77	721.11	2.20
4.75					2922.4	3.98	795.72	2.33
5.00					3210.8	4.19	873.69	2.45
5.25					3511.8	4.39	955.00	2.57
5.50					3825.3	4.60	1039.63	2.69
5.75					4151.2	4.81	1127.56	2.81
6.00					4489.6	5.02	1218.77	2.94
6.25					4840.3	5.23	1313.24	3.06
6.50							1410.97	3.18
6.75							1511.93	3.30
7.00							1616.11	3.43
7.25							1723.50	3.55
7.50							1834.08	3.67
8.00							2064.79	3.92
8.50							2308.15	4.16
9.00							2564.07	4.41
9.50							2832.49	4.65
10.00							3113.33	4.90

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Table 6C: Kembla Stainless Tube Friction Pressure Loss at 10°C				
OD x WT (mm)	76.1 x 2		108 x 2	
Bore (mm)	72.1		104.0	
Volume (l/m)	4.08		8.49	
V (l/s)	R (Pa/m)	v (m/s)	R (Pa/m)	v (m/s)
1.50	18.9	0.37	3.28	0.18
1.75	24.8	0.43	4.31	0.21
2.00	31.5	0.49	5.46	0.24
2.25	38.9	0.55	6.73	0.26
2.50	47.0	0.61	8.12	0.29
2.75	55.8	0.67	9.63	0.32
3.00	65.3	0.73	11.25	0.35
3.50	86.1	0.86	14.83	0.41
4.00	109.6	0.98	18.84	0.47
4.50	135.6	1.10	23.29	0.53
5.00	164.1	1.22	28.14	0.59
5.50	195.0	1.35	33.42	0.65
6.00	228.4	1.47	39.09	0.71
6.50	264.1	1.59	45.17	0.77
7.00	302.2	1.71	51.64	0.82
7.50	342.6	1.84	58.50	0.88
8.00	385.3	1.96	65.75	0.94
8.50	430.4	2.08	73.38	1.00
9.00	477.7	2.20	81.39	1.06
9.50	527.2	2.33	89.78	1.12
10.00	579.0	2.45	98.54	1.18
11.00	689.3	2.69	117.17	1.29
12.00	808.4	2.94	137.26	1.41
13.00	936.2	3.18	158.79	1.53
14.00	1072.7	3.43	181.75	1.65
15.00	1217.7	3.67	206.13	1.77
16.00	1371.3	3.92	231.90	1.88
17.00	1533.3	4.16	259.07	2.00
18.00	1703.7	4.41	287.61	2.12
19.00	1882.5	4.65	317.52	2.24
20.00	2069.5	4.90	348.79	2.35
21.00	2264.8	5.14	381.41	2.47
22.00	2468.4	5.39	415.37	2.59
23.00			450.67	2.71
24.00			487.29	2.83
25.00			525.24	2.94
26.00			564.50	3.06
27.00			605.07	3.18
28.00			646.94	3.30
29.00			690.11	3.41
30.00			734.58	3.53
32.00			827.37	3.77
34.00			925.28	4.00
36.00			1028.28	4.24
38.00			1136.34	4.47
40.00			1249.43	4.71
42.50			1397.83	5.00

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KemPress® Stainless Fittings Pressure Losses

Pressure loss coefficients for fittings can be found in the table below. Note: Values have been measured in laboratory testing for sizes 15mm – 54mm inclusive. Values for 76.1mm and 108mm are estimated.

Table 7A: Individual KemPress® Stainless Fittings Pressure Loss Coefficients

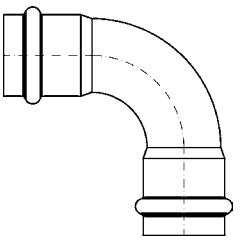
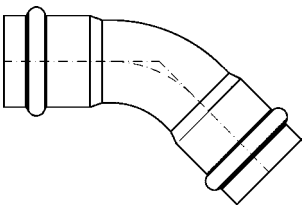
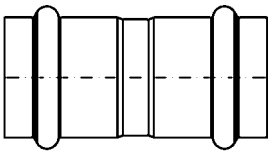
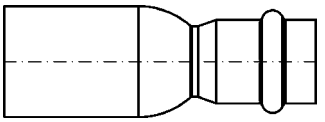
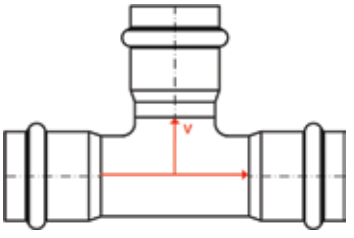
Fitting	Outside Diameter mm	Loss Coefficient ζ**)	Diagram
90° Bend	15	0.86	
	22	0.48	
	28	0.27	
	35	0.21	
	42	0.19	
	54	0.13	
	76.1	0.30	
	108	0.30	
45° Bend	15	0.45	
	22	0.39	
	28	0.34	
	35	0.37	
	42	0.33	
	54	0.29	
	76.1	0.40	
	108	0.40	
Coupling	15	0.11	
	22	0.20	
	28	0.02	
	35	0.04	
	42	0.07	
	54	0.09	
	76.1	0.10	
	108	0.10	
Reducer	22 x ...	0.40	
	28 x ...	0.46	
	35 x ...	0.59	
	42 x ...	0.51	
	53 x ...	0.48	
	76.1 x ...	0.40	
	108 x ...	0.40	
Equal T-piece flow through with flow separation	15	0.51	
	22	0.25	
	28	0.06	
	35	0.17	
	42	0.14	
	54	0.15	
	76.1	0.30	
	108	0.30	

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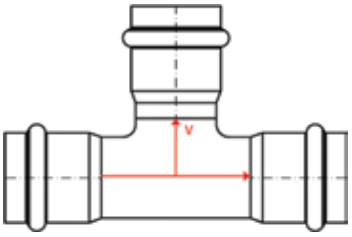
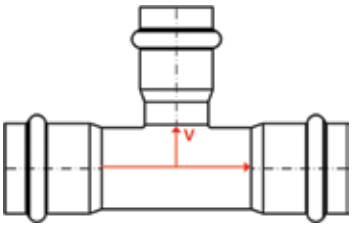
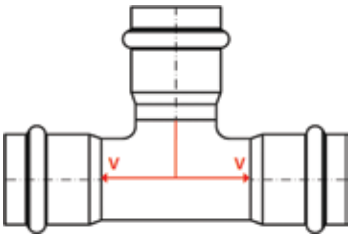
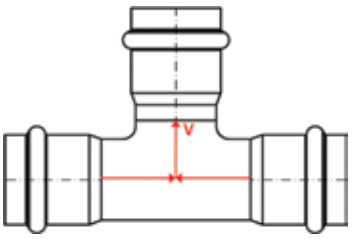
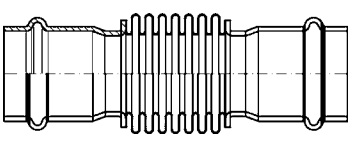
Table 7B: Individual KemPress® Stainless Fittings Pressure Loss Coefficients			
Fitting	**Outside Diameter mm**	**Loss Coefficient ζ**)**	
T-piece with flow separation	15	0.86	
	22	0.48	
	28	0.27	
	35	0.21	
	42	0.19	
	54	0.13	
	76.1	0.30	
	108	0.30	
Reducing T-piece flow through with flow separation	22 x 15 x 22	1.07	
	28 x 15 x 28	1.20	
	28 x 22 x 28	1.30	
	35 x 15 x 35	1.48	
	35 x 22 x 35	1.41	
	35 x 28 x 35	1.37	
	54 x 22 x 54	1.32	
	54 x 28 x 54	1.24	
	54 x 35 x 54	1.16	
	54 x 42 x 54	1.08	
	76.1 x … x 76.1	1.30	
	108 x … x 108	1.30	
Equal T-piece counter flow with flow separation	15	1.18	
	22	1.09	
	28	0.93	
	35	0.85	
	42	0.74	
	54	0.71	
	76.1	1.30	
	108	1.30	
Equal T-piece counter flow with flow unification	22 x …	3.00	
	28 x …	3.00	
	35 x …	3.00	
	42 x …	3.00	
	53 x …	3.00	
	76.1 x …	3.00	
	108 x …	3.00	
Expansion Compensator	15	2.00	
	22	2.00	
	28	2.00	
	35	2.00	
	42	2.00	
	54	2.00	
	76.1	2.00	
	108	2.00	

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Pressure loss "Z" (Pa) attributable to individual fittings depend on the flow velocity "v" (metres per second) and the loss coefficients "Σζ" and the drinking water temperature for the system fittings. The following tables show values for 10°C and 60°C.

Table 8A: KemPress® Stainless Fittings Pressure Loss at 10°C

Σζ	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
v (m/s)	Z (Pa)									
0.20	10.00	19.99	29.99	39.99	49.99	59.98	69.98	79.98	89.97	99.97
0.30	22.49	44.99	67.48	89.97	112.47	134.96	157.46	179.95	202.44	224.94
0.40	39.99	79.98	119.97	159.96	199.94	239.93	279.92	319.91	359.90	399.89
0.50	62.48	124.97	187.45	249.93	312.41	374.90	437.38	499.86	562.34	624.83
0.60	89.97	179.95	269.92	359.90	449.87	539.85	629.82	719.80	809.77	899.75
0.70	122.47	244.93	367.40	489.86	612.33	734.79	857.26	979.73	1102.19	1224.66
0.80	159.96	319.91	479.87	639.82	799.78	959.73	1119.69	1279.64	1439.60	1599.55
0.90	202.44	404.89	607.33	809.77	1012.22	1214.66	1417.10	1619.55	1821.99	2024.43
1.00	249.93	499.86	749.79	999.72	1249.65	1499.58	1749.51	1999.44	2249.37	2499.30
1.05	275.55	551.10	826.64	1102.19	1377.74	1653.29	1928.84	2204.38	2479.93	2755.48
1.10	302.42	604.83	907.25	1209.66	1512.08	1814.49	2116.91	2419.32	2721.74	3024.16
1.15	330.53	661.07	991.60	1322.13	1652.66	1983.20	2313.73	2644.26	2974.79	3305.33
1.20	359.90	719.80	1079.70	1439.60	1799.50	2159.40	2519.30	2879.20	3239.10	3598.99
1.25	390.52	781.03	1171.55	1562.06	1952.58	2343.10	2733.61	3124.13	3514.64	3905.16
1.30	422.38	844.76	1267.15	1689.53	2111.91	2534.29	2956.67	3379.06	3801.44	4223.82
1.35	455.50	911.00	1366.49	1821.99	2277.49	2732.99	3188.48	3643.98	4099.48	4554.98
1.40	489.86	979.73	1469.59	1959.45	2449.32	2939.18	3429.04	3918.91	4408.77	4898.63
1.45	525.48	1050.96	1576.43	2101.91	2627.39	3152.87	3678.35	4203.83	4729.30	5254.78
1.50	562.34	1124.69	1687.03	2249.37	2811.71	3374.06	3936.40	4498.74	5061.09	5623.43
1.55	600.46	1200.91	1801.37	2401.83	3002.29	3602.74	4203.20	4803.66	5404.12	6004.57
1.60	639.82	1279.64	1919.46	2559.29	3199.11	3838.93	4478.75	5118.57	5758.39	6398.21
1.70	722.30	1444.60	2166.89	2889.19	3611.49	4333.79	5056.09	5778.39	6500.68	7222.98
1.80	809.77	1619.55	2429.32	3239.10	4048.87	4858.64	5668.42	6478.19	7287.96	8097.74
1.90	902.25	1804.50	2706.74	3608.99	4511.24	5413.49	6315.74	7217.98	8120.23	9022.48
2.00	999.72	1999.44	2999.16	3998.88	4998.60	5998.32	6998.05	7997.77	8997.49	9997.21
2.10	1102.19	2204.38	3306.58	4408.77	5510.96	6613.15	7715.35	8817.54	9919.73	11021.92
2.20	1209.66	2419.32	3628.99	4838.65	6048.31	7257.97	8467.63	9677.30	10886.96	12096.62
2.30	1322.13	2644.26	3966.39	5288.52	6610.65	7932.78	9254.92	10577.05	11899.18	13221.31
2.40	1439.60	2879.20	4318.79	5758.39	7197.99	8637.59	10077.19	11516.78	12956.38	14395.98
2.50	1562.06	3124.13	4686.19	6248.25	7810.32	9372.38	10934.45	12496.51	14058.57	15620.64
2.60	1689.53	3379.06	5068.58	6758.11	8447.64	10137.17	11826.70	13516.22	15205.75	16895.28
2.70	1821.99	3643.98	5465.97	7287.96	9109.96	10931.95	12753.94	14575.93	16397.92	18219.91
2.80	1959.45	3918.91	5878.36	7837.81	9797.26	11756.72	13716.17	15675.62	17635.07	19594.53
2.90	2101.91	4203.83	6305.74	8407.65	10509.56	12611.48	14713.39	16815.30	18917.22	21019.13
3.00	2249.37	4498.74	6748.12	8997.49	11246.86	13496.23	15745.60	17994.97	20244.35	22493.72
3.10	2401.83	4803.66	7205.49	9607.32	12009.15	14410.97	16812.80	19214.63	21616.46	24018.29
3.20	2559.29	5118.57	7677.86	10237.14	12796.43	15355.71	17915.00	20474.28	23033.57	25592.85
3.30	2721.74	5443.48	8165.22	10886.96	13608.70	16330.44	19052.18	21773.92	24495.66	27217.40
3.40	2889.19	5778.39	8667.58	11556.77	14445.97	17335.16	20224.35	23113.54	26002.74	28891.93
3.50	3061.64	6123.29	9184.93	12246.58	15308.22	18369.87	21431.51	24493.16	27554.80	30616.45
3.60	3239.10	6478.19	9717.29	12956.38	16195.48	19434.57	22673.67	25912.76	29151.86	32390.95
3.70	3421.54	6843.09	10264.63	13686.18	17107.72	20529.27	23950.81	27372.35	30793.90	34215.44
3.80	3608.99	7217.98	10826.98	14435.97	18044.96	21653.95	25262.94	28871.94	32480.93	36089.92
3.90	3801.44	7602.88	11404.31	15205.75	19007.19	22808.63	26610.07	30411.51	34212.94	38014.38
4.00	3998.88	7997.77	11996.65	15995.53	19994.42	23993.30	27992.18	31991.06	35989.95	39988.83
4.10	4201.33	8402.65	12603.98	16805.31	21006.63	25207.96	29409.29	33610.61	37811.94	42013.27
4.20	4408.77	8817.54	13226.31	17635.07	22043.84	26452.61	30861.38	35270.15	39678.92	44087.69
4.30	4621.21	9242.42	13863.63	18484.84	23106.05	27727.26	32348.46	36969.67	41590.88	46212.09
4.40	4838.65	9677.30	14515.95	19354.59	24193.24	29031.89	33870.54	38709.19	43547.84	48386.49
4.50	5061.09	10122.17	15183.26	20244.35	25305.43	30366.52	35427.60	40488.69	45549.78	50610.86
4.60	5288.52	10577.05	15865.57	21154.09	26442.61	31731.14	37019.66	42308.18	47596.71	52885.23
4.70	5520.96	11041.92	16562.87	22083.83	27604.79	33125.75	38646.71	44167.66	49688.62	55209.58
4.80	5758.39	11516.78	17275.17	23033.57	28791.96	34550.35	40308.74	46067.13	51825.52	57583.92
5.00	6248.25	12496.51	18744.76	24993.02	31241.27	37489.53	43737.78	49986.04	56234.29	62482.55

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Table 8B: KemPress® Stainless Fittings Pressure Loss at 10°C

