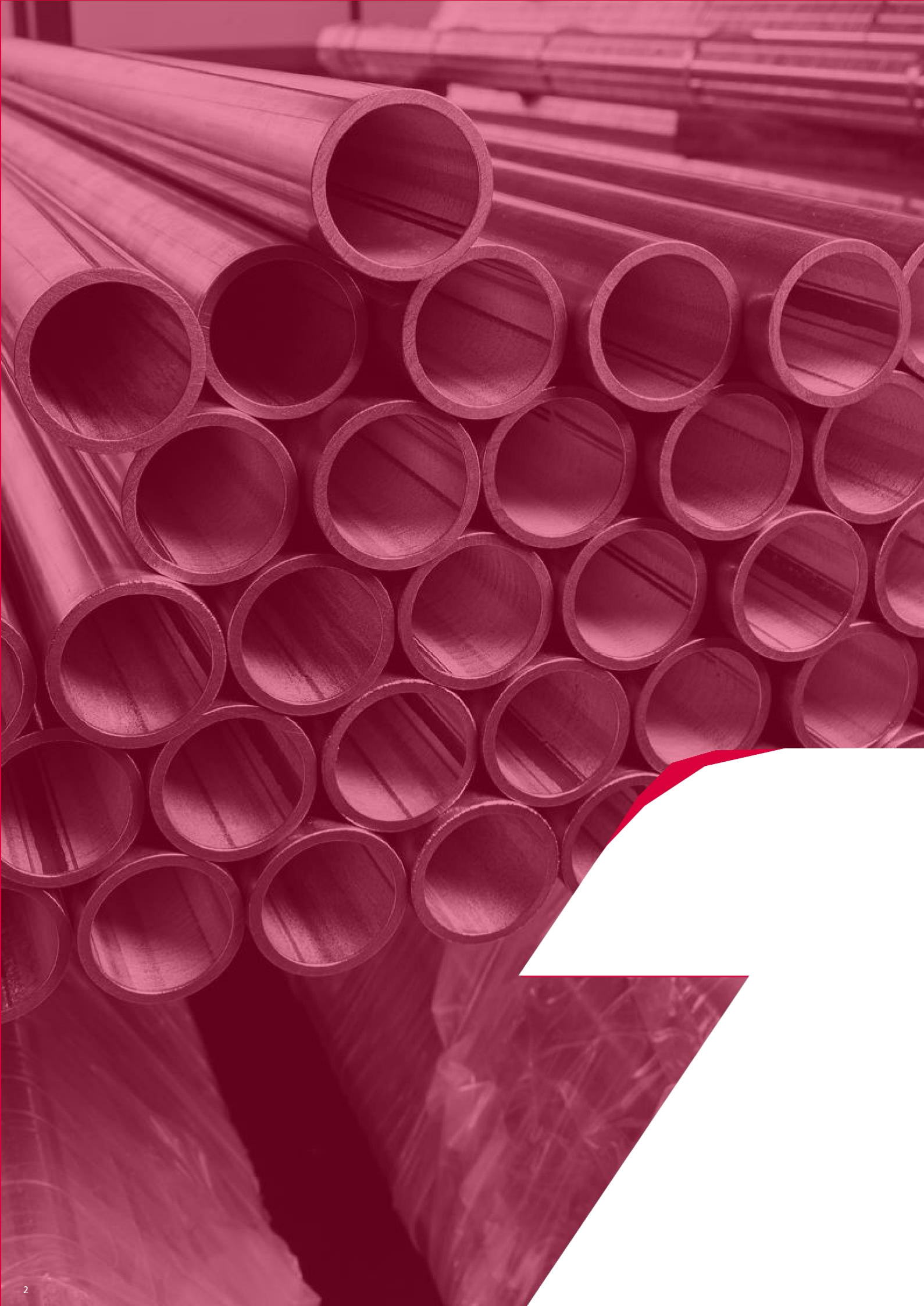




integrated
piping systems

VSH XPress







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Aalberts integrated piping systems

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This Technical Installation manual is a “trimmed down” version of the Aalberts guide aligned to the University of Leicester Design Guides. It is intended to be read in conjunction with the University design guides and supplement the same.

