

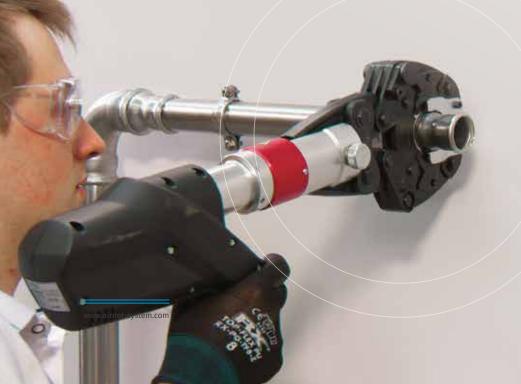
Stainless Steel

Installation and Assembly Guide



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AIRnet Installation Instructions

Notice A: Certified Installer

At AIRnet, we take pride in the quality and safety of our products. That's why we require that all installations are carried out by a certified installer, who is highly trained and equipped to handle all aspects of the installation process.

Notice B: Complete Comprehension

This comprehensive manual must be thoroughly read in its entirety in order to have a complete understanding of the AIRnet assembly process.



Operating Conditions

Operating Conditions

AIRnet stainless steel pipes and fittings are designed to convey compressed air and vacuum. The system can also be used for nitrogen, helium, argon, neon, xenon and krypton.

AIRnet system can only be used to convey compressed air, Vacuum & inert gases and the allowed medium can be in direct contact with the final product or process. However, AIRnet system cannot be used for conveying the finished products, for example, chemicals, food products, cement etc.

AIRnet stainless steel AIRnet systems must only be used within the pressure and temperature specifications referred to in the AIRnet Stainless Product Information Sheet.



AIRnet stainless steel systems must be appropriately protected against violent impacts and wind gusts.

Ensure accessibility of the AIRnet system for possible future system expansion or maintenance.



AIRnet stainless steel pipes and fittings should not be used as support for electrical equipment or earth conductors.



AIRnet stainless steel pipes should never be directly connected to a source of vibrations (use hoses instead).

AIRnet stainless steel systems support pressure dewpoints up to -70°C and are expected to be operated in C3 and below corrosivity categories according to EN ISO 9223.

Pressure relief valves must be installed where needed to ensure that the system working pressure cannot exceed the maximum working pressure of AIRnet Stainless Steel.



AIRnet pipes and fittings are not suitable for direct contact with soil. A watertight PVC pipe suited for underground or outside installations can be used to install around the AIRnet pipe.

AIRnet Installations in Explosive Environments

Cutting, deburring and assembly of AIRnet stainless steel pipes can create sparks. Necessary precautions in explosive atmospheres must be taken.



AIRnet stainless steel installations in explosive environments must always be earthed.

Bonding and earthing must be checked at frequent intervals to secure that the system cannot be electrically charged.

Purity Remarks

To guarantee the purity of the compressed air at the point of use:

- a system purge of at least 24h is highly recommended.
- a properly sized certified point-of-use filter is advised, depending on the application requirements.

AIRnet stainless steel cannot be allowed to convey any end products (food, beverage, pharmaceuticals, etc.)



Safety Instructions

Safety Instructions



AIRnet is not meant to bear weight beside its own weight. Heavier accessories incorporated into the AIRnet system (like filters or valves) need proper supporting.



Do not use any other brand fittings or pipes in combination with AIRnet stainless steel products.

Installation, adjustments and repair work of an AIRnet system must be performed by authorized trained personnel.



Installers must use the necessary protection means (PPMs). When working at heights, use a harness for personal protection, and ensure that tools are securely fastened to prevent them from falling.

Installers must comply to all local safety requirements related to the application(s) in scope. Special care must always be taken to prevent suffocation risks when working with gases other than air.



Please consider the potential galvanic corrosion when combining parts with different material.

Before any installation, adjustment, repair work or other non-routine checks, relieve the AIRnet system of pressure and effectively isolate the system from all sources of pressure.