Σζ	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
v (m/s)	Z (Pa)									
0.20	10.00	19.99	29.99	39.99	49.99	59.98	69.98	79.98	89.97	99.97
0.30	22.49	44.99	67.48	89.97	112.47	134.96	157.46	179.95	202.44	224.94
0.40	39.99	79.98	119.97	159.96	199.94	239.93	279.92	319.91	359.90	399.89
0.50	62.48	124.97	187.45	249.93	312.41	374.90	437.38	499.86	562.34	624.83
0.60	89.97	179.95	269.92	359.90	449.87	539.85	629.82	719.80	809.77	899.75
0.70	122.47	244.93	367.40	489.86	612.33	734.79	857.26	979.73	1102.19	1224.66
0.80	159.96	319.91	479.87	639.82	799.78	959.73	1119.69	1279.64	1439.60	1599.55
0.90	202.44	404.89	607.33	809.77	1012.22	1214.66	1417.10	1619.55	1821.99	2024.43
1.00	249.93	499.86	749.79	999.72	1249.65	1499.58	1749.51	1999.44	2249.37	2499.30
1.05	275.55	551.10	826.64	1102.19	1377.74	1653.29	1928.84	2204.38	2479.93	2755.48
1.10	302.42	604.83	907.25	1209.66	1512.08	1814.49	2116.91	2419.32	2721.74	3024.16
1.15	330.53	661.07	991.60	1322.13	1652.66	1983.20	2313.73	2644.26	2974.79	3305.33
1.20	359.90	719.80	1079.70	1439.60	1799.50	2159.40	2519.30	2879.20	3239.10	3598.99
1.25	390.52	781.03	1171.55	1562.06	1952.58	2343.10	2733.61	3124.13	3514.64	3905.16
1.30	422.38	844.76	1267.15	1689.53	2111.91	2534.29	2956.67	3379.06	3801.44	4223.82
1.35	455.50	911.00	1366.49	1821.99	2277.49	2732.99	3188.48	3643.98	4099.48	4554.98
1.40	489.86	979.73	1469.59	1959.45	2449.32	2939.18	3429.04	3918.91	4408.77	4898.63
1.45	525.48	1050.96	1576.43	2101.91	2627.39	3152.87	3678.35	4203.83	4729.30	5254.78
1.50	562.34	1124.69	1687.03	2249.37	2811.71	3374.06	3936.40	4498.74	5061.09	5623.43
1.55	600.46	1200.91	1801.37	2401.83	3002.29	3602.74	4203.20	4803.66	5404.12	6004.57
1.60	639.82	1279.64	1919.46	2559.29	3199.11	3838.93	4478.75	5118.57	5758.39	6398.21
1.70	722.30	1444.60	2166.89	2889.19	3611.49	4333.79	5056.09	5778.39	6500.68	7222.98
1.80	809.77	1619.55	2429.32	3239.10	4048.87	4858.64	5668.42	6478.19	7287.96	8097.74
1.90	902.25	1804.50	2706.74	3608.99	4511.24	5413.49	6315.74	7217.98	8120.23	9022.48
2.00	999.72	1999.44	2999.16	3998.88	4998.60	5998.32	6998.05	7997.77	8997.49	9997.21
2.10	1102.19	2204.38	3306.58	4408.77	5510.96	6613.15	7715.35	8817.54	9919.73	11021.92
2.20	1209.66	2419.32	3628.99	4838.65	6048.31	7257.97	8467.63	9677.30	10886.96	12096.62
2.30	1322.13	2644.26	3966.39	5288.52	6610.65	7932.78	9254.92	10577.05	11899.18	13221.31
2.40	1439.60	2879.20	4318.79	5758.39	7197.99	8637.59	10077.19	11516.78	12956.38	14395.98
2.50	1562.06	3124.13	4686.19	6248.25	7810.32	9372.38	10934.45	12496.51	14058.57	15620.64
2.60	1689.53	3379.06	5068.58	6758.11	8447.64	10137.17	11826.70	13516.22	15205.75	16895.28
2.70	1821.99	3643.98	5465.97	7287.96	9109.96	10931.95	12753.94	14575.93	16397.92	18219.91
2.80	1959.45	3918.91	5878.36	7837.81	9797.26	11756.72	13716.17	15675.62	17635.07	19594.53
2.90	2101.91	4203.83	6305.74	8407.65	10509.56	12611.48	14713.39	16815.30	18917.22	21019.13
3.00	2249.37	4498.74	6748.12	8997.49	11246.86	13496.23	15745.60	17994.97	20244.35	22493.72
3.10	2401.83	4803.66	7205.49	9607.32	12009.15	14410.97	16812.80	19214.63	21616.46	24018.29
3.20	2559.29	5118.57	7677.86	10237.14	12796.43	15355.71	17915.00	20474.28	23033.57	25592.85
3.30	2721.74	5443.48	8165.22	10886.96	13608.70	16330.44	19052.18	21773.92	24495.66	27217.40
3.40	2889.19	5778.39	8667.58	11556.77	14445.97	17335.16	20224.35	23113.54	26002.74	28891.93
3.50	3061.64	6123.29	9184.93	12246.58	15308.22	18369.87	21431.51	24493.16	27554.80	30616.45
3.60	3239.10	6478.19	9717.29	12956.38	16195.48	19434.57	22673.67	25912.76	29151.86	32390.95
3.70	3421.54	6843.09	10264.63	13686.18	17107.72	20529.27	23950.81	27372.35	30793.90	34215.44
3.80	3608.99	7217.98	10826.98	14435.97	18044.96	21653.95	25262.94	28871.94	32480.93	36089.92
3.90	3801.44	7602.88	11404.31	15205.75	19007.19	22808.63	26610.07	30411.51	34212.94	38014.38
4.00	3998.88	7997.77	11996.65	15995.53	19994.42	23993.30	27992.18	31991.06	35989.95	39988.83
4.10	4201.33	8402.65	12603.98	16805.31	21006.63	25207.96	29409.29	33610.61	37811.94	42013.27
4.20	4408.77	8817.54	13226.31	17635.07	22043.84	26452.61	30861.38	35270.15	39678.92	44087.69
4.30	4621.21	9242.42	13863.63	18484.84	23106.05	27727.26	32348.46	36969.67	41590.88	46212.09
4.40	4838.65	9677.30	14515.95	19354.59	24193.24	29031.89	33870.54	38709.19	43547.84	48386.49
4.50	5061.09	10122.17	15183.26	20244.35	25305.43	30366.52	35427.60	40488.69	45549.78	50610.86
4.60	5288.52	10577.05	15865.57	21154.09	26442.61	31731.14	37019.66	42308.18	47596.71	52885.23
4.70	5520.96	11041.92	16562.87	22083.83	27604.79	33125.75	38646.71	44167.66	49688.62	55209.58
4.80	5758.39	11516.78	17275.17	23033.57	28791.96	34550.35	40308.74	46067.13	51825.52	57583.92
5.00	68730.80	74979.06	81227.31	87475.57	93723.82	99972.08	106220.3	112468.6	118716.8	124965.1

Table 9A: KemPress® Stainless Fittings Pressure Loss at 60°C

Σζ	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
v (m/s)	Z (Pa)									
0.20	9.83	19.66	29.50	39.33	49.16	58.99	68.82	78.66	88.49	98.32
0.30	22.12	44.24	66.37	88.49	110.61	132.73	154.85	176.97	199.10	221.22
0.40	39.33	78.66	117.98	157.31	196.64	235.97	275.29	314.62	353.95	393.28
0.50	61.45	122.90	184.35	245.80	307.25	368.70	430.15	491.60	553.05	614.50
0.60	88.49	176.97	265.46	353.95	442.44	530.92	619.41	707.90	796.39	884.87
0.70	120.44	240.88	361.32	481.76	602.21	722.65	843.09	963.53	1083.97	1204.41
0.80	157.31	314.62	471.93	629.24	786.55	943.87	1101.18	1258.49	1415.80	1573.11
0.90	199.10	398.19	597.29	796.39	995.48	1194.58	1393.68	1592.77	1791.87	1990.97
1.00	245.80	491.60	737.39	983.19	1228.99	1474.79	1720.59	1966.39	2212.18	2457.98
1.05	270.99	541.99	812.98	1083.97	1354.96	1625.96	1896.95	2167.94	2438.93	2709.93
1.10	297.42	594.83	892.25	1189.66	1487.08	1784.50	2081.91	2379.33	2676.74	2974.16
1.15	325.07	650.14	975.20	1300.27	1625.34	1950.41	2275.48	2600.55	2925.61	3250.68
1.20	353.95	707.90	1061.85	1415.80	1769.75	2123.70	2477.65	2831.60	3185.55	3539.50
1.25	384.06	768.12	1152.18	1536.24	1920.30	2304.36	2688.42	3072.48	3456.54	3840.60
1.30	415.40	830.80	1246.20	1661.60	2077.00	2492.40	2907.79	3323.19	3738.59	4153.99
1.35	447.97	895.93	1343.90	1791.87	2239.84	2687.80	3135.77	3583.74	4031.71	4479.67
1.40	481.76	963.53	1445.29	1927.06	2408.82	2890.59	3372.35	3854.12	4335.88	4817.65
1.45	516.79	1033.58	1550.37	2067.16	2583.95	3100.75	3617.54	4134.33	4651.12	5167.91
1.50	553.05	1106.09	1659.14	2212.18	2765.23	3318.28	3871.32	4424.37	4977.42	5530.46
1.55	590.53	1181.06	1771.59	2362.12	2952.65	3543.18	4133.71	4724.24	5314.77	5905.30
1.60	629.24	1258.49	1887.73	2516.97	3146.22	3775.46	4404.71	5033.95	5663.19	6292.44
1.70	710.36	1420.71	2131.07	2841.43	3551.79	4262.14	4972.50	5682.86	6393.21	7103.57
1.80	796.39	1592.77	2389.16	3185.55	3981.93	4778.32	5574.71	6371.09	7167.48	7963.87
1.90	887.33	1774.66	2662.00	3549.33	4436.66	5323.99	6211.32	7098.66	7985.99	8873.32
2.00	983.19	1966.39	2949.58	3932.77	4915.97	5899.16	6882.35	7865.55	8848.74	9831.93
2.10	1083.97	2167.94	3251.91	4335.88	5419.85	6503.82	7587.79	8671.77	9755.74	10839.71
2.20	1189.66	2379.33	3568.99	4758.66	5948.32	7137.98	8327.65	9517.31	10706.98	11896.64
2.30	1300.27	2600.55	3900.82	5201.09	6501.37	7801.64	9101.91	10402.19	11702.46	13002.73
2.40	1415.80	2831.60	4247.40	5663.19	7078.99	8494.79	9910.59	11326.39	12742.19	14157.98
2.50	1536.24	3072.48	4608.72	6144.96	7681.20	9217.44	10753.68	12289.92	13826.16	15362.40
2.60	1661.60	3323.19	4984.79	6646.39	8307.98	9969.58	11631.18	13292.77	14954.37	16615.97
2.70	1791.87	3583.74	5375.61	7167.48	8959.35	10751.22	12543.09	14334.96	16126.83	17918.70
2.80	1927.06	3854.12	5781.18	7708.24	9635.29	11562.35	13489.41	15416.47	17343.53	19270.59
2.90	2067.16	4134.33	6201.49	8268.66	10335.82	12402.98	14470.15	16537.31	18604.48	20671.64
3.00	2212.18	4424.37	6636.55	8848.74	11060.92	13273.11	15485.29	17697.48	19909.66	22121.85
3.10	2362.12	4724.24	7086.37	9448.49	11810.61	14172.73	16534.85	18896.98	21259.10	23621.22
3.20	2516.97	5033.95	7550.92	10067.90	12584.87	15101.85	17618.82	20135.80	22652.77	25169.75
3.30	2676.74	5353.49	8030.23	10706.98	13383.72	16060.46	18737.21	21413.95	24090.69	26767.44
3.40	2841.43	5682.86	8524.29	11365.71	14207.14	17048.57	19890.00	22731.43	25572.86	28414.29
3.50	3011.03	6022.06	9033.09	12044.12	15055.15	18066.18	21077.21	24088.24	27099.27	30110.30
3.60	3185.55	6371.09	9556.64	12742.19	15927.73	19113.28	22298.82	25484.37	28669.92	31855.46
3.70	3364.98	6729.96	10094.94	13459.92	16824.90	20189.87	23554.85	26919.83	30284.81	33649.79
3.80	3549.33	7098.66	10647.98	14197.31	17746.64	21295.97	24845.30	28394.62	31943.95	35493.28
3.90	3738.59	7477.19	11215.78	14954.37	18692.96	22431.56	26170.15	29908.74	33647.33	37385.93
4.00	3932.77	7865.55	11798.32	15731.09	19663.87	23596.64	27529.41	31462.19	35394.96	39327.73
4.10	4131.87	8263.74	12395.61	16527.48	20659.35	24791.22	28923.09	33054.96	37186.83	41318.70
4.20	4335.88	8671.77	13007.65	17343.53	21679.41	26015.30	30351.18	34687.06	39022.94	43358.83
4.30	4544.81	9089.62	13634.43	18179.24	22724.06	27268.87	31813.68	36358.49	40903.30	45448.11
4.40	4758.66	9517.31	14275.97	19034.62	23793.28	28551.93	33310.59	38069.25	42827.90	47586.56
4.50	4977.42	9954.83	14932.25	19909.66	24887.08	29864.50	34841.91	39819.33	44796.75	49774.16
4.60	5201.09	10402.19	15603.28	20804.37	26005.46	31206.56	36407.65	41608.74	46809.83	52010.93
4.70	5429.69	10859.37	16289.06	21718.74	27148.43	32578.11	38007.80	43437.48	48867.17	54296.85
4.80	5663.19	11326.39	16989.58	22652.77	28315.97	33979.16	39642.35	45305.55	50968.74	56631.93
5.00	6144.96	12289.92	18434.87	24579.83	30724.79	36869.75	43014.71	49159.67	55304.62	61449.58

Table 9B: KemPress® Stainless Fittings Pressure Loss at 60°C

Σζ	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
v (m/s)	Z (Pa)									
0.20	108.15	117.98	127.82	137.65	147.48	157.31	167.14	176.97	186.81	196.64
0.30	243.34	265.46	287.58	309.71	331.83	353.95	376.07	398.19	420.32	442.44
0.40	432.61	471.93	511.26	550.59	589.92	629.24	668.57	707.90	747.23	786.55
0.50	675.95	737.39	798.84	860.29	921.74	983.19	1044.64	1106.09	1167.54	1228.99
0.60	973.36	1061.85	1150.34	1238.82	1327.31	1415.80	1504.29	1592.77	1681.26	1769.75
0.70	1324.85	1445.29	1565.74	1686.18	1806.62	1927.06	2047.50	2167.94	2288.38	2408.82
0.80	1730.42	1887.73	2045.04	2202.35	2359.66	2516.97	2674.29	2831.60	2988.91	3146.22
0.90	2190.06	2389.16	2588.26	2787.35	2986.45	3185.55	3384.64	3583.74	3782.84	3981.93
1.00	2703.78	2949.58	3195.38	3441.18	3686.97	3932.77	4178.57	4424.37	4670.17	4915.97
1.05	2980.92	3251.91	3522.90	3793.90	4064.89	4335.88	4606.88	4877.87	5148.86	5419.85
1.10	3271.58	3568.99	3866.41	4163.82	4461.24	4758.66	5056.07	5353.49	5650.90	5948.32
1.15	3575.75	3900.82	4225.89	4550.96	4876.02	5201.09	5526.16	5851.23	6176.30	6501.37
1.20	3893.45	4247.40	4601.34	4955.29	5309.24	5663.19	6017.14	6371.09	6725.04	7078.99
1.25	4224.66	4608.72	4992.78	5376.84	5760.90	6144.96	6529.02	6913.08	7297.14	7681.20
1.30	4569.39	4984.79	5400.19	5815.59	6230.99	6646.39	7061.79	7477.19	7892.58	8307.98
1.35	4927.64	5375.61	5823.58	6271.54	6719.51	7167.48	7615.45	8063.41	8511.38	8959.35
1.40	5299.41	5781.18	6262.94	6744.71	7226.47	7708.24	8190.00	8671.77	9153.53	9635.29
1.45	5684.70	6201.49	6718.28	7235.07	7751.86	8268.66	8785.45	9302.24	9819.03	10335.82
1.50	6083.51	6636.55	7189.60	7742.65	8295.69	8848.74	9401.79	9954.83	10507.88	11060.92
1.55	6495.84	7086.37	7676.90	8267.43	8857.96	9448.49	10039.02	10629.55	11220.08	11810.61
1.60	6921.68	7550.92	8180.17	8809.41	9438.66	10067.90	10697.14	11326.39	11955.63	12584.87
1.70	7813.93	8524.29	9234.64	9945.00	10655.36	11365.71	12076.07	12786.43	13496.79	14207.14
1.80	8760.25	9556.64	10353.03	11149.41	11945.80	12742.19	13538.57	14334.96	15131.35	15927.73
1.90	9760.65	10647.98	11535.32	12422.65	13309.98	14197.31	15084.64	15971.98	16859.31	17746.64
2.00	10815.13	11798.32	12781.51	13764.71	14747.90	15731.09	16714.29	17697.48	18680.67	19663.87
2.10	11923.68	13007.65	14091.62	15175.59	16259.56	17343.53	18427.50	19511.47	20595.44	21679.41
2.20	13086.30	14275.97	15465.63	16655.29	17844.96	19034.62	20224.29	21413.95	22603.61	23793.28
2.30	14303.00	15603.28	16903.55	18203.82	19504.10	20804.37	22104.64	23404.92	24705.19	26005.46
2.40	15573.78	16989.58	18405.38	19821.18	21236.98	22652.77	24068.57	25484.37	26900.17	28315.97
2.50	16898.64	18434.87	19971.11	21507.35	23043.59	24579.83	26116.07	27652.31	29188.55	30724.79
2.60	18277.56	19939.16	21600.76	23262.35	24923.95	26585.55	28247.14	29908.74	31570.34	33231.93
2.70	19710.57	21502.44	23294.31	25086.18	26878.05	28669.92	30461.79	32253.66	34045.53	35837.40
2.80	21197.65	23124.71	25051.77	26978.82	28905.88	30832.94	32760.00	34687.06	36614.12	38541.18
2.90	22738.80	24805.97	26873.13	28940.30	31007.46	33074.62	35141.79	37208.95	39276.11	41343.28
3.00	24334.03	26546.22	28758.40	30970.59	33182.77	35394.96	37607.14	39819.33	42031.51	44243.70
3.10	25983.34	28345.46	30707.59	33069.71	35431.83	37793.95	40156.07	42518.19	44880.32	47242.44
3.20	27686.72	30203.70	32720.67	35237.65	37754.62	40271.60	42788.57	45305.55	47822.52	50339.50
3.30	29444.18	32120.93	34797.67	37474.41	40151.16	42827.90	45504.64	48181.39	50858.13	53534.88
3.40	31255.72	34097.14	36938.57	39780.00	42621.43	45462.86	48304.29	51145.72	53987.14	56828.57
3.50	33121.32	36132.35	39143.38	42154.41	45165.44	48176.47	51187.50	54198.53	57209.56	60220.59
3.60	35041.01	38226.56	41412.10	44597.65	47783.20	50968.74	54154.29	57339.83	60525.38	63710.93
3.70	37014.77	40379.75	43744.73	47109.71	50474.69	53839.67	57204.65	60569.62	63934.60	67299.58
3.80	39042.61	42591.93	46141.26	49690.59	53239.92	56789.25	60338.57	63887.90	67437.23	70986.56
3.90	41124.52	44863.11	48601.70	52340.30	56078.89	59817.48	63556.07	67294.67	71033.26	74771.85
4.00	43260.51	47193.28	51126.05	55058.83	58991.60	62924.37	66857.15	70789.92	74722.69	78655.47
4.10	45450.57	49582.44	53714.31	57846.18	61978.05	66109.92	70241.79	74373.66	78505.53	82637.40
4.20	47694.71	52030.59	56366.47	60702.36	65038.24	69374.12	73710.00	78045.89	82381.77	86717.65
4.30	49992.92	54537.73	59082.54	63627.36	68172.17	72716.98	77261.79	81806.60	86351.41	90896.22
4.40	52345.21	57103.87	61862.52	66621.18	71379.83	76138.49	80897.15	85655.80	90414.46	95173.11
4.50	54751.58	59728.99	64706.41	69683.83	74661.24	79638.66	84616.07	89593.49	94570.91	99548.32
4.60	57212.02	62413.11	67614.20	72815.30	78016.39	83217.48	88418.57	93619.67	98820.76	104021.9
4.70	59726.54	65156.22	70585.91	76015.59	81445.28	86874.96	92304.65	97734.33	103164.0	108593.7
4.80	62295.13	67958.32	73621.52	79284.71	84947.90	90611.10	96274.29	101937.5	107600.7	113263.9
5.00	67594.54	73739.50	79884.46	86029.42	92174.37	98319.33	104464.3	110609.3	116754.2	122899.2