This Press fit system is only to be used on traditional copper tube within hot and cold domestic water systems and in the situations and sizes noted in the University Design Guides. No other situations are allowed.

Where there are references in this Technical Installation Manual to other types of system, other types of fluids and other materials these are for background information only and are NOT an indication that these materials and use on these

fluids are accepted.

This document MUST be read in conjunction with the University Water Safety Plan (WSP) and all disinfection processes must align with this manual noting that dip sterilization solution strengths are as design guide MSo4 (they are lower strength for pressfit than for another traditional materials).



VSH

technical data

applications



potable water installations

VSH XPress Stainless fittings (not for VSH XPress Stainless 304) with stainless steel CV tubes that fulfil EN 10312, DVGW worksheet W534 - GW541 and for Switzerland, SVGW W/TPW 132 (10/04).

o-rings:	EPDM* (black)
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operating temperature:	-35°C to +135°C
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max. operating pressure:	16 bar
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VSH XPress Copper fittings with copper tubes that fulfil EN 1057.

o-rings:	EPDM (black)
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operating temperature:	-20°C to +110°C
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max. operating pressure:	16 bar
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In potable water installations with VSH XPress Stainless fittings and tubes, the content of water-soluble chloride ions may not exceed 250 mg/l.

* Ethylene Propylene Diene Monomer

fittings

threaded fittings

The VSH XPress product range also includes components with female and male threads. VSH XPress Stainless, Carbon and Copper fittings with female and male threads are manufactured in accordance with DIN 2999/ISO 7/1. Hemp or other chloride-free sealants are suitable for the threads of VSH XPress Stainless fittings. PTFE sealing tape may not be used in conjunction with stainless steel due to the water soluble chloride ions it contains. With threaded fittings, we recommend that sealing is to be executed before the pressing, in order not to stress the press connection.

screw fittings (copper)



Manufacturers of gas heating appliances supply their products with the respective screw connections in place. G6360-type 'half screw fittings' may, therefore, be used as press connections to already-present screw connections.

The half screw fitting (G6360), as well as the G6340 screw fitting with a double-sided press end, is also approved in accordance with DIN 3436 HTC.

bronze threaded transition fittings

Threaded transition fittings are generally manufactured from gunmetal. A distinction is made in this case between strand or continuous casting (straight joints) and mould casting (bends, tees and wall plates). Tests have shown that mould cast (sand cast) press fittings are less suitable for gas installations for the following reasons: mould casting joints can never be as leak- proof (homogenous) as strand cast or copper ones. There is always, in particular, a danger of air cavities despite 100% impermeability testing. Additionally, the mechanical load of the pressing heightens these dangers as it may cause cavities to burst open. Therefore, for safety reasons, Aalberts integrated piping systems decided not to include any mould-cast parts in the range of copper gas press fittings.

union couplings

Union couplings should be combined with male threaded counterparts with appropriate support for the seal. Usually this will be parallel (G-)thread. It is not recommended to use parts with male conical (R-)thread, for they usually supply too little support for the flat sealing.

1. check the quality and integrity of the flat sealing. Sealing and support flats must be clean and free of indentations
2. mount the union on the male thread until hand tight
3. apply 1/8 to 1/4 turn, using a matching spanner. Over-turning might cause damage to the sealing ring