Only genuine AIRnet parts and tools should be used when installing, adjusting or repairing an AIRnet stainless steel system.

All plugs and caps must be removed before installing the AIRnet pipes.



Check the surface of the AIRnet pipes before installing. There should be no relevant scratches, abrasions, dents etc.



Use only solvents or chemicals which do not damage the materials of AIRnet.

Please conduct an LMRA (last minute risk assessment) before commencing an AIRnet installation.



Before using the AIRnet stainless steel system, installers must ensure that all necessary test controls and applicable rules for the specific installation are complied with.

At initial startup of the AIRnet system, apply a test pressure of 1.5 bar to identify leakage or imperfect joints. After performing an inspection, increase the pressure gradually and constantly (max 1 bar every 5 minutes) and perform a second inspection for leakages or imperfect joints at the final pressure.

Never use damaged AIRnet fittings or tools.



Product Range	Pipes SS304L: D15 (½"), D28 (1"), D35 (1 ½"), D42 (1 ½"), D54 (2"), D76 (2 ¾"), D89 (3 ½"), D108 (4") Pipes SS316L: D15 (½"), D28 (1"), D42 (1 ½")	
Applications	Compressed Air, Vacuum, Nitrogen, Helium, Argon, Neon, Xenon and Krypton.	
Material	Stainless Steel AISI 316L 1.4404 Stainless Steel AISI 304L 1.4301	EN10088 ASTM A666
Safety factor	4, Burst pressure > 64 Bar (> 928 PSI)	
Working pressure	16 Bar (232 PSI)	
Working temperature	-20°C to 120°C (- 4°F to 248° F)	
Vacuum level	20 mbar (0.29 PSI) abs	
Dewpoint	Lowest allowable pressure dewpoint is -70°C (-94°F)	
Treatment	Annealing	

Fittings	D15 (½"), D28 (1"), D35 (1 ¼"), D42 (1 ½"), D54 (2"), D76 (2 ¾"), D89 (3 ½"), D108 (4")		
Connection	Press fit system		
Materials	Stainless steel AISI 316L 1.4404	EN10088 ASTM A666	
Seal fittings	FKM (fluoroelastomer)		

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LMRA (Last Minute Risk Assessment)

This checklist is a risk assessment to be performed on-site at the customer and must be preceded by a detailed risk assessment.



STEP 1: EVALUATION BEFORE THE START OF WORK

STEP I: EVALUATION BEFORE THE START OF WORK	YES	NO	N/A
Do I know what to do and how?			
Am I trained to do this kind of work?			
Is my work equipment suitable and in good condition / inspected?			
Do I have the necessary PPE, and do they offer appropriate protection?			
Do I have a work permit that allows me to start?			
Is my working environment free of slipping, tripping and/or falling hazards?			
Is my work environment sufficiently enlightened?			
Have I identified all energy sources and followed the Lock Out – Tag Out procedure?			
Do I know the regulations for using and handling dangerous goods I am going to use?			
Is the atmosphere in and around my work environment safe? (confined space, explosion)			
Is the danger of falling objects excluded?			
Am I sufficiently protected against falls from height?			
Are the weather conditions good?			
Can I lift loads manually in an ergonomic way?			
Is my work environment defined?			
Is there regular supervision when I work in isolation?			
Am I aware of the risks of other activities in my work environment?			
Do I know the locations of first aid equipment (e.g. emergency shower, eyewash bottle)			
Do I know the locations of firefighting equipment (e.g.; extinguisher, reel)			
Do I know the alarm procedure and numbers in the event of a fire or accident?			
Do I know my escape route and evacuation site?			
Have I taken all measures to prevent environmental pollution?			