2.6 RECOMMENDED WATER VELOCITIES

Reference should be made to relevant national standards and codes, including AS/NZS 3500, regarding allowable maximum design velocities.

Illustration 1: *Axial compensator with* KemPress® *sockets*

2.7 THERMAL EXPANSION/ MOVEMENT

Tube lines conveying hot, cold, or media of varying temperature and lines which are exposed to a high level of heat radiation (e.g. solar radiation etc.), expand and contract, generating thermal movement of the system.

If the lines are constrained and subject to thermal movement, damage can result (mostly in the form of fatigue failures). It is especially important to avoid stress concentrations between fixed points, typically found at valves and other fittings.

In order to maximise the design life of the system and reduce repair and maintenance costs, sufficient space for thermal movement must be allowed for in the system.

To achieve this, the design of the tube network can frequently be exploited. Incorporating expansion loops, offsets and horseshoe expansion links (see Illustration 6) into the system are cost-effective ways to accommodate thermal expansion and contraction. The basic principle is that sufficient movement potential must always be available between two fixed points.

If the line routing does not enable sufficient compensation for thermal movement, installation of special component parts, such as axial compensators may be considered. These are available from MM Kembla, see Illustration 1. To enable regular maintenance inspections the installation location should be visible and easily accessible for these items.

For concealed installations, unobstructed thermal expansion is to be accommodated by surrounding the lines with inert, chloride-free, non-restrictive material of sufficient thickness. In particular, ceiling penetrations are to be cushioned carefully, ensuring that a fixed point has not been created (see Illustrations 2 - 4)

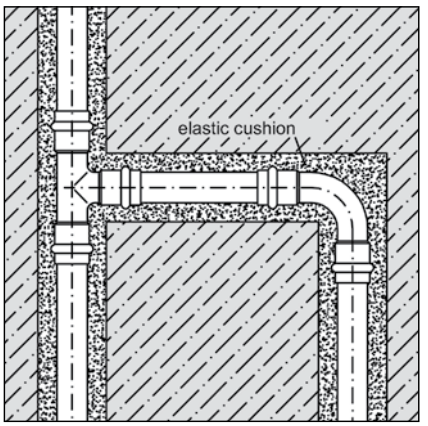

Illustration 2: *Tubes under plaster*

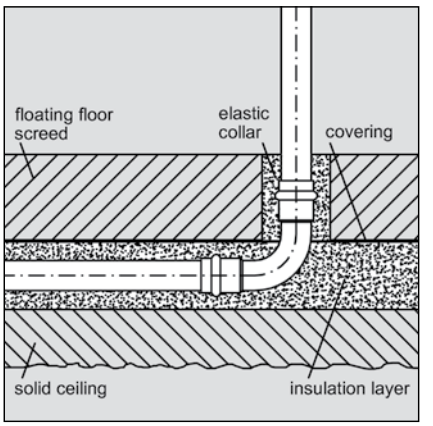

Illustration 3: *Tubes under composition floor (in thermal and footfall acoustic insulation)*

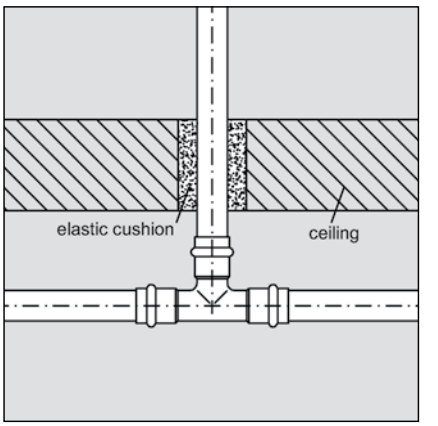

Illustration 4: *Tubes in ceiling penetrations*

Linear Expansion Formula

Table 10 below is based on potable water, for other media expansion may be different e.g. diesel oil. For other media please check with MM Kembla.

$\Delta L = (L)\ (\alpha)\ (\Delta \vartheta)$

ΔL = Tube Length Change in mm

L = Pipeline/Tube Length (mm)

α = Linear Thermal Expansion Coefficient (16.5×10^{-6} per °C change, for stainless steel from +20°C to +200°C)

$\Delta \vartheta$ = Maximum Temperature Difference, calculated by Maximum Tube Wall Temperature °C – Minimum Tube Wall Temperature °C, considering changes in ambient temperature, exposure to other heat sources e.g. solar radiation, and temperature changes in the media within the tube system. For example, there will be approximately 1mm/metre of expansion at a 60°C temperature differential where water is the medium.

Table 10: Thermal expansion "ΔL" of Kembla Stainless systems [mm] for water

Tube Length L (m)	Temperature Differential $\Delta\vartheta$ °C						
	10	20	30	40	50	60	70
1	0.17	0.33	0.50	0.66	0.83	0.99	1.16
2	0.33	0.66	0.99	1.32	1.65	1.98	2.31
3	0.50	0.99	1.49	1.98	2.48	2.97	3.47
4	0.66	1.32	1.98	2.64	3.30	3.96	4.62
5	0.83	1.65	2.48	3.30	4.13	4.95	5.72
6	1.00	1.98	2.97	3.96	4.95	5.94	6.93
7	1.16	2.31	3.47	4.62	5.78	6.93	8.09
8	1.33	2.64	3.96	5.28	6.60	7.92	9.24
9	1.49	2.97	4.46	5.94	7.43	8.91	10.40
10	1.66	3.30	4.95	6.60	8.25	9.90	11.55

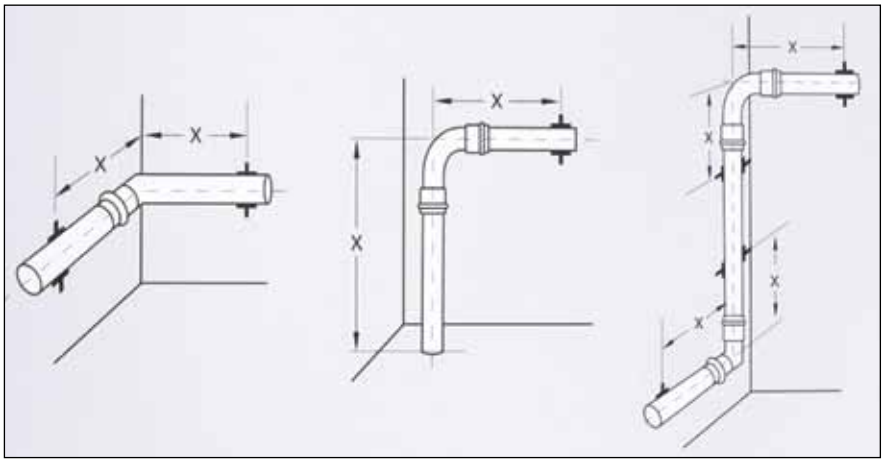

Illustration 5: *Minimum spacing "X" of sliding brackets to allow for thermal expansion (see Table 11)*

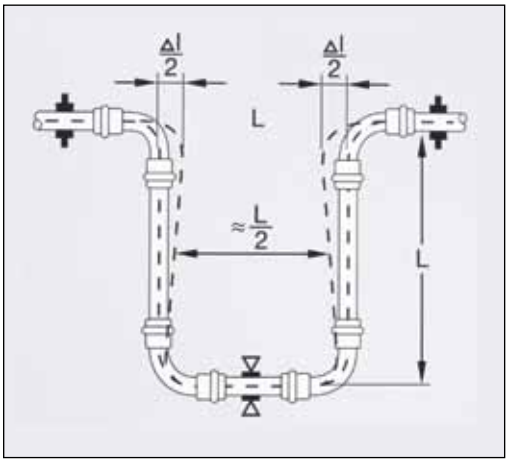

Illustration 6: *Minimum length of leg "L" of a U-bend, used as an expansion compensating element, to accommodate thermal expansion (see Table 12)*

Table 11: Minimum distance "X" to sliding supports (m) to allow for thermal expansion (see Illustration 5)

Tube Diameter d (mm)	Temperature Differential ΔL						
	10mm	20mm	30mm	40mm	50mm	60mm	70mm
15	0.57	0.80	0.98	1.13	1.27	1.39	1.50
22	0.69	0.97	1.19	1.37	1.54	1.68	1.82
28	0.77	1.10	1.34	1.55	1.73	1.90	2.05
35	0.87	1.22	1.50	1.73	1.94	2.12	2.29
42	0.95	1.35	1.64	1.90	2.12	2.32	2.51
54	1.08	1.52	1.86	2.15	2.41	2.63	2.85
76.1	1.28	1.81	2.21	2.55	2.86	3.13	3.38
108	1.52	2.15	2.63	3.04	3.40	3.73	4.02

Table 12: Minimum side length "L" of a U-bend expansion element for thermal expansion absorption (m) (see Illustration 6)

Tube Diameter d (mm)	Temperature Differential ΔL						
	10mm	20mm	30mm	40mm	50mm	60mm	70mm
15	0.33	0.46	0.57	0.65	0.73	0.80	0.87
22	0.40	0.56	0.69	0.79	0.89	0.97	1.05
28	0.45	0.63	0.77	0.89	1.00	1.10	1.18
35	0.50	0.71	0.87	1.00	1.12	1.22	1.32
42	0.55	0.77	0.95	1.10	1.22	1.34	1.45
54	0.62	0.88	1.08	1.24	1.39	1.52	1.64
76.1	0.74	1.04	1.28	1.47	1.65	1.81	1.95
108	0.88	1.24	1.52	1.76	1.96	2.15	2.32

2.8 INSULATION – ACOUSTIC AND THERMAL

Any lagging or insulation materials applied to the stainless steel tubes must not have a water soluble chloride ion content exceeding 0.05% by weight. Failure to ensure this may result in corrosion and a shortened life of the installed system.

Acoustic Insulation

Acoustic insulation is to be implemented according to standards and codes, including the National Construction Code in Australia.

Tubes, including fittings, in isolation generate no noise, but supports that are poorly constructed or poorly sized can generate flow noise that will be transmitted on the tube work.

Tubes should always be acoustically insulated against structure borne noise in wall break-through penetrations, or on installation walls using clamps with acoustic insulation, or they should be laid in utility shafts.

Thermal Insulation

Thermal insulation of tubes is to be implemented according to standards and codes, including the National Construction Code in Australia. Additionally, the following design considerations should be observed.

Tube lines for cold drinking water are to be laid so that the drinking water quality is not impaired by the heat influence of the environment. A sufficient separation distance to heat sources is to be maintained (hot water and heating lines, flues etc.), so that the lines are not influenced by these heat sources. If this is not possible, the cold water lines must be insulated against unwanted heating.

In refrigeration systems, cooling water tubes are frequently operated with temperatures from 4°C to 6°C. To decrease energy losses and to avoid unwanted water condensate (undershooting of the dew-point temperature of the ambient air), these lines must be water-blocking thermally-insulated. These requirements apply not only for newly built systems, but also for those laid during renovation in existing buildings.

2.9 ELECTRICAL SAFETY – EQUIPOTENTIAL BONDING

Stainless steel tubes form, with their corresponding fittings (including press fittings), a continuous electrically conducting connection and equipotential bonding must be addressed in accordance with relevant codes and standards.

2.10 TRACE HEATING SYSTEMS

In order to avoid unacceptable increases of pressure, shut off lines which do not possess their own safety systems must not be heated. In connection with electrical trace heating, it is absolutely necessary that relevant standards are followed.

In case of stainless steel lines which are equipped with electrical trace heating, it is to be ensured that the tube inside-wall temperature does not exceed 60°C for a long period.

Short-term temperatures of approx. 70°C are permissible for the purpose of thermal disinfection.

2.11 TYPICAL APPLICATION DESIGN INFORMATION

To ensure the correct use of Kembla Stainless and KemPress® Stainless fittings, please confirm with MM Kembla that the tube and proposed O-ring seal materials are suitable for the application. Some typical applications are listed below and for other applications please reference the KemPress® Stainless Application Guide, available from MM Kembla, or contact MM Kembla.

Potable Water

Kembla Stainless tube and KemPress® Stainless fittings are suitable for all potable water applications, having Watermark approval for the Standard EPDM (black) and FKM (red) O-ring seals.

Treated and Process Water

Kembla Stainless tube and KemPress® Stainless fittings are suitable for softened and demineralised water, including desalinated water treated via reverse osmosis.

Fire Systems

Kembla Stainless tube and KemPress® Stainless fittings have FM and VdS approval for use in fire sprinkler systems. The approvals are based on a tested system comprising of Kembla Stainless tube, KemPress® Stainless fittings with specific EPDM or FKM O-rings, the use of nominated press tools, jaws and high pressure slings and installation standards. These configurations and installation methods are critical in order to achieve the requirements of the approvals. A summary of the approved pressures and applications can be found in Table 13.

FM Approval

The KemPress® Stainless system has FM approvals in the size range 22 – 108 mm, using the standard black-coloured EPDM O-ring seals for wet systems only and the red-coloured Industry FKM O-ring seals for wet and dry systems, to 12 bar for all sizes. To comply with FM approvals, special jaws must be used for 22mm size and special high pressure (HP) slings must be used for sizes 28mm – 108mm inclusive. KemPress® tools KPL or KPXL must be used for sizes d = 22 – 54 mm and NovoPress model ACO401 for sizes d = 76.1 and 108 mm. Please contact MM Kembla for further information.

KemPress® Stainless is approved for use in sprinkler systems when joined to the sprinkler trunk pipe work by an FM Approved "Transition Fitting" and for use as valve trim, gauge connections, or other auxiliary piping in sizes below 35 mm nominal size.