markings

VSH XPress Stainless fittings		
	marking	packaging label
	VSH XPress green ring or sticker 316L approvals dimension	type R..... dimension description EAN no. art. no. approvals quantity
VSH XPress Stainless Gas fittings		
	marking	packaging label
	VSH XPress/XPress yellow marking Gas MOP5 GT/5 316L dimension DVGW	type R..... G dimension description EAN no. art. no. approvals quantity
VSH XPress Stainless 304 fittings		
	marking	packaging label
	VSH XPress logo - not allowed for potable water black ring or brown / black sticker 304 dimension	type R24.. dimension description EAN no. art. no. quantity
VSH XPress Carbon fittings		
	marking	packaging label
	VSH XPress red ring or sticker galvanized approvals dimension	type C..... dimension description EAN no. art. no. approvals quantity
VSH XPress Copper fittings		
	marking	packaging label
	VSH XPress/XPress approvals dimension	type dimension description EAN no. art. no. approvals quantity
VSH XPress Copper Gas fittings		
	marking	packaging label
	VSH XPress/XPress dimension yellow marking Gas PN5 GT/1 MOP5 T2 approvals	type G..... dimension description EAN no. art. no. approvals quantity
VSH XPress CuNi fittings		
	marking	packaging label
	dimension	type CUN..... dimension description EAN no. art. no. approvals quantity

tubes

copper tubes

Copper tubes that may be used for the VSH XPress Copper system for water applications must comply with the EN 1057 (R220/R250/R290) standard and DVGW-work sheet GW392. Copper tubes used in a VSH XPress system for gas applications must comply with the EN 1057 (R250/R290) and DVGW-work sheet GW392. EN 1057 is the standard for seamless copper and copper alloyed tubes for potable water, gas and heating installations.



flammability

Uninsulated copper tubes are considered as non-combustible tubes class A1 according EN 13501-1.

insulation

Hot water piping systems must be insulated to prevent heat loss in accordance with the Energy-Conservation Act (EnEG).

For regulations regarding heating installations, please see the

manufacturer's guidelines. In order to avoid any corrosion on the outside, please ensure that insulating materials do not contain any traces of ammonia or nitrates. In order to minimize the risk of corrosion on the outside of the tube, insulation materials should, as far as possible, be used in conjunction with a moisture barrier. Possible solutions include the use of materials, such as Densopaste or a synthetic layer, between the outside of the copper tube and the insulation material. For installations in the Netherlands, the 'Waterwerkbladen' must be followed.

imperial systems

Xpress fittings are only suitable for use with metric tube sizes and specifications and should not be installed to imperial tube. Where imperial systems are to be worked on, a suitable imperial to metric

mixed metal systems

Where a transition is required from one material to another, then contact corrosion must be avoided. It is not allowed to press different materials with each other (so only copper tube with copper or bronze fittings) unless stated otherwise. The advice is to make a detachable connection with a suitable materials (e.g. of bronze or brass).

applications

- all potable water installations in accordance with the German Potable Water Decree (TrinkwV) and EU Directive 98/83/EC, DIN 50930, Part 6 and in compliance with DIN 1988
- cold and hot water installations
- heating installations
- district heating installations
- solar installations
- compressed air
- cooling water/industrial water installations
- industrial rainwater installations
- gas installations*
- heating oil EL (extra light) installations*
- shipbuilding

technical characteristics for approved copper tubes

material	DHP copper material no. CW 024A in accordance with DIN EN 1412
outside Ø tolerance	EN 1057
tensile strength	R220 - soft - 220 N/mm ² R250 - medium-hard - 250 N/mm ² R290 - hard - 290 N/mm ²
smallest bend radius	3.5 x external diameter of the tube (down to -10°C)

released wall thickness per outside diameter

copper tubes in accordance with EN 1057			
outside Ø [mm]			
		R250	0.7-1.0
15	1.0	1.0	1.0
18	1.0	1.0	1.0
22	1.0-1.1	0.9-1.2	0.9-1.2
28		0.9-1.2	0.9-1.5
35			0.9-1.5
42		1.2	1.2-1.5
54		1.2	1.2-2.0
64			2.0
66.7		1.2	1.2-2.0
76.1			2.0
88.9			2.0
108		1.5	1.5-2.5

* Requires alternative fittings (gas) or o-rings (fuel oil).

press tools



Press tools consist of a press machine and corresponding press jaws or slings. The press machine can either be powered by battery or by mains. The correct sized jaws and slings must be used for each tube diameter used in the system in order to achieve a perfect connection.