LMRA (Last Minute Risk Assessment)



	YES	NO	N/A
Did I read and understand the installation manual for AIRnet - www.airnet-system.com			
Is scaffolding and/or lifting equipment inspected and in good condition?			
Will the AIRnet system be installed within the limits of the product in terms of environment, pressure and temperature?			
Will the AIRnet system be used for the gasses mentioned in the technical datasheet OR has a written confirmation from the manufacturer been obtained that claims AIRnet can be used for this type of gas?			
Will the AIRnet system be properly earthed (electrically?)			
Did I check for any damage to the AIRnet material due to transport?			
Did I check if the tools used are in good condition and have been maintained as per requirement?			
Did I check if the right tools are available for carrying out the AIRnet installation?			

STEP 2: MEASURES TO ELIMINATE OR REDUCE EXISTING RISKS TO AN ACCEPTABLE LEVEL

STEP 3: PRESENT WHEN FORMATTING THIS LMRA

Name	Date	Signature



Commissioning Report

All AIRnet commissioning has to be registered in the F3 app!

Go to https://airnetinstructions.com/ to register your installation and get up-to-date information about AIRnet.

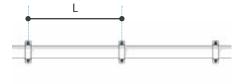
Commissioning data to be collected and submitted in the F3 app as shown below:

Certified installer:	Responsible AIRnet champion:			
Customer:	Commissioning date (dd/mm/yyyy):			
Customer address:				
Expansion of existing installation	New installation			
Before installation				
SAFETY All safety instructions at customer site have been acknowledged and applied. The AIRnet installation manual (latest version is available on the website: https://www.airnet-system.com/en) has been read and understood. The installation is carried out in accordance with the instructions in this manual. MEDIUM Compressed air Vacuum Nitrogen Other:	AMBIENT CONDITIONS The installation is installed: Indoor Outdoor The piping is protected against violent impacts and wind gusts NETWORK LAYOUT To ensure proper draining of condensate, pipes should be sloped at 1-2% and a drain point should be foreseen at every lowest point of the line. Ensure that pressure vessels are bolted to the floor, and that vibrations may not be transmitted to the AlRnet piping.			
TMAX — °C / °F TAVG — °C / °F TMIN — °C / °F	Expansion loops Number of expansion loops or compensators:			
Working pressure bar(g) / psi	Longest straight line: m/ft			

Installation

Check if enough supporting is used based on the table on the right. The table shows the maximum allowed distance L between two pipe clips.

External pipe diameter (mm / inch)	Maximum distance (m / ft)
15 / 1/2"	1,5 / 5
28 / 1"	2,5 / 8
35 / 1 1/4"	2,5 / 8
42 / 1 1/2"	3 / 10
54 / 2"	3,5 / 11,5
76 / 2 ³/₄"	4 / 13
89 / 3 1/2"	4,5 / 14,5
108 / 4"	5 / 16





Commissioning Report

All valves and flanges are supported by a pipe clip on both sides	© Check	Insertion depth man have been checked least 10% of fittings	on at
Commissioning			
3. Use leak finder spray or and go back to step 1.4. Increase pressure gradu	r / 22 psi to the system. dropping between the end or an ultrasonic leak detector the ally (max 1 bar / 14 psi every domonitor the pressure at the ing, go to point 3. The handover lead during first pressurization ound mections lead during final pressurization ound mections lead our mections lead out the end of lead out the end out the e	f the line and the vessel. If preso find the leak. Depressurize to find the leak. Depressurize to find the line for 30 minutes at 1,5 bar / 22 psi	es.
Signatures			
AIRnet installer	AIRnet champion	Cust	tomer representative