VdS Approval

The KemPress® Stainless system has VdS approvals, using the standard black-coloured EPDM O-ring seals for wet systems only and the red-coloured Industry FKM O-ring seals for wet and dry systems. To comply with VdS approvals, special jaws must be used for 22mm size and special high pressure (HP) slings must be used for sizes 28mm – 108mm inclusive. KemPress® tools KPL or KPXL must be used for sizes d = 22 – 54 mm and NovoPress model ACO401 for sizes d = 76.1 and 108 mm. Please contact MM Kembla for further information.

The use is limited to the protection of LH, OH1 - OH3 and select OH4 fire hazard classes (exhibition halls, cinemas, theatres and concert halls) and is also limited to the connection of the system components among each other.

The connection of other non-system components is only admissible via detachable metal connections.

The mounting and installation instruction of the manufacturer and their specifications of the press techniques have to be observed during use. The admissible clamp clearances for copper pipes according to VdS CEA 4001 do apply.

It is not allowed to insert additives in the extinguishing water. Exceptions are anti-corrosive agents according to manufacturer release and previous agreement with VdS.

The Standard fittings with EPDM (black) O-ring may be used only as branch and distribution pipe in wet systems behind the alarm valve station, with sizes 22 – 76.1 mm approved to 16 bar and size 108 mm to 12.5 bar, according to VdS guideline – design and installation of sprinkler systems – VdS CEA 4001. The use is limited to the connection of the system components among each other. The connection of other non-system components is only admissible via detachable metal connections.

The Industry fittings with FKM (red) O-ring may be used only as branch and distribution pipe in wet and dry systems behind the alarm valve station, with fittings in sizes 22 – 76.1 mm approved to 16 bar, according to VdS guideline – design and installation for sprinkler systems – VdS CEA 4001.

Compressed Air Systems

The Kembla Stainless tube and KemPress® Stainless fittings system is suitable for compressed air installations where working pressure is 16 bar. Compressed air may contain oil and as such it is recommended to only use the KemPress® Stainless Industry fittings incorporating the FKM (red) O-rings.

Gas Supply (Fuel Gas)

The Kembla Stainless tube and KemPress® Stainless fittings system is suitable for fuel gases such as propane, butane and natural gas (methane), where maximum working pressure is 5 bar. Gas installation should be tested in accordance with the requirements specified in relevant standards including AS/NZS5601. The KemPress® Stainless Gas fittings, incorporating the HNBR (yellow) O-rings, must be used.

Table 13: FM and VdS Fire Sprinkler System Approvals and Requirements for Kembla Stainless Tube and KemPress® Stainless Fittings

OD	FM Approval		VdS Approval		Mandatory Tools, Jaw & Slings	
	Standard EPDM O-ring Wet Systems Only	Industry FKM O-ring Wet & Dry Systems	Standard EPDM O-ring Wet Systems Only	Industry FKM O-ring Wet & Dry Systems	Press Tool	Jaw/Slings
22mm	12 bar	12 bar	16 bar	16 bar	KPL/KPXL	Sanha SA Profile Jaw
28mm	12 bar	12 bar	16 bar	16 bar	KPL/KPXL	NovoPress M-Profile HP Sling
35mm	12 bar	12 bar	16 bar	16 bar	KPL/KPXL	NovoPress M-Profile HP Sling
42mm	12 bar	12 bar	16 bar	16 bar	KPL/KPXL	NovoPress M-Profile HP Sling
54mm	12 bar	12 bar	16 bar	16 bar	KPL/KPXL	NovoPress M-Profile HP Sling
76.1mm	12 bar	12 bar	16 bar	16 bar	NovoPress ACO401	NovoPress M-Profile HP Sling
108mm	12 bar	12 bar	12.5 bar	N/A	NovoPress ACO401	NovoPress M-Profile HP Sling

2.12 CORROSION RESISTANCE

Internal Corrosion

Stainless steel forms a passive layer (chromic oxide layer for the most part) on contact with oxygen and/or oxygenated water (e.g. drinking water). This passive layer prevents corrosion and ensures high levels of water quality, hygiene and durability.

Chloride levels in excess of those considered acceptable may result in a break-down of the passive layer and allow corrosion, with the three main types being pitting corrosion, crevice corrosion and stress corrosion cracking. The accepted view is that crevice corrosion of grade 316 stainless steel is rare where chloride concentrations are below 1000 ppm (Corrosion of Stainless Steels in Supply (Drinking) and Waste (Sewage) Water Systems, Stainless Steel Advisory Service Information Sheet 4.92, March 2001.

It should also be noted that pitting and crevice corrosion increases with temperature, although for potable water the typical temperatures and chloride levels should not be a problem. NHMRC/ARMCANZ Australian Drinking Water Guidelines give a guideline maximum value of 250 ppm for chlorides in drinking water. Bore water may have elevated chloride levels and care should be taken to ensure the levels are within the acceptable range.

For sterilisation processes, free chlorine at concentrations of up to 25 ppm, for a period of up to 24 hours can be tolerated, providing the lines are thoroughly flushed with fresh water and residual chlorine is limited to <1ppm.

Stainless steel may become sensitised from exposure to excessive heat e.g. during the welding, cutting with fast running saws/cutting discs and this shall be avoided. Hot bending of stainless steel tubes is not allowed.

External Corrosion

The KemPress® Stainless system should not be installed in locations where it will be exposed to high levels of chlorides. If this is unavoidable, precautions should be implemented to minimise the risk of corrosion, including application of watertight tapes and coatings.

Thermal insulation is to be kept permanently dry in order to retain its insulation effect and materials must not exceed a mass content of 0.05% of water-soluble chloride ions.

Connecting to Other Materials

Stainless steel and carbon steel must not be connected directly with each other. Where there is a requirement to connect stainless steel tube with carbon steel, a non-ferrous metal spacer of at least 50 mm length, or tube diameter, whichever is greater, shall be installed. This may be achieved through the installation of a non-ferrous metal valve (brass or red brass) between the stainless steel and carbon steel materials.

In case of the installation of stainless steel with copper materials it is recommended to use brass or red bronze connector of at least 50 mm length. Note: the OD's are not matching from Kembla stainless to Kembla Copper tube and that adaptors are required to interconnect the materials.

In closed systems e.g. heating and coolant systems with no-oxygen, interconnection with other metallic pipe systems is not a problem.

2.13 FIRE RESISTANCE AND PROTECTION

Kembla Stainless tube and KemPress® Stainless fittings are non-flammable and will not contribute to fire propagation.

Fire protection is to be implemented according to the respective national standards and building codes. Any materials applied to the KemPress® Stainless system for the purpose of achieving fire ratings at penetrations must be chloride-free.

2.14 STANDARDS AND COMPLIANCE

Kembla Stainless tube is 316L grade stainless steel (material EN 1.4404) complying with DIN EN 10088, fabricated according to DIN EN 10312 and DVGW - W 541 and is supplied as straight 6 m lengths with outside diameters in the range 15mm – 108mm. It is compliant with AS 5200.053 and has Watermark Approval # 23151.

KemPress® Stainless fittings are manufactured and quality controlled to AS3688, with 316L grade stainless steel (material EN1.4404) for parts made from tube, 316Ti (material EN1.4571) for threaded fittings and 316 (material 1.4408) for precision cast fittings. Watermark Approval # 23087 for Standard (EPDM) and Industry (FKM) fittings.

2.15 DESIGN QUICK REFERENCE GUIDE

Table 14: Quick reference guide to Kembla Stainless tube and KemPress® Stainless fittings

Field of Application	Dim./Nominal Pressure	Seals	Tools
KemPress® Stainless Standard			
- Drinking water - Processed water - Heating system - Cooling water - Condensate - Utility and rain water	d = 15-22mm PN 40 d = 28-35mm PN 25 d = 42-108mm PN 16	**EPDM** Colour: black Max. continuous temp.: -30°C up to 120°C (short time up to 150°C) Requirements according to KTW satisfied	d =15-28mm KemPress® KPS d =15-54mm KemPress® KPL d =15-108mm KemPress® KPXL (see Section 3.1 for specifications)
KemPress® Stainless Industry			
- Compressed air - Solar thermal power - Cooling water - Bulk goods - Applications in industry	d = 15-22mm PN 40 d = 28-35mm PN 25 d = 42-108mm PN 16 HT	**FKM** Colour: red Max. continuous temp.: -20°C to 200°C (depending on the medium) Solar thermal power up to 200°C (short time up to 280°C) Resistant against oils and water glycol mixture	d =15-28mm KemPress® KPS d =15-54mm KemPress® KPL d =15-108mm KemPress® KPXL (see Section 3.1 for specifications)
KemPress® Stainless Gas			
- Flammable/fuel gases according to DVGW G260 and G262	d = 15-108 mm PN 5 / GT 5 Underground laying not allowed GAS	**HNBR** Colour: yellow Max. continuous temp.: -20°C to 100°C Requirements according to DVGW VP 614 satisfied	d =15-28mm KemPress® KPS d =15-54mm KemPress® KPL d =15-108mm KemPress® KPXL (see Section 3.1 for specifications)
Materials:			
Fittings from tube:	Material No.: 1.4404 (316L) according to EN 10088		
Threaded fittings:	Material No.: 1.4571 (316Ti) according to EN 10088		
Stainless steel parts:	Material No.: 1.4408 according to EN 10283		
Tubes:	Material No.: 1.4404 (316L) according to EN 10088 Tube dimensions according to EN 10312 and DVGW-GW 541 bright-annealed and solution-heat-treated, strength limited in upper values according to EN 10312		
Tube inside surface:	Free of harmful component parts and according to the special requirements of GW DVGW-Code of Practice 541		

SECTION 3
INSTALLATION GUIDELINES

MM KEMBLA STAINLESS AND KEMPRESS® STAINLESS FITTINGS SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL COUNTRY CODES AND STANDARDS INCLUDING THE NATIONAL CONSTRUCTION CODE IN AUSTRALIA AND AS/NZS 3500.

3.1 RECOMMENDED PRESSING TOOLS

MM Kembla guarantees the leak tightness of the KemPress® Stainless pressed joints for standard potable water and gas applications, regardless of the manufacturer of the pressing tools, providing the pressing machines and pressing jaws and/or slings meet the following requirements:

- The pressing tools must be maintained and used according to the respective manufacturer's guidelines.
- KemPress® press tools and standard pressure jaws/slings are fully compliant as follows:
  - KPS for 15 mm – 28 mm inclusive
  - KPL for 15 mm – 54 mm inclusive
  - KPXL for 15 mm – 108 mm inclusive
- Compact pressing machines, such as KemPress® KPS, for pressing sizes up to and including 28 mm, must exert a minimum pressing force of 18 kN
- Conventional and electronic pressing machines, such as KemPress® KPL, for pressing sizes up to and including 54 mm, must exhibit a minimum pressing force of 30 kN
- Conventional and electronic pressing machines, such as KemPress® KPXL, for pressing sizes up to and including 108 mm, must exhibit a minimum pressing force of 32 kN
- High pressure applications are subject to approval by MM Kembla and may require special press tools, jaws and slings.
- The correct EN size jaw/sling shall be used for the fitting
- With KemPress® Stainless fittings up to including 54 mm in diameter, pressing jaws and slings for press connections of the type M-MM must exhibit the original profiles SA, M or V
- With KemPress® Stainless fittings greater than 54 mm in diameter, pressing jaws and slings for press connections of the type M-MM must exhibit the original profiles M.
- MM KEMBLA assembly instructions for the system must be observed at all times.

3.2 KEMPRESS® PRESSING TOOLS

KemPress® tools are the smartest, lowest weight and easiest to use tools on the market for the range of products and sizes they can service. They have been specifically designed and tested to work with Kembla Stainless tube and KemPress® Stainless fittings and with alternate jaws, adaptors and slings can also be used to press KemPress® Copper fittings. Please check with MM Kembla for requirements.

There is a small tool (KPS), a large tool (KPL) and an extra large tool (KPXL), each able to press a certain size range, with the KPXL able to press the full range in 15mm – 108 mm. The jaws for KPL and KPXL can be interchanged between the two tools, however, the attachments for KPL and KPXL cannot be used with the KPS tool.

KemPress® Tools - Key Features

- Same tools used for the KemPress® Copper system, simply change adaptors and slings to suit material and press profile as required.
- Slim, light weight and ergonomic design
- One hand operation (Patent) KPS and KPL
- Perfectly balanced with Jaws
- Longest Maintenance interval:
  - KPXL - 40,000 pressing cycles
  - KPL - 40,000 pressing cycles
  - KPS - 35,000 pressing cycles
- Smart electronic controls:
  - Flashes if not pressed correctly
  - Battery status indicator
- Second battery included, rapid recharge
- Tool Service Program:
  - National service centre operated by MM Kembla
  - Loan tool provided during service/repair
- Safe handling with slip-proof rubberised housings
- Emergency stop button for safety
- Signals if press not completed correctly - Immediately after the pressing cycle a green lights shows if the required pressing force was achieved, a red light if not
- Press cycle must be completed once it starts
- Electronic log book allows for quick and precise analysis of errors for servicing and repair
- Electronic monitoring of the jaw locking bolt and visual error indicator (KPL only)
- When you reach the maximum number of presses before a service is required a warning light flashes.
- The machine will not close down enabling you to complete the job in hand.
- Redundant switch-off
- Rotatable head (KPS & KPXL)

Table 15: KemPress® Press Tools Specifications			
Technical Data	**KPS**	**KPL**	**KPXL**
Fitting Size Range (KemPress® Stainless)	15mm – 28mm	15mm – 54mm	15mm – 108mm
Weight incl. Battery excl. jaws, adaptors & slings	1.7 kg	3.3 kg	4.6 kg
Length	319 mm	410 mm	487 mm
Width	70 mm	80 mm	79 mm
Height	96 mm	125 mm	116 mm
Power Consumption	240 W	450 W	450 W
Piston Force (minimum press force)	21 kN	30 kN	32 kN
Piston Stroke	30 mm	40 mm	80 mm (40 mm as req'd)
Battery	12V/1.5 Ah Li-ion	18V/1.5 Ah Li-ion	18V/3.0 Ah Li-ion
Charging Time	30 mins	30 mins	60 mins
Number of Presses Before Service	35,000	40,000	40,000
Noise Pressure at User's Ear	75.5 db(A)	76.5 db(A)	76.5 db(A)
Type of Protection	IP20	IP20	IP20

KemPress® Tool Operation

Holding the tool securely, press and hold the start button for approximately 3 seconds to begin the automatic press cycle (the green LED will go out). Release the start button and continue to hold the tool securely. The green LED will light when the press cycle is complete. To cancel the automatic press cycle, press and hold the release button on the side of the tool until the tool turns off.

If the red LED lights up, press the start button. If the tool does not run, call MM Kembla for advice. If the red and green LEDs flash alternately, the tool is ready for a service, contact MM Kembla Customer Service Centre. The tool will turn off automatically after 30 minutes of no use. Turn the tool ON by quickly pressing and releasing the start button and open the jaws around the fitting.

3.3 SAFETY AND MAINTENANCE OF KEMPRESS® TOOLS, JAWS, ADAPTOR JAWS AND SLINGS

KemPress® tools should only be used as directed, by trained persons. Always remove the battery before performing regular cleaning and maintenance work. Keep hands away from jaws and slings while tool is in use and never operate the tool without jaws/slings attached. Crush injuries to hands and fingers may result.

KemPress® tools, jaws and slings are low maintenance, however, to ensure optimal performance and safety there are some minimum precautions and maintenance procedures that need to be followed.

Carry out basic inspection of the pressing device and attachments (jaws, adaptors and slings) prior to each use to ensure they are clean and free from debris and dirt. The attachments should be visually inspected to ensure there are no cracks. If there are any cracks, do not use them, as there is risk of the attachments shattering and potential injury from flying fragments. It is recommended to always wear appropriate eye protection whenever using the pressing device.

When inspecting the pressing jaws and slings, also ensure that there are no foreign material deposits and that the contours of the pressing surfaces are in order. Failure to do this may result in incorrect joint formation and damage to the attachments and/or the pressing device. Regular application of light machine oil to the moving parts of jaws, adaptors and slings and a general application of an anti-corrosive spray is recommended to maintain serviceable condition and function.

The pressing device, attachments and batteries must be serviced at least within 40,000 presses for the KemPress® KPL and KPXL tools and 35,000 for the KemPress® KPS tool. It is recommended to have the press tool, jaws, adaptor jaws and slings inspected by MM Kembla at least once per year. There are costs associated with this service work. Failure to have the required services carried out may affect the warranty. See Section 4.3 KemPress® Tool Warranty.