All VSH XPress fittings with diameter from 12 to 108 mm can be pressed using the appropriate press tools listed in our product range. Please use the **M-profile** jaws or slings that correspond to the diameter to be installed. A special adapter may also be required for diameters of 35 to 108 mm, in addition to the press slings.

note

VSH XPress fittings for sprinkler applications may only be pressed with press jaws and slings stated in the certificate or found in our tool selector:
www.aalberts-ips.eu/presstool

approved press tools

All approved press tools to fit the right product are found in our online tool selector, but the University require the use of only the NovoPress tool and the NovoCheck App.

maintenance and correct usage

Correct pressing is guaranteed when the press tools are used correctly. Regular maintenance and lubrication of the press jaws, slings and tools are necessary. Please take notice of the manufacturer's instructions for usage and maintenance.

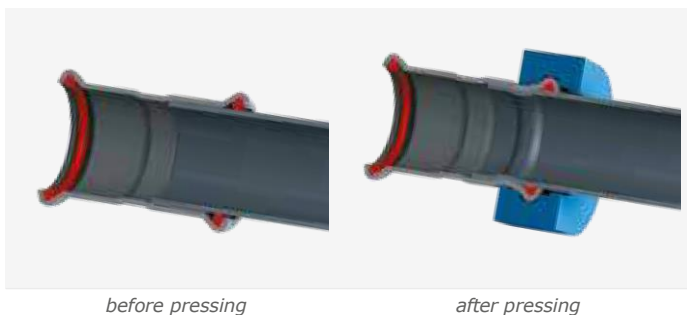
When installing VSH XPress Copper and VSH XPress Copper Gas fittings larger than 35 mm, it is essential that the grooves in the press jaws and slings are lubricated with MoS₂ lubricant!

For sizes 42 to 76.1 mm, jaws and slings should be lubricated after every 50 joints, size 88.9 mm every 10 joints and after every 5 joints for size 108 mm.

note

care must be taken to avoid any contact between lubricant and o-rings. Badly maintained and/or damaged press jaws pose a potential risk. Damaged jaws can damage the fittings, leaving metal particles behind in the jaw as a result. If the same jaw is then used to press a stainless steel fitting, these metal particles will be pressed into the fitting, which could lead to pitting corrosion. Therefore, always make sure that press jaws and slings are properly cleaned when switching between materials.

The illustrations show a cross-section of the press profile before and after pressing.



before pressing

after pressing

installation guidelines



1. cut the tube to length After measuring, the tube can be cut to length using a tube cutter (see picture), a fine-toothed handsaw or a mechanical saw with electrical motor suitable for the tube material. The tube must always be cut

completely through. Never partially cut the tube and break it off as this could cause corrosion. **Do not use oil-cooled saws, grinding wheels or flame cutters.**

VSH SudoXPress Carbon tubes with PP coating and coated copper tubes (Wicu)

To ensure the safe connection of a press fitting, the tube's PP coating must be removed up to the insertion depth using a stripper before assembling the press fitting. With Wicu copper tubes, a support sleeve must be used to maintain the rigidity of the press connection.



2. deburring the tube The tube ends must be carefully and thoroughly deburred inside and out after being cut to length. This is in order to avoid any damage to the o-ring when inserting the tube into the press fitting.

Deburring the

inside of tubes prevents pitting and corrosion. A hand deburrer suitable for the material or an electrical tube deburrer may be used for both inside and outside of the tube. Burrs sticking to the tube must be removed.

3. calibration

Always ensure the tube ends are cut off radially and rounded off evenly. The tube ends must be calibrated before pressing, especially in case of copper tubes coated in accordance with DIN EN 1057 R220, e.g. Wicu tubes.