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Cleaning Products

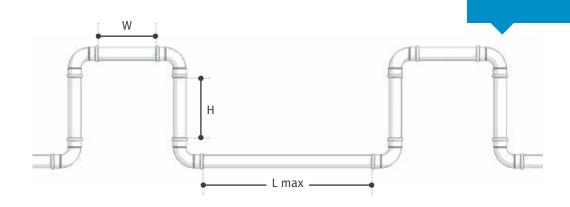
Product	Usage in the field	Stainless steel 304L	Stainless steel 316L	O-rings in SS fittings
Disinfection/ sterilization				
Ethyl Alcohol (ethanol) (60-90%)	Seldom, used on small external surfaces	Good	Good	Good
Isopropyl alcohol (isopropanol)	Seldom, used on small external surfaces	Good	Good	Good
Amphoterics		Good	Good	Unknown
Quaternary ammonium compounds (QAC)	environmental sanitation of noncritical surfaces	Good	Good	Unknown
Gluteraldehyde	high-level disinfectant for medical equipment, not for non-critical surfaces	Good	Good	Unknown
Formaldehyde	Seldom, produces carcinogenic fumes	Good	Good	Good (at concentration of 40% or less)
Whole Room disinfection/ sterilization				
QAC fogging		Unknown	Unknown	Unknown
Cleaning (components)				
surfactants (detergents in general)		Good	Good	Good
Ethylene diamine tetracetic acid (EDTA)		Good	Good	Not resistant



Expansion Loops and Compensators

Long straight pipes will expand or contract due to temperature variations. To compensate for this effect, expansion loops or compensators are required. An expansion loop is a U-shaped construction that compensates the variation in length. Compensators are straight fittings specifically designed to allow axial movement. The number of expansion loops / compensators depends on the total length of the straight line and the maximum temperature variation.

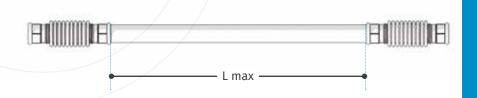
The below table gives the maximum possible straight distance between two expansion loops with fixed piping vs. the temperature variation:



	Ø15 mm / 1/2"	Ø28 mm / 1"	Ø35 mm / 11/4"	Ø42 mm / 1 1/2"	Ø54 mm / 2"	Ø76 mm / 2 3/4"	Ø89 mm / 3 1/2"	Ø108 mm / 4"
н	0,75 m / 2,5 ft	1 m /	3,3 ft	1,25m	/ 4,1 ft	1,5 m	/ 5 ft	1,75 m / 5,75 ft
W	0,375 m / 1,25 ft	0,5 m	/ 1,6 ft	0,625n	n / 2 ft	0,75 m	/ 2,5 ft	0,875 m / 2,9 ft
Δt			Maxim	um distance betw	een two expansion	joints		
5°C / 9°F	726 m / 2383 ft	691 m / 2269 ft	553 m / 1815 ft	720 m / 2364 ft	560 m / 1838 ft	573 m / 1881 ft	489 m / 1606 ft	549 m / 1802 ft
10°C / 18°F	363 m / 1191 ft	345 m / 1134 ft	276 m / 907 ft	360 m / 1182 ft	280 m / 919 wft	286 m / 940 ft	244 m / 803 ft	274 m / 901 ft
20°C / 36°F	181 m / 595 ft	172 m / 567 ft	138 m / 453 ft	180 m / 591 ft	140 m / 459 ft	143 m / 470 ft	122 m / 401 ft	137 m / 450 ft
30°C / 54°F	121 m / 397 ft	115 m / 378 ft	92 m / 302 ft	120 m / 394 ft	93 m / 306 ft	95 m / 313 ft	81 m / 267 ft	91 m / 300 ft
40°C / 72°F	90 m / 297 ft	86 m / 283 ft	69 m / 226 ft	90 m / 295 ft	70 m / 229 ft	71 m / 235 ft	61 m / 200 ft	68 m / 225 ft
50°C / 90°F	72 m / 238 ft	69 m / 226 ft	55 m / 181 ft	72 m / 236 ft	56 m / 183 ft	57 m / 188 ft	48 m / 160 ft	54 m / 180 ft
60°C / 108°F	60 m / 198 ft	57 m / 189 ft	46 m / 151 ft	60 m / 197 ft	46 m / 153 ft	47 m / 156 ft	40 m / 133 ft	45 m / 150 ft
70°C / 126°F	51 m / 170 ft	49 m / 162 ft	39 m / 129 ft	51 m / 168 ft	40 m / 131 ft	40 m / 134 ft	34 m / 114 ft	39 m / 128 ft
80°C / 144°F	45 m / 148 ft	43 m / 141 ft	34 m / 113 ft	45 m / 147 ft	35 m / 114 ft	35 m / 117 ft	30 m / 100 ft	34 m / 112 ft
90°C / 162°F	40 m / 132 ft	38 m / 126 ft	30 m / 100 ft	40 m / 131 ft	31 m / 102 ft	31 m / 104 ft	27 m / 89 ft	30 m / 100 ft
100°C / 180°F	36 m / 119 ft	34 m / 113 ft	27 m / 90 ft	36 m / 118 ft	28 m / 91 ft	28 m / 94 ft	24 m / 80 ft	27 m / 90 ft