Any service or repair of the KemPress® pressing tool or jaws, requiring opening the device, or mechanical repairs, shall only be carried out by MM Kembla or their authorised agent. Failure to do so may void the warranty.

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KemPress® Tool Service Program

The MM Kembla tool service and repair program is easy, ensures minimal down time and provides known maximum costs for repairs. The key components of the program include:

- 1800 804 631 national customer service centre
- Loan tools available while your tool is being serviced/ repaired
- Convenient and easy process for lodging your tool for service/repair via MM Kembla branches, the place of purchase or via our express courier exchange program
- Tool track: maintenance scheduling and tracking system
- Maximum repair price guarantee: the cost won't exceed our maximum repair price and if the cost of repair is less, you only get charged that amount
- No fix, no charge
- Up to 12 months warranty on repairs

Any service or repair of the KemPress® pressing tool or jaws, requiring opening the device, or mechanical repairs, shall only be carried out by MM Kembla or their authorised agent. Failure to do so may void the warranty.

3.4 HANDLING AND STORAGE OF KEMBLA STAINLESS TUBES AND KEMPRESS® STAINLESS FITTINGS

In the storage and transport of tubes and fittings, damage and contamination, including physical damage from building site activity, swarf, other building materials, soil and stormwater must be avoided. It is recommended to transport and store the tubes carefully, preferably on squared timbers and ensuring no risk of damage from heavy objects falling or resting on them. The tubes and fittings shall be stored dry and not placed directly on the ground. Fittings are to be taken from the original packaging only directly prior to installation.

3.5 TUBE CUTTING AND DE-BURRING

It is recommended to use a tube cutter to cut Kembla Stainless tubes to ensure a clean and right angled cut.
Note: The tube cutter shall not have been used for cutting carbon steel/ferrous metals. Failure to ensure this may result in a corrosion failure point.

If electrically driven saws are used for cutting Kembla Stainless tubes, the cutting speed needs to be carefully controlled to ensure no sensitization of the material occurs. Experience indicates that even a straw-yellow discoloration of the stainless steel can indicate a sensitization of the material. If annealing colours appear, the affected sections must be eliminated and the remaining stainless steel tube surfaces shall be carefully checked both inside and out.

Purpose designed planetary saws, for cutting stainless steel tubes, are ideal for cutting higher volumes of tubes and larger sizes, as they simultaneously de-burr as they cut.

The utilization of high speed cutting disks, angle grinders or flame cutters is not allowed for cutting stainless steel tubes.

Caution: After cutting, the tube ends are to be carefully de-burred inside and outside using a tube de-burring tool or suitable hand file.

3.6 BENDING STAINLESS STEEL TUBES

Hot bending of stainless steel tubes is not allowed as it will adversely affect the composition of the stainless steel, compromising performance.

Kembla Stainless tubes up to and including dimension 28 mm must be cold bent with suitable bending tools. Larger size tubes are not to be bent.

A bending radius, measured in the neutral axis of the bend, of at least R = 3.5D is to be maintained, where R is the radius and D is the tube diameter.

It is to be ensured that, after bending, a sufficiently long, straight cylindrical tube piece is available for further processing.

3.7 INSERTION DEPTHS AND DISTANCES OF FITTINGS

There are minimum tube insertion depths and minimum spacing requirements between two press fittings and from wall/floor penetrations to press fittings. These minimum distances are required to ensure proper use of the pressing tools and to facilitate correct formation of the joints. Please refer to the following drawings and tables.

Table 16: Minimum spacing between fittings and from fittings to walls

Tube OD mm	Insertion Depth mm (e)	Minimum Spacing in mm (see Illustrations 7 - 10)			
		A min	**L** min	**B** min	**C** min
15	24	10	58	60	84
22	28	10	66	60	88
28	28	10	66	60	88
35	30	10	70	60	90
42	38	20	96	60	98
54	43	20	106	60	103
76.1	50	30	130	60	110
108	69	30	168	60	129

For Tube Sizes d ≤ 54 mm

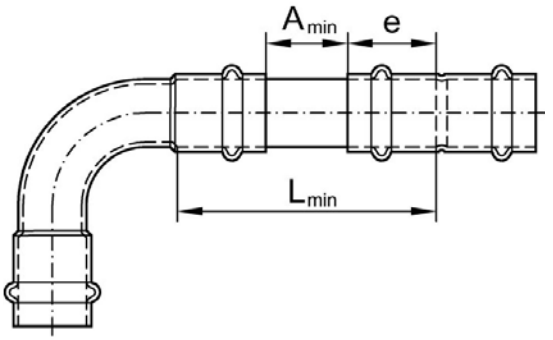

Illustration 7: *Minimum spacing between two press fittings (A), minimum insertion depth (e) and minimum tube length (L) for sizes d ≤ 54 mm (see Table 16)*

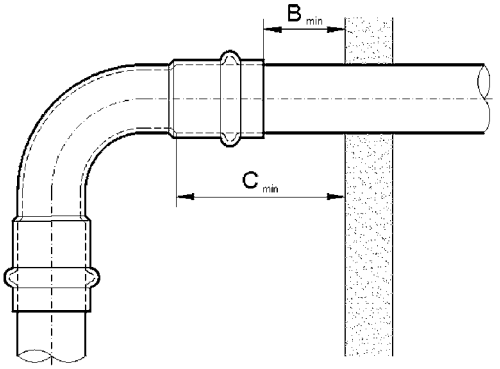

Illustration 8: *Minimum distance from wall/floor to front of press fitting (B) and socket end from wall (C) for sizes d ≤ 54 mm (see Table 16)*

For Tube Sizes d = 76.1 mm and 108 mm

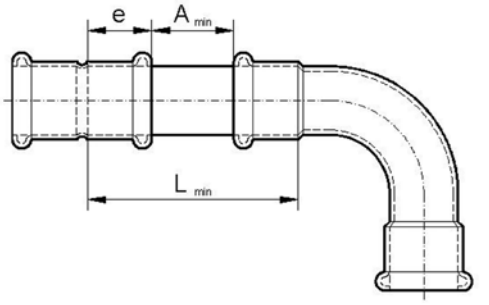

Illustration 9: *Minimum spacing between two press fittings (A), minimum insertion depth (e) and minimum tube length (L) for sizes d > 54 mm (see Table 16)*

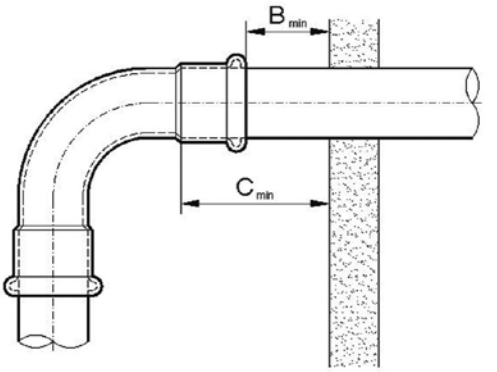

Illustration 10: *Minimum distance from wall/floor to front of press fitting (B) and socket end from wall (C) for sizes d > 54 mm (see Table 16)*

3.8 PRESS TOOL SPACE REQUIREMENTS

Table 17 and Illustration 11 below provide information regarding the required space to safely and effectively complete press cycles with KemPress® tools using either jaws and slings.

Table 17: KemPress® Tool Space requirements relative to walls and other tubes. (see illustration 11)

Tube Size OD mm	A mm	B mm	C mm	D mm	E mm	F mm
15 Jaw	20	56	32	40	80	155
22 Jaw	25	65	32	50	82	175
28 Jaw & HP Sling	25	75	32	54	82	182
35 Jaw	30	83	32	65	85	205
35 HP Sling	75	95	75	75	95	205
42 Sling & HP Sling	75	140	85	110	155	375
54 Sling & HP Sling	85	150	90	110	155	375
76.1 Sling & HP Sling	115	220	120	200	220	650
108 Sling & HP Sling	150	255	150	200	255	650

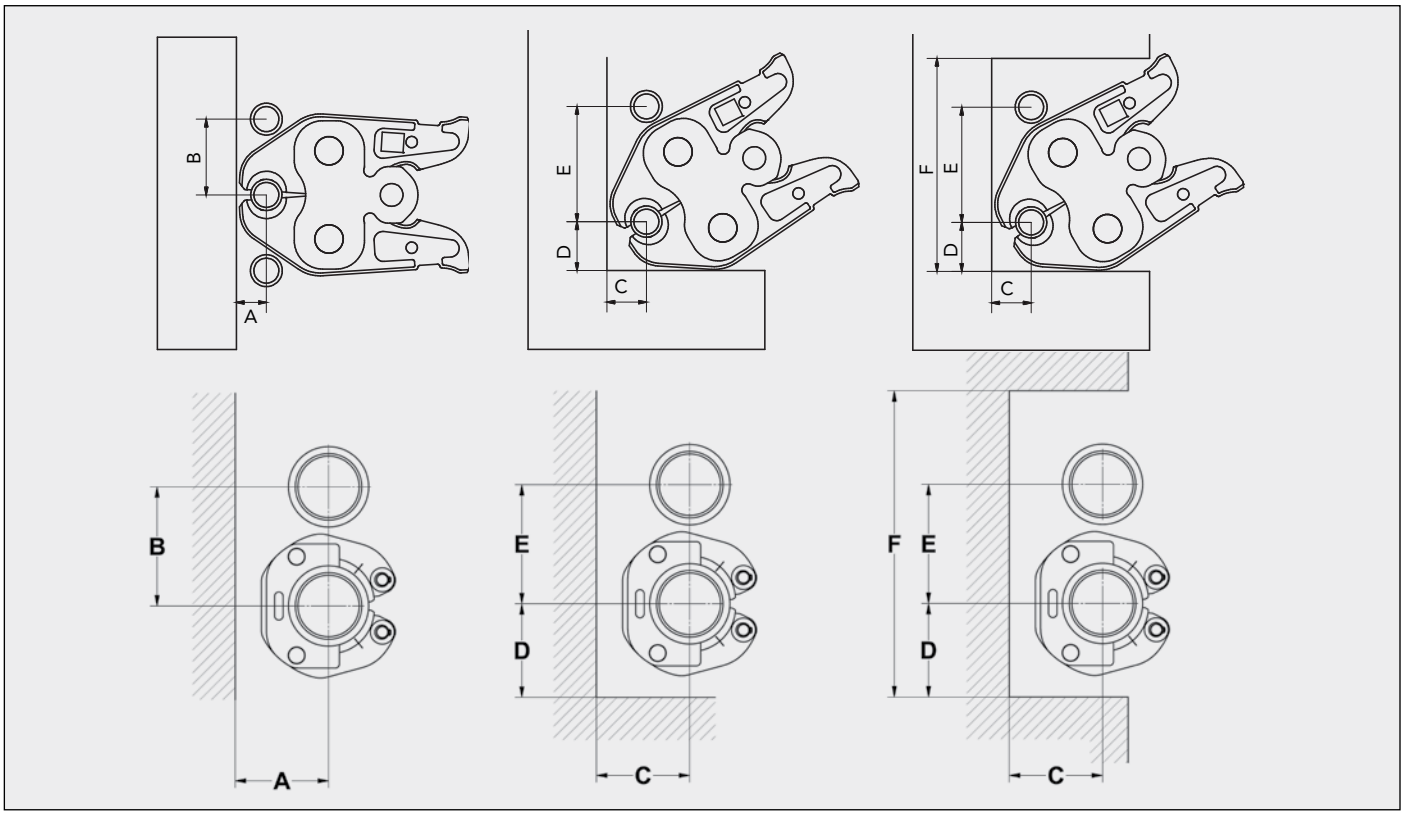

Illustration 11: KemPress® *jaw/sling space requirements relative to walls and other tubes. Tubes assumed as equal size.*

3.9 THREADED FITTINGS

KemPress® Stainless threaded fittings incorporate BSP R external taper (male), BSP Rp internal parallel (female), according to EN 10226, for connecting threads and G thread according to EN/ISO 228 for fastening screw threads.

Only chloride-free sealant may be used to seal stainless steel threaded components. Do not use PTFE sealing tapes that contain chloride ions as they can lead to corrosion in stainless steel tubes and fittings.

It is recommended to use a permanently elastic thread sealing compound, suitable for the end use application, which is free from chloride ions.

3.10 COUPLING OF TUBES TO KEMPRESS® STAINLESS FITTINGS

The procedure for coupling Kembla Stainless tube and KemPress® Stainless fittings is shown below. Please note that for high pressure applications a special press tool, jaw and HP slings may be required (subject to confirmation of suitability from MM Kembla).

The tube ends must be clean for the creation of trouble-free press connections. The tube exterior surfaces shall have no scratches or grooves in the section of tube end being inserted into a socket for press fitting.

FOR KEMBLA STAINLESS TUBES WITH AN OUTSIDE DIAMETER UP TO AND INCLUDING D = 35 MM

STEP 1
Cut tubes as required with a pipe cutter, squarely at a right angle.

Note: The cutter blade shall not have been used for other ferrous metals. Failure to ensure this may result in a corrosion failure point.

ALTERNATIVE
Cut tubes with a fine toothed hand saw at a right angle.

Note: The saw shall not have been used for other ferrous metals. Failure to ensure this may result in a corrosion failure point.

STEP 2
Always de-burr tubes carefully and thoroughly with a suitable de-burring tool inside and outside. Failure to do so may result in leaks from damaging O-rings, compromising joint integrity, as well as the risk of increasing turbidity and facilitating corrosion near joints

Note: The equipment used to de-burr shall not have been used for other ferrous metals. Failure to ensure this may result in a corrosion failure point.

STEP 3
Mark the insertion depth on the tube, or male plain end of fitting, with felt tipped pen and template. The marker must be water-proof. Refer to Table 16 in Section 3.7 Minimum Insertion Depth (e) in mm.

STEP 4
Check KemPress® Stainless fittings for correct seating of the O-ring, that it is free of dirt and that it is not damaged. Insert tube into the fitting up to the stop, using slight rotation. The fitting outer edge must line up with the mark.

STEP 5
Select press jaw according to the fitting dimension, checking to make sure the jaw surface is clean and in good condition. Attach the press jaw to the press machine. Close the retention/locking bolts as required.

STEP 6
Ensure the fitting has not moved and that the outer edge still lines up with the marking. Open the press jaw and place at right angles on to the KemPress® Stainless fitting such that the bead of the fitting is inserted into the groove of the press jaw.

STEP 7
Initiate the pressing procedure by pressing the start button for approximately 3 seconds. The pressing procedure will run automatically and should not be interrupted prematurely. This ensures a permanent joint that is sealed and has the required tensional and axial force locking properties. After completing the pressing process, the pressing tool can be removed from the pressed connection by opening the press jaw.

For safety, the pressing process can be stopped by pressing the emergency stop button. Once the emergency button has been activated, the tool will need to be reset. The affected fitting and tube section should be discarded and new components used.

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FOR KEMBLA STAINLESS TUBES WITH AN OUTSIDE DIAMETER D=42MM AND D=54MM

For the dimensions 42 and 54 mm, the use of the KemPress® KPL, KPXL or other approved press tool (see Section 3.1 Recommended pressing tools) is required. KemPress® tools require adaptor jaw ZB203 for these sizes. For high pressure applications a special press tool and HP slings may be required (subject to confirmation of suitability from MM Kembla).

The installation is the same as described above for the steps 1 to 4 of "For Kembla Stainless tubes with an outside diameter up to and including d = 35 mm", then the procedure is continued with the dimensions 42 mm and 54 mm with the operation steps 5 to 9 below.

STEP 5
Select the appropriate press sling and check that it is clean and that the surface is smooth. In order to ensure correct operation of the pressing slings, the sliding segments must be free to move/slide. The sliding segments are tensioned by springs, holding them in the correct starting position. Please ensure that the marking lines on the inner and outer rings form a line for the correct starting position. If the segments are not freely moving, clean and lubricate with light machine oil or have them serviced by an approved KemPress® service agent.

STEP 6
Place the sling around the KemPress® Stainless fitting such that the bead of the fitting is inserted into the groove of the press sling. Close press sling. Make certain that the pressing sling fits tightly into the fitting. Afterwards position the pressing sling by rotating it so that the pressing machine can be correctly attached.

STEP 7
Select adaptor jaw ZB203 for the dimension for the dimensions 42 mm and 54 mm. Insert the adaptor jaw into the press tool and close the locking bolts.

STEP 8
Open the adaptor jaw by depressing the jaw levers and attach to the press sling so that the claws of the adaptor jaw grip around the pins of the press sling. Check whether fittings outer edge lines up with the marker of the insertion depth then start the pressing procedure by pressing the start button. The pressing procedure should not be interrupted prematurely. Following this procedure ensures a permanently sealed connection always results. For safety, the pressing process can be stopped by pressing the emergency stop button. Once the emergency button has been activated, the tool will need to be reset. The affected fitting and tube section should be discarded and new components used.