4. marking insertion depth

The required insertion depth (see table page 27) must be marked on the tube or the press fitting (the latter for fittings with tube ends) in order to guarantee a

safe and proper joint. VSH XPress Carbon and Stainless Steel 12-54 mm fittings with male end, already have the required insertion depth marked on them, which makes any manual marking unnecessary. Mark the insertion depth using the insertion depth marker for VSH XPress. Reliable pressing with the corresponding tensile strengths can only be achieved if

the elements are correctly installed. The pressing operation behind the bead is of crucial importance for the tensile strength. The marking on the tube must remain visible (but as close as possible to the fitting) to identify any movement before or after pressing.

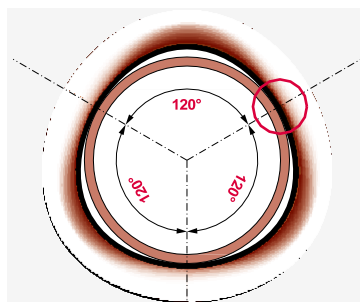


5. check the fitting and tube

Before assembly, the fitting must be checked to ensure that the o-rings are present and correctly positioned.

The tube, fitting and o-ring must be examined for any foreign materials (e.g. dirt,

burrs), which must be removed, if present.



The leak before press function on the VSH Xpress copper is created by a triangle shaped o-ring bead. This should not be confused for a damaged fitting.

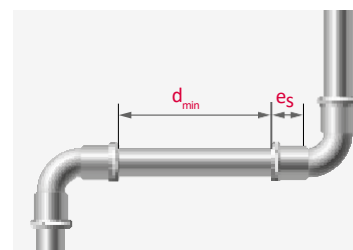


6. assembly of fitting and tube

Insert the tube carefully into the fitting up to the marked insertion depth, simultaneously rotating and pushing it in the direction of the axis. The insertion depth marking must remain

visible. The fittings should be inserted at least as far as the marked insertion depth. Rough and careless insertion of the tube into the fitting may result in damage to the o-ring and is therefore not permitted.

If assembly is difficult because of the permitted size tolerances, lubricants like water or soap may be used. **Under no circumstances oils, fats or grease may be used as lubricants.**



To optimize installation, time may be saved by assembling a number of connections first and then pressing the various connections one by one afterwards. Marking the distance (e_s) provides a check that the tube has not been pushed out of the fitting during pressing. Before starting the final pressing process of the various connections, it is also important to check the minimum required installation distances (see table).

Ø [mm]	insertion depth			minimum distance	minimum tube length		
	e _s [mm]			d _{min} [mm]	2x e _s + d _{min} [mm]		
	VSH XPress Stainless (Gas) / Stainless 304	VSH XPress Carbon	VSH XPress Copper (Gas)	VSH XPress Stainless (Gas) / Stainless 304, Carbon, Copper	VSH XPress Stainless (Gas) / Stainless 304	VSH XPress Carbon	VSH XPress Copper (Gas)
12	-	17	17	10	-	44	44
15	20	20	20	10	50	50	50
18	20	20	20	10	50	50	50
22	21	21	21	10	52	52	52
28	23	23	23	10	56	56	56
35	26	26	26	10	62	62	62
42	30	30	30	20	80	80	80
54	35	35	35	20	90	90	90
64	-	-	50	30	-	-	130
66.7	-	50	50	30	-	130	130
76.1	55	55	50	55	165	165	155
88.9	63	63	64	65	191	191	193
108	77	77	64	80	234	234	208

The table below gives the minimum required installation space so that pressing can be carried out correctly using the appropriate press tools. These distances relate to the general installation configurations that are schematically depicted in figures 1, 2 and 3.