Expansion Loops and Compensators



The table below gives the maximum possible straight distance between two compensators vs. the temperature variation:

	Ø15 mm / 1/2"	Ø28 mm / 1"	Ø35 mm / 11/4"	Ø42 mm / 11/2"	Ø54 mm / 2"						
Δt	Maximim distance between two compensators (1000 cycles max.)										
5°C / 9°F	193 m / 636 ft	266 m / 874 ft	315 m / 1033 ft	387 m / 1272 ft	436 m / 1431 ft						
10°C / 18°F	96 m / 318 ft	133 m / 437 ft	157 m / 516 ft	193 m / 636 ft	218 m / 715 ft						
20°C / 36°F	48 m / 159 ft	66 m / 218 ft	78 m / 258 ft	96 m / 318 ft	109 m / 357 ft						
30°C / 54°F	32 m / 106 ft	44 m / 145 ft	52 m / 172 ft	64 m / 212 ft	72 m / 238 ft						
40°C / 72°F	24 m / 79 ft	33 m / 109 ft	39 m / 129 ft	48 m / 159 ft	54 m / 178 ft						
50°C / 90°F	19 m / 63 ft	26 m / 87 ft	31 m / 103 ft	38 m / 127 ft	43 m / 143 ft						
60°C / 108°F	16 m / 53 ft	22 m / 72 ft	26 m / 86 ft	32 m / 106 ft	36 m / 119 ft						
70°C / 126°F	13 m / 45 ft	19 m / 62 ft	22 m / 73 ft	27 m / 90 ft	31 m / 102 ft						
80°C / 144°F	12 m / 39 ft	16 m / 54 ft	19 m / 64 ft	24 m / 79 ft	27 m / 89 ft						
90°C / 162°F	10 m / 35 ft	14 m / 48 ft	17 m / 57 ft	21 m / 70 ft	24 m / 79 ft						
100°C / 180°F	9 m / 31 ft	13 m / 43 ft	15 m / 51 ft	19 m / 63 ft	21 m / 71 ft						

Example

Consider an installation with a 100m / 328 ft straight line in 15mm / 1/2" pipe. The minimum temperature of the system is -20°C / -4°F in the winter, and the maximum temperature is 50°C / 122°F due to hot compressed air when the system is in use. The Δt is then 70°C / 126°F.

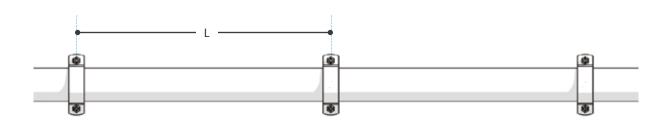
For this 100m / 328 ft straight line, this means that 1 expansion loop is required. This means that for this straight line, 7 compensators are required.



Pipe Support

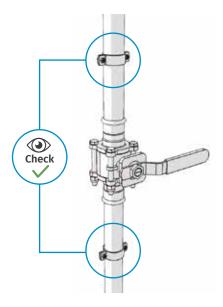
The maximum distance L between two pipe clips is given by the table below:

Make sure the piping system is rigidly supported to the structure of the building so that movement due to external forces (e.g. wind) of the piping is prevented.