STEP 9
Loosen the press sling by pulling apart.

FOR KEMBLA STAINLESS TUBES WITH AN OUTSIDE DIAMETER D=76.1MM AND D=108MM

For the dimensions 76.1 and 108 mm, the use of the KemPress® KPXL or other approved press tool (see 3.1 Recommended pressing tools) is required. For high pressure applications a special press tool and HP slings may be required (subject to confirmation of suitability from MM Kembla).

For the 76.1 mm size, it is recommended to use the KemPress® 76.1 mm press sling and Adaptor Jaw ZB221.

For the 108 mm size, it is recommended to use the KemPress® 108 mm press sling and Adaptor jaw ZB221 for the first pressing, followed by the 108 mm press sling and Adaptor Jaw ZB222 for the second pressing.

The installation is the same as described above for the steps 1 to 4 of "For Kembla Stainless tubes with an outside diameter up to and including d = 35 mm", then the procedure is continued with the dimensions 42 mm and 54 mm with the operation steps 5 to 9 below.

FOR KEMBLA STAINLESS TUBES WITH AN OUTSIDE DIAMETER D=76.1MM

STEP 5

Select the 76.1 mm press sling and check that it is clean and that the surface is smooth. In order to ensure correct operation of the pressing slings, the sliding segments must be free to move/slide. The sliding segments are tensioned by springs, holding them in the correct starting position. Please ensure that the marking lines on the inner and outer rings form a line for the correct starting position. If the segments are not freely moving, clean and lubricate with light machine oil or have them serviced by an approved KemPress® service agent.

STEP 6

Place the sling around the KemPress® Stainless fitting such that the bead of the fitting is inserted into the slot of the press sling. Close press sling. Make certain that the pressing sling fits tightly into the fitting. Afterwards position the pressing sling by rotating it so that the pressing machine can be correctly attached.

STEP 7
Select adaptor jaw ZB221 for the dimension for the dimensions 76.1 mm. Insert the adaptor jaw into the press tool and close the locking bolts.

STEP 8
Open the adaptor jaw by depressing the jaw levers and attach to the press sling so that the claws of the adaptor jaw grip around the pins of the press sling. Check whether fittings outer edge lines up with the marker of the insertion depth then start the pressing procedure by pressing the start button. The pressing procedure should not be interrupted prematurely. Following this procedure ensures a permanently sealed connection always results. For safety, the pressing process can be stopped by pressing the emergency stop button. Once the emergency button has been activated, the tool will need to be reset. The affected fitting and tube section should be discarded and new components used.

STEP 9
Loosen the press sling by pulling apart.

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FOR KEMBLA STAINLESS TUBES WITH AN OUTSIDE DIAMETER D = 108MM
(Note: requires two pressings with different adaptor jaws for the same 108 mm sling)

STEP 5

Select the 108mm press sling and check that it is clean and that the surface is smooth. In order to ensure correct operation of the pressing slings, the sliding segments must be free to move/slide. The sliding segments are tensioned by springs, holding them in the correct starting position. Please ensure that the marking lines on the inner and outer rings form a line for the correct starting position. If the segments are not freely moving, clean and lubricate with light machine oil or have them serviced by an approved KemPress® service agent.

STEP 6

Place the sling around the KemPress® Stainless fitting such that the bead of the fitting is inserted into the slot of the press sling. Close press sling and secure the fastening latch. Make certain that the pressing sling fits tightly into the fitting. Afterwards position the pressing sling by rotating it so that the pressing machine can be correctly attached.

STEP 7

Select adaptor jaw ZB221 for the dimension for the dimensions 108 mm first press. Insert the adaptor jaw into the press tool and close the locking bolts

STEP 8
Open the adaptor jaw by depressing the jaw levers and attach to the press sling so that the claws of the adaptor jaw grip around the pins of the press sling. Check whether fittings outer edge lines up with the marker of the insertion depth then start the pressing procedure by pressing the start button. The pressing procedure should not be interrupted prematurely. Following this procedure ensures a permanently sealed connection always results. After completing the pressing process, the pressing tool can be removed from the press sling by opening the intermediate jaw. Then carry out step 7 to 9 using the intermediate jaw ZB222 to complete the second stage of pressing in order to close the press sling completely. For safety, the pressing process can be stopped by pressing the emergency stop button. Once the emergency button has been activated, the tool will need to be reset. The affected fitting and tube section should be discarded and new components used.

STEP 9
Loosen the press sling by releasing the fastening latch and then pull apart.

3.11 TUBE FIXING AND SUPPORT

Please refer to the relevant national standards and/or codes, such as AS/NZS 3500, to determine the requirements for tube fixing and support.

Tubes are to be connected directly to the building by means of standard brackets, clips and hangers and must not be attached to other lines. In order to fulfil acoustic protection requirements, clamps with appropriate elastomeric inserts are to be employed.

Clamps are always to be attached on the tube only, not on the fittings. With regard to placement of clips on the tubes, in particular in the area of branches (bends, T-joints etc.), please reference Section 2.7 in this guide regarding thermal movement.

SECTION 4
COMMISSIONING, MAINTENANCE AND WARRANTIES

4.1 PRESSURE TESTING, FLUSHING AND DISINFECTING INSTALLED SYSTEMS

Pressure testing, flushing and commissioning of installed tubes and fittings shall be carried out in Australia and New Zealand in accordance with standards and codes, including AS/NZS 3500.

It is important to ensure that the system remains full following a water pressure test, systems that are drained or partially drained will have increased risk of pitting corrosion.

Intensive flushing with clear drinking water shall be carried out directly after any chemical disinfection. No remains of disinfection agents may be measured in the drinking water at the tapping points and respectively the tapping measured values may not be higher than potable water standards. Failure to do so will increase the risk of corrosion.

The thermal disinfection of stainless steel lines can be carried out at high temperatures. The temperature is limited to 120°C in case of standard KemPress® Stainless fittings because of the EPDM O-rings. However, there is no restriction on the disinfection duration.

4.2 KEMBLA STAINLESS TUBE AND KEMPRESS® STAINLESS FITTINGS WARRANTY

For full details of the MM Kembla warranty please see http://www.kembla.com.au/trading-terms and download the Standard Conditions of Sale for Goods.

There are three elements to the KemPress® Stainless press-fit system, the stainless steel tube, the fittings and the press equipment. MM Kembla guarantees that, when installed by a licensed plumber in accordance with the KemPress® Stainless Design and Installation Guide, the tube and fittings will be fit for their intended purpose for a period of not less than 25 years for potable water and fuel gas applications. This means that the system is designed not to leak for a minimum of 50 years and guaranteed not to leak for 25 years.

For industrial applications, subject to MM Kembla confirming in writing that the products are suitable for the application, MM Kembla guarantees that the tube and fittings will be fit for their intended purpose for a period of not less than 10 years.

This guarantee covers licensed plumbers using these tools on our fittings. The warranty does not cover faults arising from incorrect installations and faults arising from competitor fittings used on the same installation.

4.3 KEMPRESS® TOOL WARRANTY

KemPress® tools, jaws, adaptor jaws and slings are guaranteed to work for a minimum of 3 years from date of purchase. The warranty covers the repair of any damage or malfunction that is the cause of defective materials or parts.

It will not cover damage caused by improper use, inadequate maintenance and mishandling of the tool (major impact caused by dropping the tool and water damage for example).

The KemPress® Li-ion batteries and battery chargers are covered by a limited 12 month warranty.

The following faults are not covered by the warranty (for examples of how MM Kembla can detect these faults, please contact customer service):

1. Tool damaged by dropping
2. Water damage
3. Heavily affected by dirt
4. Unauthorized opening
5. Inappropriate handling
6. Continuous operation
7. Operation without jaws and fitting
8. Inserting the battery by force

FOR FURTHER INFORMATION:

Contact your MM Kembla representative or Customer Service.

T: 1800 804 631

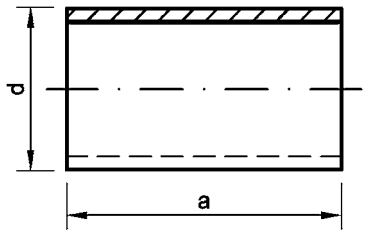
F: 1800 817 846

E: tubesales@kembla.com.au

MM Kembla, ABN 13 003 762 641

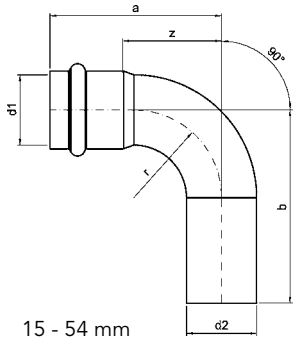
Gloucester Boulevarde, PO BOX 21, Port Kembla, NSW 2505
www.kembla.com.au

Kembla Stainless Tubes in 6 m lengths, AISI 316L

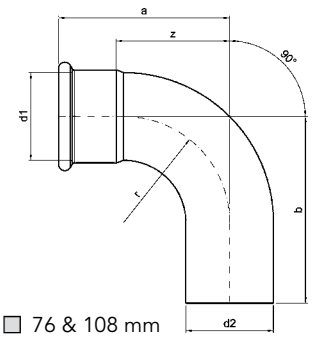


Product Code	OD (d) mm	Wall Thickness mm	Dry Weight kg/m	Wet Weight,filled with water kg/m	Volume l/m	Tube Length (a)mm	6m Tube Mass kg
X95250	15	1.0	0.351	0.484	0.133	6000	2.106
X95251	22	1.2	0.625	0.928	0.302	6000	3.750
X95252	28	1.2	0.805	1.321	0.515	6000	4.830
X95253	35	1.5	1.258	2.064	0.804	6000	7.548
X95254	42	1.5	1.521	2.718	1.195	6000	9.126
X95255	54	1.5	1.972	4.017	2.043	6000	11.832
X95256	76.1	2.0	3.711	7.798	4.083	6000	22.266
X95257	108	2.0	5.308	13.810	8.495	6000	31.848

KemPress® Stainless Bend 90° Female/Male



15 - 54 mm

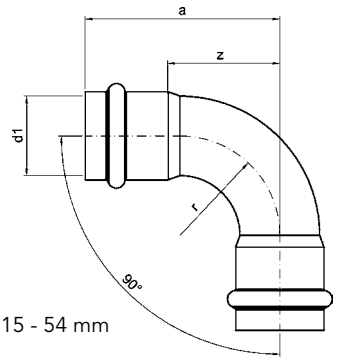


76 & 108 mm

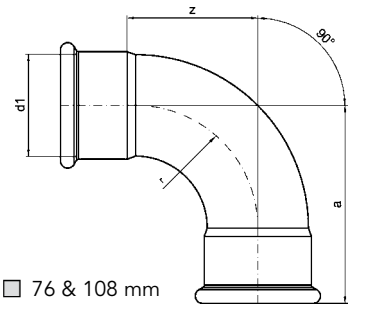
Standard	Industry	Gas	Dimension d1 x d2	a	b	z
X95450	X95460	X95470	15	48	60	22
X95451	X95461	X95471	22	63	72	34
X95452	X95462	X95472	28	68	77	39
X95453	X95463	X95473	35	87	93	56
X95454	X95464	X95474	42	103	113	64
X95455	X95465	X95475	54	125	131	80
X95456	X95466	X95476	76	143	162	92
X95457	X95467	X95477	108	210	231	131

KEMBLA
KemPress®

KemPress® Stainless Bend 90° Female/Female



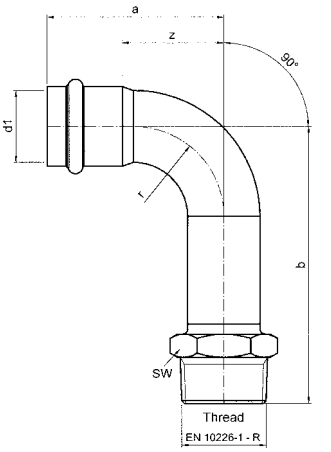
15 - 54 mm



76 & 108 mm

Standard	Industry	Gas	Dimension d1 x d2	a	z
X95500	X95510	X95520	15	48	22
X95501	X95511	X95521	22	63	34
X95502	X95512	X95522	28	68	39
X95503	X95513	X95523	35	87	56
X95504	X95514	X95524	42	103	64
X95505	X95515	X95525	54	125	80
X95506	X95516	X95526	76	143	92
X95507	X95517	X95527	108	201	131

KemPress® Stainless Bend 90° Male BSPT/R Thread



Standard	Industry	Gas	Dimension d1 x R	a	b	Z	SW
X95600	X95610	X95620	15 x 1/2	48	84	22	22
X95601	X95611	X95621	22 x 3/4	63	100	34	30
X95602	X95612	X95622	28 x 1	68	108	39	36
X95603	X95613	X95623	35 x 1 1/4	87	128	56	46
X95604	X95614	X95624	42 x 1 1/2	103	149	64	55
X95605	X95615	X95625	54 x 2	125	173	80	65

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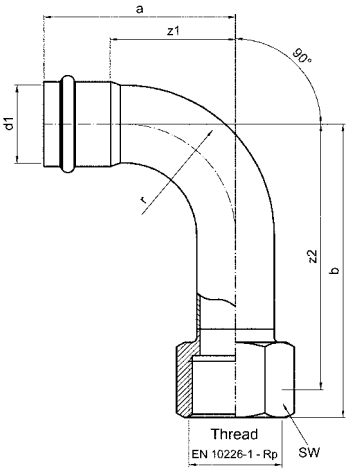
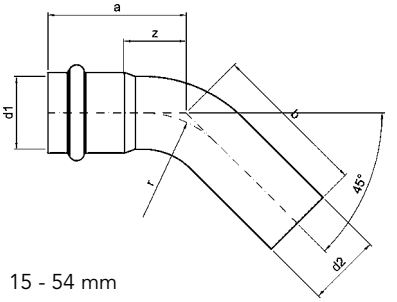
KemPress® Stainless Bend 90° Female BSPP/Rp Thread

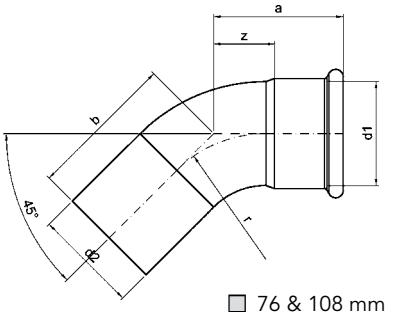


Standard	Industry	Gas	Dimension d1 x Rp	a	b	Z1	Z2	SW
X95550	X95560	X95570	15 x 1/2	48	91	22	77	24
X95551	X95560	X95570	22 x 3/4	63	105	34	90	32
X95552	X95560	X95570	28 x 1	69	113	39	96	38
X95553	X95560	X95570	35 x 1 1/4	87	133	56	113	46

KemPress® Stainless Bend 45° Female/Male



15 - 54 mm

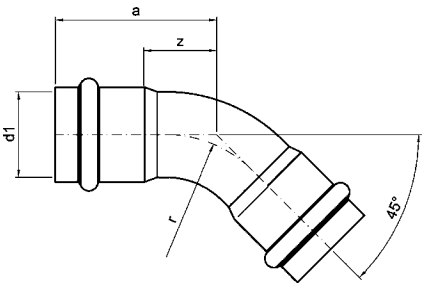


☐ 76 & 108 mm

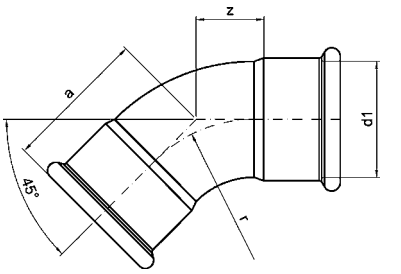
Standard	Industry	Gas	Dimension d1	a	b	z
X95650	X95660	X95670	15	37	47	12
X95651	X95661	X95671	22	48	56	19
X95652	X95662	X95672	28	53	60	24
X95653	X95663	X95673	35	58	64	27
X95654	X95664	X95674	42	68	79	30
X95655	X95665	X95675	54	83	89	38
X95656	X95666	X95676	76	89	108	38
X95657	X95667	X95677	108	124	150	54