outside Ø [mm]	fig. 1		fig. 2			fig. 3	
	a	b	a	b	c	d	e (tube depth) [mm]
12-15	56	20	75	25	28	131	40
18	60	20	75	25	28	131	40
22	65	25	80	31	35	150	40
28	75	25	80	31	35	150	60
35	75	30	80	31	44	170	70
42	140/115*	60/75*	140/115*	60/75*	75	265	70
54	140/120*	60/85*	140/120*	60/85*	85	290	70
64	145*	110*	145*	100*	100	345	70
66.7	145*	110*	145*	100*	100	345	70
76.1	140*	110*	165*	115*	115	395	80
88.9	150*	120*	185*	125*	125	435	90
108	170*	140*	200*	135*	135	470	100

minimal needed installation space (* slings)

7. pressing

Before pressing, the press jaws and slings must be checked for dirt, which must be removed if present. Furthermore, the press machine must be in good condition and the manufacturer's instructions for operating the device, maintenance must be observed. Also make sure that the correct press jaws and slings for the application are used. In order to create a correctly pressed connection, the groove of the press tool must enclose the press fitting o-ring bead.

Once pressing has started, always complete the press cycle and under no circumstances interrupt the process. All the approved machines, press jaws and slings to fit the right product are available in our online tool selector on our website: www.aalberts-ips.eu/presstool

It is not permitted to

- press a connection more than once.
- rotate a joint after pressing.



pressing gas installations

VSH XPress Stainless Gas and Copper Gas are suitable for gases of the second and third gas family (natural- and liquid gases) in accordance with DVGW Worksheet G 260 and are installed inside buildings (with HTC) and outside buildings (without HTC).

A combination of VSH XPress Stainless Gas and Copper Gas is not permitted for new installations. Connections to gas fittings and gas parts in brass, bronze, ductile grey cast iron and diecast aluminium may be connected with gas thread/press fittings or flanges. If renovations or repairs are being carried out, make sure the tubes are in accordance with the DIN-EN/DVGW standards. Tubes must have perfect, undamaged outer surfaces and must not be painted.

Local regulations must always be observed (e.g. DVGW-TRGI 2018):

1. gas fittings and tubes should be marked yellow to avoid confusion.
2. tubes must be protected during construction against mechanical damage.
3. carry out tests according to G1 Gas Guidelines (e.g. check covered tubes).
4. when laid under screed (above the reinforcement), place in concrete slots.
5. the operating temperature is: -20°C to +70°C

bending tubes

It may be necessary to bend a tube in order to carry out the installation. Manual, hydraulic or electrical-operated pipe benders with the corresponding bend formers can be used for this. The tube manufacturer will determine the suitability of the bending tool. VSH XPress Stainless, Carbon steel and Copper tubes may be bent cold, in accordance with DIN EN 1057.

The tube may not be bent when warm due to the danger of corrosion.

The smallest bending radius is as follows:

stainless steel (12 - 28 mm)	$r_{min} = 3.5 \times d$
carbon steel (12 - 28 mm)	$r_{min} = 3.5 \times d$
copper tubes (12 - 28 mm)	$r_{min} = 3.5 \times d$

- a smaller bend radius is not permitted
- diameters larger than 28 mm can be bent by machine

pressure testing

It is recommended that completed pipework systems are pressure tested prior to being covered (insulation, or paint), and should be performed prior to commencing the cleaning procedure.

The entire system should be pressure tested in accordance of BSRIA and B&ES.

This pressure test can be both pneumatic and hydraulic and is determined by the installed and planned commissioning regime.

If the pipe system is to be left empty after the pressure test, then a pressure test with dry air and/or inert gas should be performed, (microbiological contamination through bacteria and corrosion of carbon steel systems has to be avoided).

The pressure test should consist of two steps; Leak test

Tightness test

The leak test involves inspecting the system for joint integrity (tightness), the tightness test focuses on checking the system for strength.

The tightness test with water is described in the B&ES Guide to Good Practice TR/6, BS EN 806-4, BS6700.

If pre-fabricated pipework or equipment has been hydraulically pressure tested, off site prior to installation, this should be notified to the cleaning/chemical treatment specialist as these may have already developed an internal layer of corrosion, microbiological, biofilm build up etc.