External Pipe Diameter (mm / inch)	Maximum distance (m / ft)
15 / 1/2"	1,5 / 5
28 / 1"	2,5 / 8
35 / 1 1/4"	2,5 / 8
42 / 1 ½"	3 / 10
54 / 2"	3,5 / 11,5
76 / 2 ¾"	4 / 13
89 / 3 ½"	4,5 / 14,5
108 / 4"	5 / 16

Valves must be supported by a pipe clip on both sides, with a maximum distance of 0.5m (20") between the valve and the pipe clips.





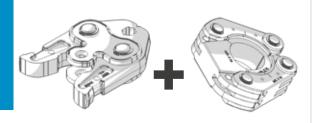
Tools -Overview

D15 - D35
1/2" - 1 1/4"



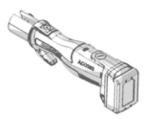
D15 / ½" = 2812 1030 00 D28 / 1" = 2812 2030 00 D35 / 1 ¼" = 2812 3030 00

D42 - D54 1 ½" - 2"



2812 4530 00

D42 / 1 ½" = 2812 4030 00 D54 / 2" = 2812 5030 00



230V: 2812 0030 00 110V: 2812 0030 01 Including protective case, battery charger, charger cable

Spare parts:

Charger: 230V: 2812 0430 00 110V: 2812 0430 01 Battery: 2812 0230 00

Cable to work on grid power:

2812 0428 01 (110V) 2812 0428 00 (220V)

D76 - D108 2 ¾" - 4"



Spare parts:

Charger: 230V: 2812 0430 00 110V: 2812 0430 01 Battery: 2812 0230 00

Cable to work on grid power: 2812 0428 01 (110V)

2812 0428 00 (220V)

D76 / 2 3/4" = 2812 6030 00 D89 / 3 1/2"= 2812 7030 00 D108 / 4" = 2812 8030 00 230V: 2812 0130 00 110V: 2812 0130 01 Including protective case, battery charger, charger cable, cable to work on power grid

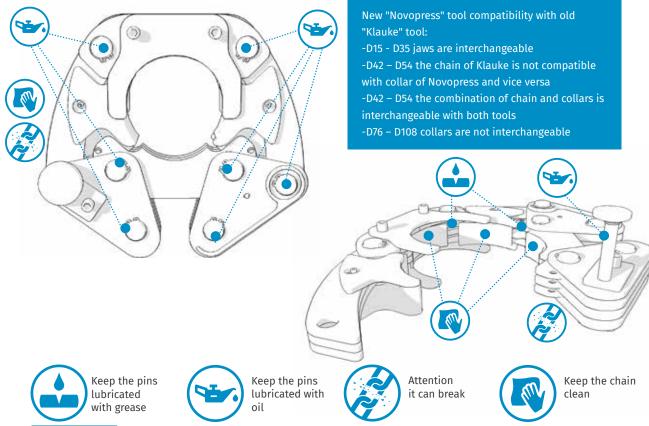
Note: the AIRnet Stainless Steel System will only attain the designed pressure when installed using the tools in the table above. Using other tools is not recommend, as this may lower the pressure rating.



Tools - Inspection and Maintenance

To guarantee correct installation, the pressing tools must be checked regularly by an official authorized repairer according to the manufacturer specifications. All moving parts and pressing surfaces must be cleaned and lubricated daily. Before starting installation, make sure to inspect the tools thoroughly. Any possible oxidation, paint or dirt will affect the reliability, possibly resulting in sliding issues on the fittings during pressing.