KEMBLA
KemPress®

KemPress® Stainless Bend 45° Female/Female



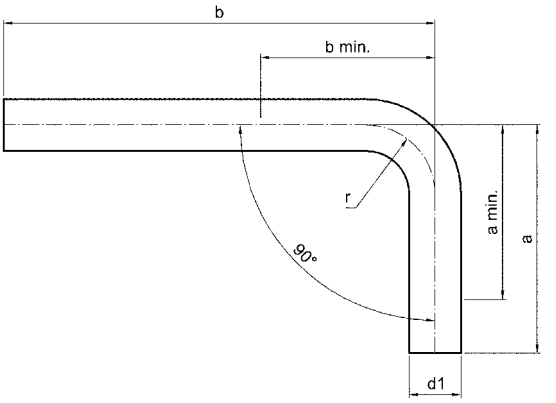
15 - 54 mm



☐ 76 & 108 mm

Standard	Industry	Gas	Dimension d1	a	z
X95700	X95710	X95720	15	37	12
X95701	X95711	X95721	22	48	19
X95702	X95712	X95722	28	53	24
X95703	X95713	X95723	35	58	27
X95704	X95714	X95724	42	68	29
X95705	X95715	X95725	54	83	38
X95706	X95716	X95726	76	89	38
X95707	X95717	X95727	108	124	54

KemPress® Stainless Bend 90° Plain Ends



Standard	Industry	Gas	Dimension d1	a	a min	b	b min
X95750			15	62	55	125	55
X95751			22	73	65	150	65
X95752			28	85	80	200	80
X95753			35	92	92	225	92
X95754			42	113	-	250	113
X95755			54	131	-	300	131

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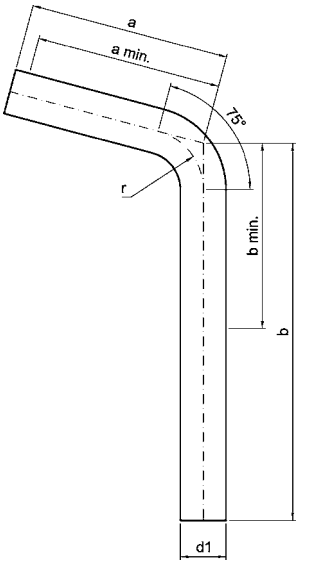
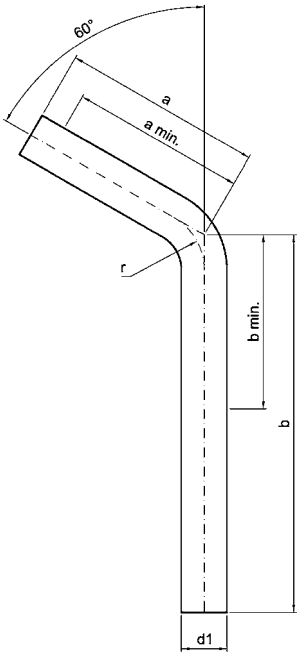
KemPress®

KemPress® Stainless Bend 75° Plain Ends



Standard	Industry	Gas	Dimension d1	a	a min	b	b min
X95800			15	66	55	125	55
X95801			22	75	65	150	65
X95802			28	85	76	200	76
X95803			35	92	81	225	81
X95804			42	113	100	250	100
X95805			54	131	120	300	120

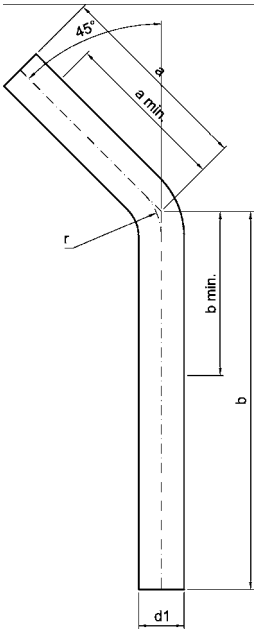
KemPress® Stainless Bend 60° Plain Ends



Standard	Industry	Gas	Dimension d1	a	a min	b	b min
X95850			15	66	55	125	55
X95851			22	75	65	150	65
X95852			28	85	62	200	62
X95853			42	92	71	225	71
X95854			54	113	85	250	85
X95855			76	162	130	350	130
X95856			108	231	160	350	160

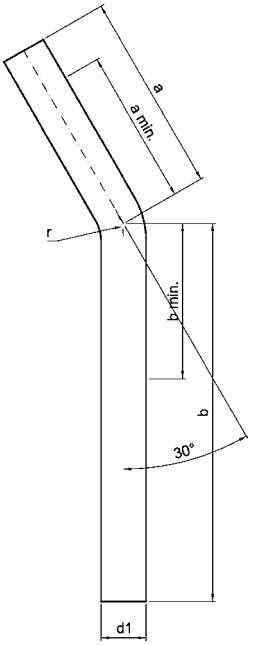
KEMBLA
KemPress®

KemPress® Stainless Bend 45° Plain Ends



Standard	Industry	Gas	Dimension d1	a	a min	b	b min
X95900			15	66	55	125	55
X95901			22	75	60	150	60
X95902			28	85	62	200	62
X95903			35	92	70	225	70
X95904			42	113	75	250	75

KemPress® Stainless Bend 30° Plain Ends

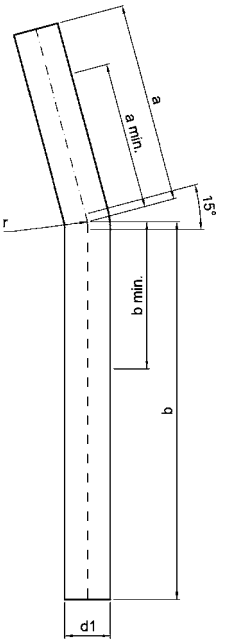


Standard	Industry	Gas	Dimension d1	a	a min	b	b min
X95950			15	66	52	125	52
X95951			22	75	55	150	55
X95952			28	85	55	200	55
X95953			35	92	55	225	55
X95954			54	131	77	300	77
X95955			76	162	130	350	130
X95956			108	231	160	350	160

KEMBLA

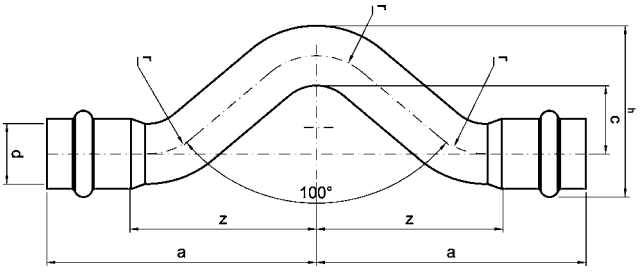
KemPress®

KemPress® Stainless Bend 15° Plain Ends



Standard	Industry	Gas	Dimension d1	a	a min	b	b min
X96000			15	66	49	125	49
X96001			22	75	52	150	52
X96002			28	85	51	200	51
X96003			35	92	50	225	50
X96004			54	131	65	300	65
X96005			76	162	130	350	130
X96006			108	231	160	350	160

KemPress® Stainless Full Crossover



Standard	Industry	Gas	Dimension d	a	c	h	z
X96950	N/A	N/A	15	79	21	8	53
X96951	N/A	N/A	22	93	26	7	64
X96952	N/A	N/A	28	105	28	9	84

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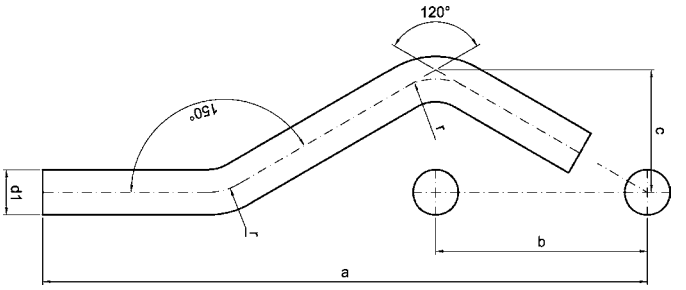
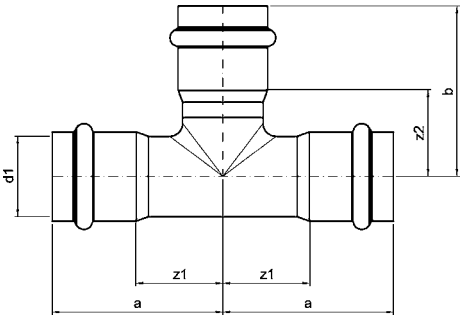
KemPress® Stainless Pipe Bridge

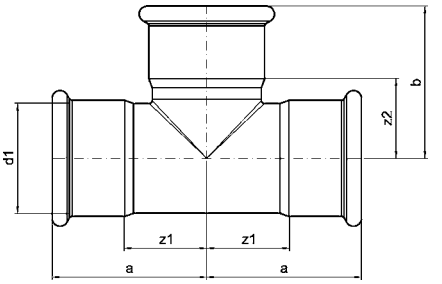


Standard	Industry	Gas	Dimension d1	a	b	c
X96900			15	200	70	41
X96901			22	216	78	45
X96902			28	244	87	50

KemPress® Stainless Equal Tee



15 - 54 mm



☐ 76 & 108 mm

Standard	Industry	Gas	Dimension d1 x d2 x d3	a	b	z1	z2	z3
X96250	X96260	X96270	15	48	46	22	21	22
X96251	X96261	X96271	22	54	53	26	25	26
X96252	X96262	X96272	28	60	59	30	30	30
X96253	X96263	X96273	35	65	65	35	35	35
X96254	X96264	X96274	42	77	77	39	38	39
X96255	X96265	X96275	54	89	90	45	46	45
X96256	X96266	X96276	76	108	106	57	55	57
X96257	X96267	X96277	108	144	144	74	74	74

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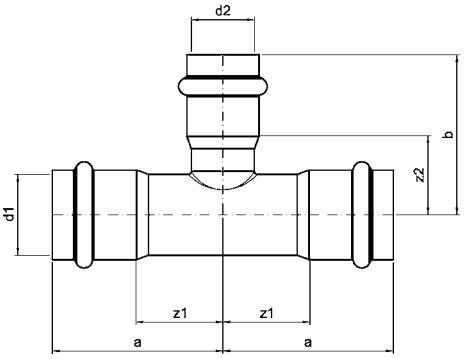
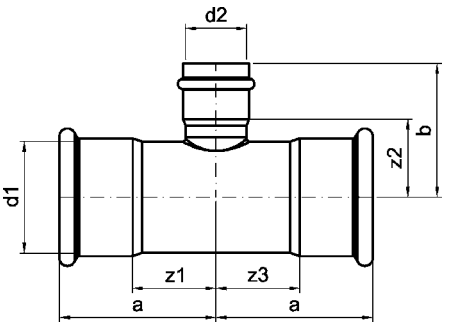
KemPress®

KemPress® Stainless Reducing Tee



15 - 54 mm



76 & 108 mm

Standard	Industry	Gas	Dimension d1 x d2 x d3	a	b	z1	z2	z3
X96300	X96350	X96400	22 x 15 x 22	44	44	15	18	15
X96301	X96351	X96401	28 x 15 x 28	60	54	30	28	30
X96302	X96352	X96402	28 x 22 x 28	60	53	30	27	30
X96303	X96353	X96403	35 x 15 x 35	65	58	35	33	35
X96304	X96354	X96404	35 x 22 x 35	65	59	35	31	35
X96305	X96355	X96405	35 x 28 x 35	65	62	35	33	35
X96306	X96356	X96406	42 x 22 x 42	77	63	39	34	39
X96307	X96357	X96407	42 x 28 x 42	77	64	39	35	39
X96308	X96358	X96408	42 x 35 x 42	77	67	39	37	39
X96309	X96359	X96409	54 x 22 x 54	89	69	45	40	45
X96310	X96360	X96410	54 x 28 x 54	89	70	45	41	45
X96311	X96361	X96411	54 x 35 x54	89	74	45	42	45
X96312	X96362	X96412	54 x 42 x 54	89	81	45	42	45
X96313	X96363	N/A	76 x 22 x 76	108	83	57	55	57
X96314	X96364	N/A	76 x 28 x 76	108	85	57	56	57
X96315	X96365	N/A	76 x 35 x 76	108	87	57	57	57
X96316	X96366	N/A	76 x 42 x 76	108	95	57	57	57
X96317	X96367	X96417	76 x 54 x 76	108	102	57	57	57
X96318	X96368	X96418	108 x 22 x 108	144	99	74	70	74
X96319	X96369	N/A	108 x 28 x108	144	101	74	72	74
X96320	X96370	X96420	108 x 35 x 108	144	103	74	73	74
X96321	X96371	X96421	108 x 42 x 108	144	111	74	73	74
X96322	X96372	X96422	108 x 54 x 108	144	118	74	73	74
X96323	X96373	X96423	108 x 76 x 108	144	122	74	71	74

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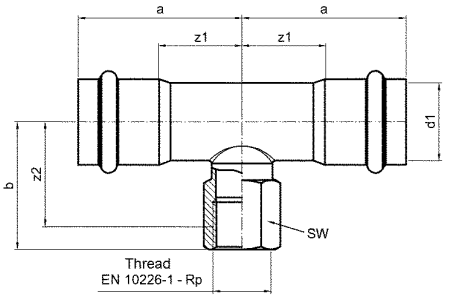
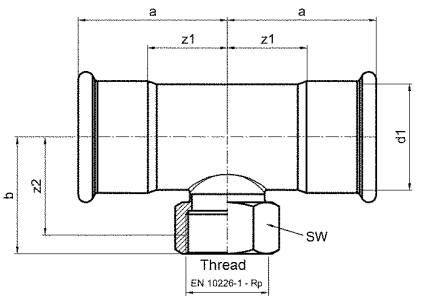
KemPress® Stainless Female BSPP/Rp Threaded T-Junction



15 - 54 mm



☐ 76 & 108 mm

Standard	Industry	Gas	Dimension d1 x RP	a	b	z1	z2	SW
X96450	X96500	X96550	15 x 1/2	48	45	22	32	24
X96451	X96501	X96551	22 x 1/2	54	48	26	35	24
X96452	X96502	X96552	22 x 3/4	54	50	26	35	32
X96453	X96503	X96553	28 x 1/2	60	46	30	32	24
X96454	X96504	X96554	28 x 3/4	60	54	30	39	32
X96455	X96505	X96555	28 x 1	60	57	30	40	38
X96456	X96506	X96556	35 x 1/2	65	49	35	36	24
X96457	X96507	X96557	35 x 3/4	65	51	35	36	32
X96458	X96508	X96558	35 x 11/4	65	65	35	45	46
X96459	X96509	X96559	42 x 1/2	77	54	39	40	24
X96460	X96510	X96560	42 x 3/4	77	56	39	41	32
X96461	X96511	X96561	42 x 11/2	77	68	39	48	55
X96462	X96512	X96562	54 x 1/2	89	60	45	46	24
X96463	X96513	X96563	54 x 3/4	89	62	45	47	32
X96464	X96514	X96564	54 x 2	89	80	45	56	65
X96465	X96515	X96565	76.1 x 3/4	108	75	57	60	32
X96466	X96516	X96566	76.1 x 2	108	85	57	61	65
X96467	X96517	X96567	108 x 3/4	144	91	74	76	32
X96468	X96518	X96568	108 x 2	144	101	74	77	65

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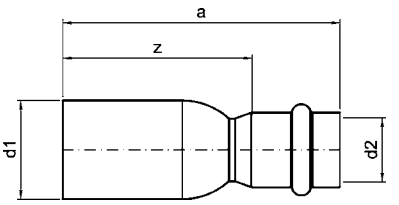
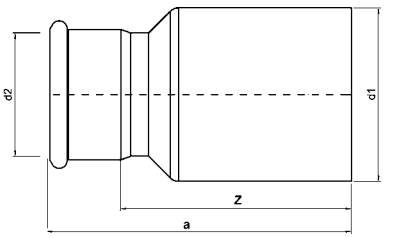
KemPress® Stainless Reducer with Tube End



15 - 54 mm

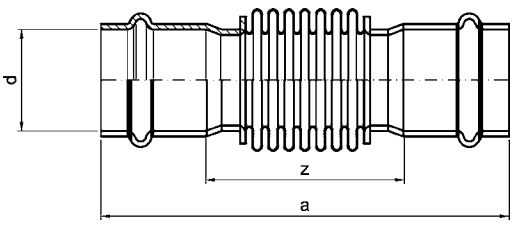


76 & 108 mm

Standard	Industry	Gas	Dimension d1 x d2	a	z
X95400	X95414	X95428	22 x15	73	47
X95401	X95415	X95429	28 x15	78	52
X95402	X95416	X95430	28 x22	77	48
X95403	X95417	X95431	35 x22	84	55
X95404	X95418	X95432	35 x28	85	55
X95405	X95419	X95433	42 x22	95	66
X95406	X95420	X95434	42 x28	97	67
X95407	X95421	X95435	42 x35	95	64
X95408	X95422	X95436	54 x28	106	76
X95409	X95423	X95437	54 x35	106	75
X95410	X95424	X95438	54 x42	112	73
X95411	X95425	X95439	76 x54	141	96
X95412	X95426	X95440	108 x54	180	135
X95413	X95427	X95441	108 x76	181	130