						Klauk	ke D15 - D	054					Klauke I	076 - D10	8
		15	18	22	28	35	42	54	Chain + collar 42	Chain + collar 54	Battery/ charger	76	89	108	Battery/ charger
	15	YES													
	18		YES												
	22			YES											
	28				YES										
Novopress	35					YES									
ACO 203 BT	42						NO								
	54							NO							
	Chain + collar 42								YES						
	Chain + collar 54									YES					
	Battery/charger										NO				
	76											NO			
Novopress ACO 403 BT	89												NO		
	108													NO	
	Battery/charger														NO

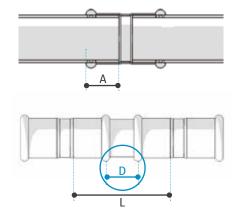




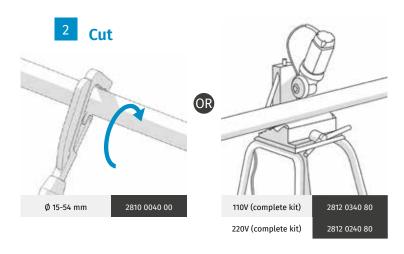
Installation -Pipe Preparation

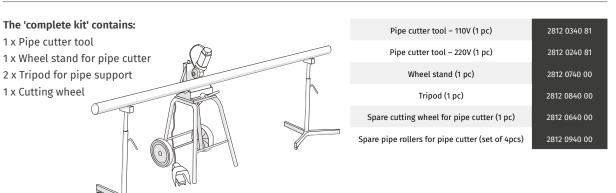
1 Measure

Pipe Outside Diameter (mm/inch)	A mm/inch	D (mm/inch)	L (mm / inch)
15 / 1/2"	20 / 1³/16"	20 / 13/16"	60 / 2 3/8"
28 / 1"	23 / 15/16"	20 / 13/16"	66 / 2 5/8"
35 / 1 1/4"	26 / 1"	20 / 13/16"	72 / 2 1³/16"
42 / 1 1/2"	30 / 1 ³/16"	40 / 1 %16"	100 / 5 1/2"
54 / 2"	35 / 1 3/8"	40 / 1 %16"	110 / 4 5⁄16"
76 / 2 3/4"	55 / 2 ³/16"	60 / 2 3/8"	170 / 6 11/16"
89 / 3 1/2"	60 / 2 3/8"	60 / 2 3/8"	180 / 7 ½16"
108 / 4"	75 / 2 15/16"	60 / 2 3/8"	210 / 8 1/4"



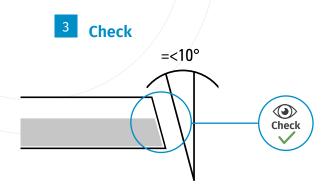
- A = Insertion Depth
- D = Minimum Distance
- L = Minimum Pipe Length Tube

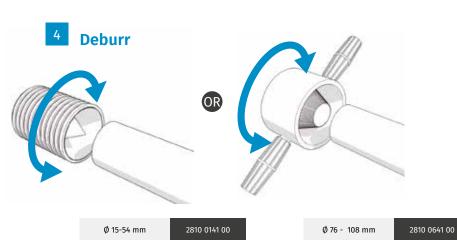


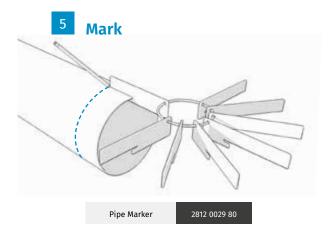




Installation -Pipe Preparation



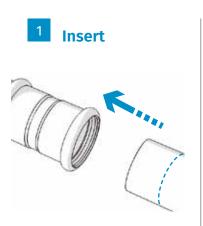


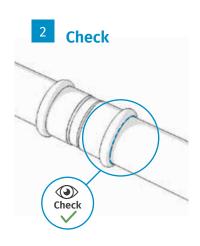




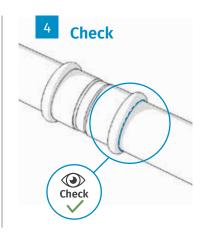
Diameters 15 - 35 mm / 1/2"- 1 1/4"

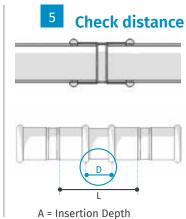












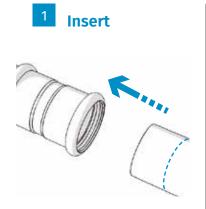
D = Minimum Distance

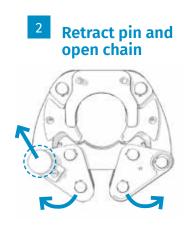
L = Minimum Pipe Length Tube

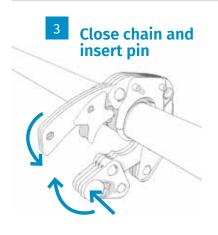


Diameters 42 - 54 mm / 1 1/2 " - 2"

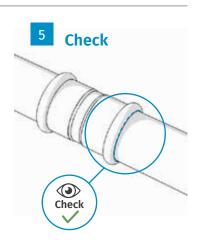


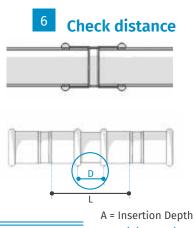




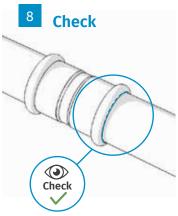








7 Press



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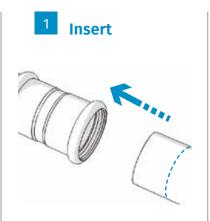
D = Minimum Distance

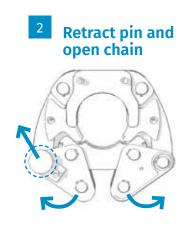
L = Minimum Pipe Length Tube

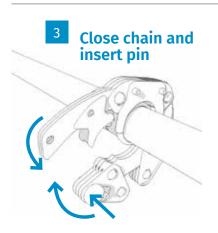


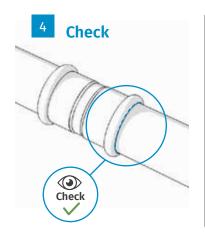
Diameters 76 - 108 mm / 2 3/4" - 4"

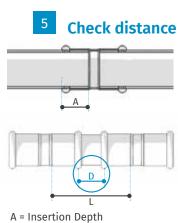








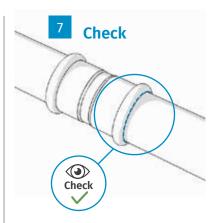




D = Minimum Distance

L = Minimum Pipe Length Tube







To carry out pressing correctly, there must be a minimum distance between the pipe and the building, and from pipe to pipe as shown in the tables below.

Minimum distances and space requirement 15 - 35 mm

Pipe	Figure 1		pe Figure 1 Figure 2			Figure 3				Figure 4		
Ø	А	D	А	D	D1	Α	С	D	D1	D	E	
15	56	30	75	30	35	85	155	30	35	40	60	
28	82	40	90	40	45	90	180	40	45	40	63	
35	85	40	90	40	45	90	180	40	45	40	66	

Minimum distances 42 - 108 mm

Pipe	Figu	re 4		Figure 5				
Ø	D	Е	А	В	С			
42	50	80	150	150	110			
54	50	85	150	150	110			
76	60	115	170	210	170			
89	60	120	190	260	190			
108	60	135	200	320	280			

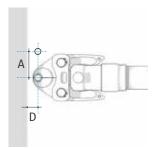


Figure 1 - Minimum distances and space requirements

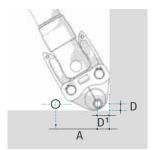


Figure 2 - Minimum distances and space requirements

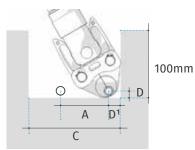


Figure 3 - Minimum distances and space requirements

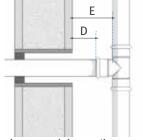


Figure 4 - Minimum distances and space requirements

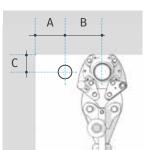


Figure 5 - Minimum distances for chains / collars

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