KemPress® Stainless Expansion Compensator

Installation must be visible and easily accessible



Standard	Industry	Gas	Dimension d	a	z	GDK
X97000	N/A	N/A	15	106	45	10
X97001	N/A	N/A	22	108	37	14
X97002	N/A	N/A	28	113	42	12
X97003	N/A	N/A	35	124	49	14
X97004	N/A	N/A	42	146	53	16
X97005	N/A	N/A	54	165	56	20
X97006	N/A	N/A	76.1	201	76	24
X97007	N/A	N/A	108	265	92	34

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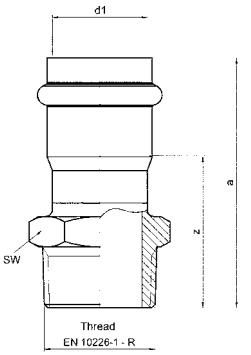
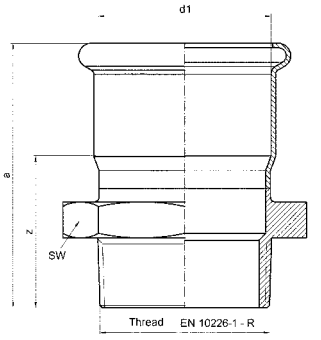
KemPress® Stainless Male BSPT/R Thread Adaptor, Female Socket



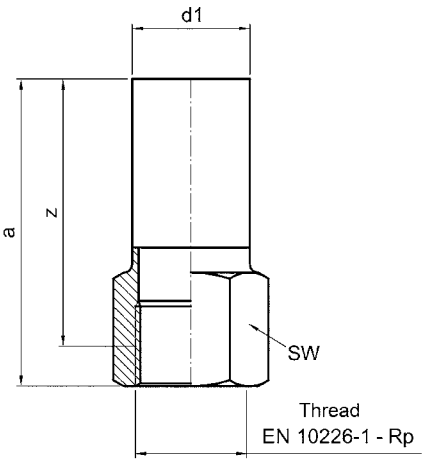
15 - 54 mm



☐ 76 & 108 mm

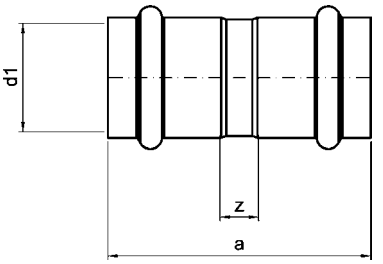
Standard	Industry	Gas	Dimension d1 x R	a	z	SW
X96050	X96063	X96076	15 x 1/2	46	20	24
X96051	X96064	X96077	15 x 3/4	63	37	30
X96052	X96065	X96078	22 x 1/2	51	22	27
X96053	X96066	X96079	22 x 3/4	51	22	30
X96054	X96067	X96080	22 x 1	52	23	36
X96055	X96068	X96081	28 x 3/4	72	42	30
X96056	X96069	X96082	28 x 1	74	44	36
X96057	X96070	X96083	35 x 1	80	49	36
X96058	X96071	X96084	35 x 11/4	84	53	46
X96059	X96072	X96085	42 x 11/2	94	55	55
X96060	X96073	X96086	54 x 2	107	62	65
X96061	X96074	X96087	76.1 x 21/2	117	65	100
X96062	X96075	X96088	108 x 4	155	84	125

KemPress® Stainless Female BSPP/Rp Thread Adaptor, Tube End

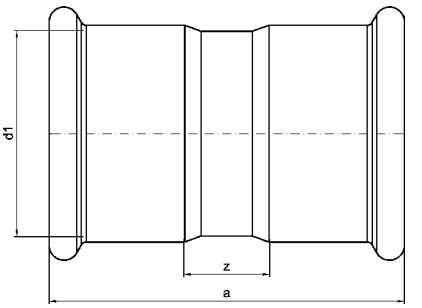


Standard	Industry	Gas	Dimension d1 x Rp	a	z	SW
X96200			15 x 1/2	66	53	24
X96201			22 x 1/2	71	58	24
X96202			22 x 3/4	73	58	32
X96203			28 x 3/4	78	63	32

KemPress® Stainless Coupling



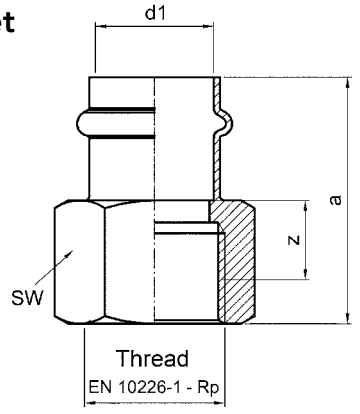
15 - 54 mm



☐ 76 & 108 mm

Standard	Industry	Gas	Dimension d1	a	z
X95300	X95310	X95320	15	56	6
X95301	X95311	X95321	22	76	20
X95302	X95312	X95322	28	78	19
X95303	X95313	X95323	35	78	17
X95304	X95314	X95324	42	94	18
X95305	X95315	X95325	54	106	18
X95306	X95316	X95326	76	132	31
X95307	X95317	X95327	108	170	31

KemPress® Stainless Female BSPP/Rp Thread Adaptor, Female Socket



Standard	Industry	Gas	Dimension d1 x Rp	a	z	SW
X96150	X96160	X96170	15 x 1/2	46	7	24
X96151	X96161	X96171	15 x 3/4	49	9	30
X96152	X96162	X96172	22 x 1/2	50	8	24
X96153	X96163	X96173	22 x 3/4	52	9	30
X96154	X96164	X96174	22 x 1	55	9	38
X96155	X96165	X96175	28 x 3/4	76	32	32
X96156	X96166	X96176	28 x 1	79	32	38
X96157	X96167	X96177	35 x 11/4	89	39	46
X96158	X96168	X96178	42 x 11/2	98	40	55
X96159	X96169	X96179	54 x 2	107	39	65

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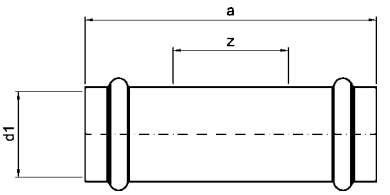
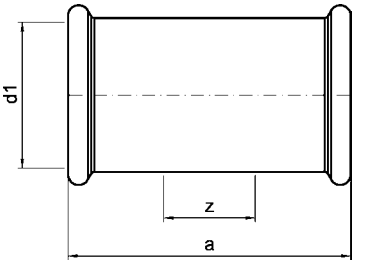
KemPress® Stainless Slip Coupling



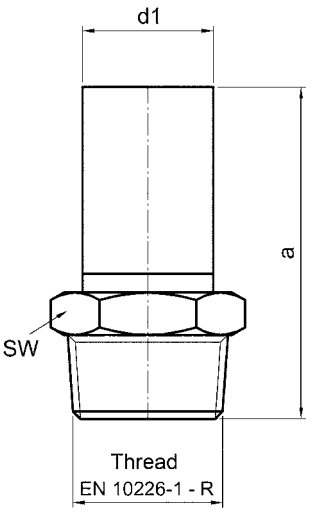
15 - 54 mm



☐ 76 & 108 mm

Standard	Industry	Gas	Dimension d1	a	z
X95350	X95360	X95370	15	78	27
X95351	X95361	X95371	22	84	27
X95352	X95362	X95372	28	96	37
X95353	X95363	X95373	35	98	37
X95354	X95364	X95374	42	114	37
X95355	X95365	X95375	54	131	42
X95356	X95366	X95376	76	148	47
X95357	X95367	X95377	108	210	71

KemPress® Stainless Male BSPT/R Adaptor, Tube End



Standard	Industry	Gas	Dimension d1 x R	a	SW
X96100			15 x 1/2	59	22
X96101			22 x 1/2	64	24
X96102			22 x 3/4	68	30
X96103			28 x 1	76	36

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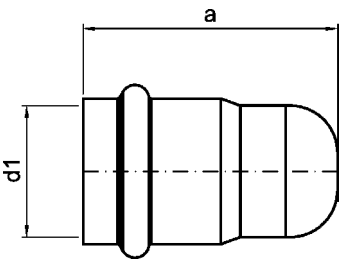
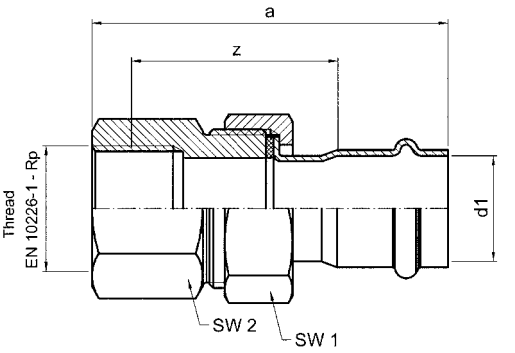
KemPress® Stainless End Cap with Socket



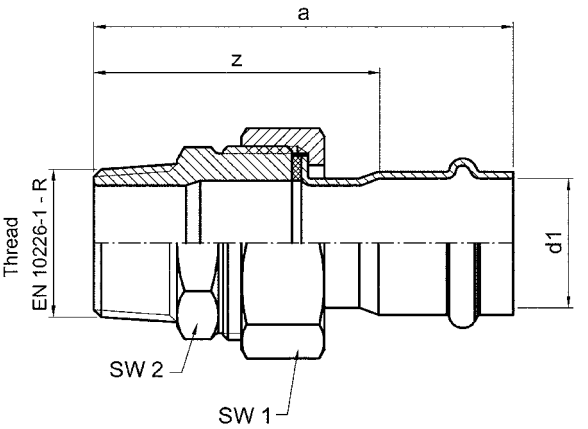
Standard	Industry	Gas	Dimension d1	a
X96850	X96860	X96870	15	47
X96851	X96861	X96871	22	51
X96852	X96862	X96872	28	54
X96853	X96863	X96873	35	57
X96854	X96864	X96874	42	68
X96855	X96865	X96875	54	82

KemPress® Stainless Female BSPP/Rp Thread Union, Female Socket, Stainless Steel Nut



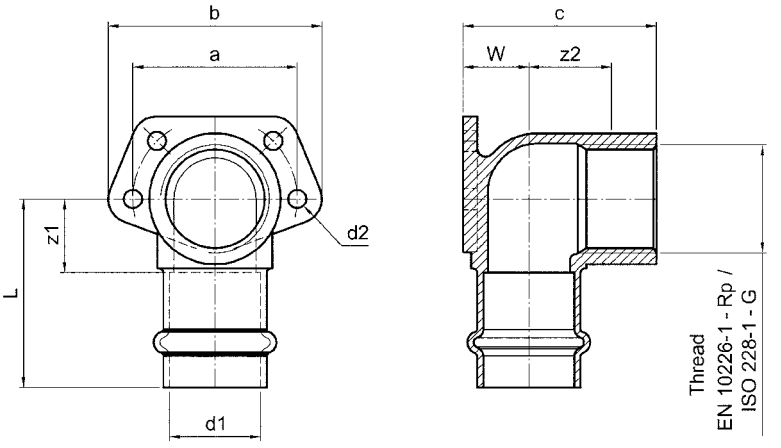
Standard	Industry	Gas	Dimension d1 x Rp	a	z	G	SW1	SW2
X96700	X96710	X96720	15 x 1/2	93	53	27	24	X96700
X96701	X96711	X96721	15 x 3/4	94	53	32	30	X96701
X96702	X96712	X96722	22 x 3/4	104	60	38	32	X96702
X96703	X96713	X96723	22 x 1	107	60	38	38	X96703
X96704	X96714	X96724	28 x 3/4	114	69	50	32	X96704
X96705	X96715	X96725	28 x 1	118	71	40	41	X96705
X96706	X96716	X96726	35 x 11/4	113	62	55	46	X96706
X96707	X96717	X96727	42 x 11/2	115	57	58	55	X96707
X96708	X96718	X96728	54 x 2	126	57	75	70	X96708

KemPress® Stainless Male BSPT/R Thread Union, Flat Sealing, Stainless Steel Nut



Standard	Industry	Gas	Dimension d1 x R	a	z	SW1	SW2
X96750	X96760	X96770	15 x 1/2	90	63	30	27
X96751	X96761	X96771	15 x 3/4	91	64	30	30
X96752	X96762	X96772	22 x 3/4	101	71	38	36
X96753	X96763	X96773	28 x 1	115	85	50	36
X96754	X96764	X96774	35 x 11/4	124	92	55	46
X96755	X96765	X96775	42 x 11/2	126	87	58	55
X96756	X96766	X96776	54 x 2	138	93	75	70

KemPress® Stainless Female BSPP/Rp Thread Bend 90° with Wall Mount Plate



Standard	Industry	Gas	Dimension d1 x Rp	a	b	c	z1	z2	L	W	d2
X96600	X96610	X96620	15 x 1/2	40	55	40	15	14	40	13	5
X96601	X96611	X96621	22 x 3/4	46	55	47	18	16	46	16	5
X96602	X96612	N/A	28 x 1	55	70	58	22	21	51	20	5

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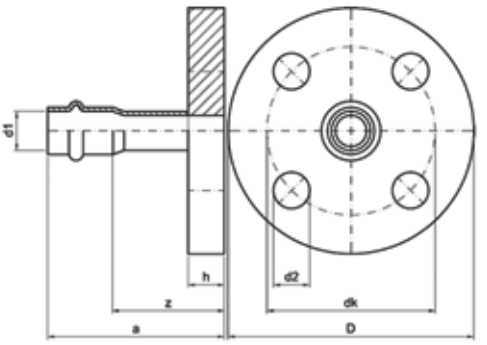
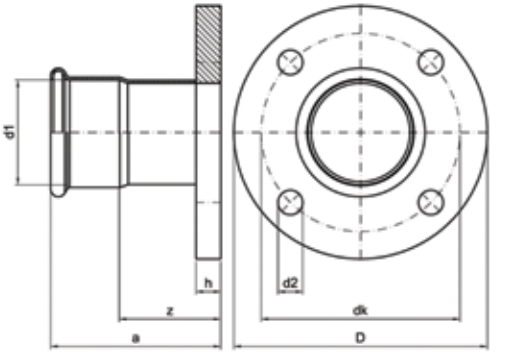
KemPress® Stainless, Spacers for Female BSP Bend 90° with Wall Mount Plate

Standard	Industry	Gas	Dimension
X96650			18mm for 22 x 3/4
X96651			25mm for 15 x 1/2

KemPress® Stainless Adaptor Flange with Socket End



15 - 54 mm



76 & 108 mm

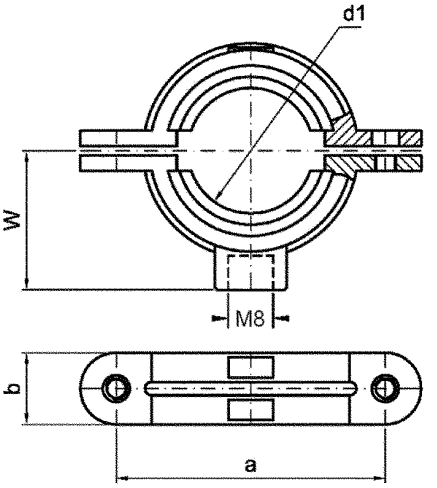
Standard	Industry	Gas	Dimension d1	a	z	h	dk	d2	D	Bolt Holes
X96801	X96811	X96821	22 mm	69	40	14	75	14	105	4
X96802	X96812	X96822	28 mm	75	45	16	85	14	115	4
X96803	X96813	X96823	35 mm	78	47	16	100	18	140	4
X96804	X96814	X96824	42 mm	87	48	16	110	18	150	4
X96805	X96815	X96825	54 mm	100	55	18	125	18	165	4
X96806	X96816	X96826	76.1 mm	124	73	18	145	18	185	4
X96807	X96817	X96827	108 mm	162	92	20	180	18	220	8

KemPress® Stainless Flange Seals

Adaptor flange sealing, asbestos free, suitable up to maximum 400°C, resistant against water, steam, fuel, depleted liquor, oils, gases (DVGW tested according to DIN 3535 part 6). Dimensions according to EN 1514-1, 2 mm thickness for flanges, PN 10/16 = EN 1092-1 and EN 1092-2

Standard	Industry	Gas	Dimension d
X97051			22 mm
X97052			28 mm
X97053			35 mm
X97054			42 mm
X97055			54 mm
X97056			76.1 mm
X97057			108 mm

KemPress® Stainless Pipe Clamps with Insulation



Standard	Industry	Gas	Dimension d1	a	b	w
X97100			15 mm	47	18	25
X97101			22 mm	54	18	28
X97102			28 mm	60	18	31
X97103			35 mm	67	18	35
X97104			42 mm	74	18	38
X97105			54 mm	86	18	44

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