Due to the inherent dangers associated with pneumatic testing using inert gas or dry air a responsible person must be in charge of this operation at all times.

The following must be understood as a recommendation only. BASIC

PROCEDURE

If the system is to be pressure tested (as recommended) then the following procedure applies to each section in turn.

1. Test Preparation

- a. Check that all high points have suitable vents to facilitate removal of air during filling and that these are all closed.
- b. Install suitable drainage facilities at all low points for drainage.
- c. Blank plug or seal any open ends and close all valves at the limits of the test section of the piping
- d. Remove, blank off all terminal units that may be damaged by the test pressure.
- e. Open all valves within the enclosed test section.
- f. Check that the test gauge is working correctly and has been calibrated, and has the correct range.

g. If the compressed dry air or inert gas is at a higher pressure than is required for the test (maximum 0.5bar pressure) a pressure reducing valve, pressure gauge and pressure relief valve set to open at the test pressure should be fitted to the connecting pipework.

- h. If possible the compressed air supply should be outside the test area
- i. Check that there is a suitable method for draining the system.

It is recommended that systems be tested with a nitrogen rich (90%)/air mixture. If air is to be used it should be clean, dry and free from oil, the drying performance should conform to 'purity class 3 under the ISO 8573' for particulate contamination, water and oil content.

Guidance should be sought from the relevant compressor manufacturer.

Excessive oil carry over in compressed air may be detrimental to the EPDM seals as well as causing bacteriological issues. Pure Nitrogen is also acceptable but consideration should be taken of HSE guidelines or recommendations.

2. Pneumatic Pressure Testing

a. An initial low-pressure test at 0.5 bar is to be carried out, having put the necessary safety measures in place, to enable any leaks to be found.

Significantly leaking, un-pressed or damaged joints shall be replaced, but those with low leakage rates should be identified for close inspection during the high-pressure test.

- b. This test pressure is to be maintained / pumped for a period of 30 minutes minimum.
- c. The test is passed if the pressure in the system is maintained for one hour and there is no visible leakage throughout the test.
- d. If required, a signature should be obtained on a test certificate.
- e. After testing, safely release the pressure, if necessary ensure that all vents on cylinder tanks and pressure vessels are opened to atmosphere BEFORE draining down and refitting vulnerable items.

These test times may vary according to the pipework system (plastic pipe systems may take longer to achieve stable pressures).

Water Regulation 12 requires 'that the water system shall be capable of withstanding an internal water pressure not less than 1.5 times the maximum pressure to which the installation or relevant part is designed to be subjected to in operation'.

When hydraulic testing is undertaken then the following should be carried out

training & support

To support the correct installation of the VSH Xpress copper fittings on-site and virtual training on the required installation best practices for the product line.

These can be delivered to various group sizes and are organised via the local sales representative.

Following completion of training, attendees are issued with a photo card indicating successful completion of the session proving they are familiar with the products and installation practices required.

Once completed training is valid for a duration of 3 years, however we are happy to provide this service at more regular intervals if required.

on-site support

Where required, Aalberts IPS UK are happy to attend site to visually inspect installation practices as products are being installed, offering tool box talks to address any areas where it is deemed additional information is required.

Should there be any areas of concern regarding installation of VSH Xpress products, Aalberts IPS offer a non-destructable test (NDT) service which inspects the system fittings installed to ensure that full socketing of tube and fittings has been achieved with minimal disruption to project time frames.

Please note NDT is a chargeable service with further information on this being available from your local area sales representative.

warranty

VSH Xpress Copper fittings are supplied with a 25 year warranty covering manufacturing and material defects.

The warranty offered is based on the correct selection, use and installation of the products in accordance with the published details.

pre-installation checks

- tube is cut clean and square
- tube ends have been internally and externally de-burred.
- tube end correctly depth marked using the correct depth marking tool.
- tube and fitting inspected for any defects
- tube is fully inserted in fitting socket
- press tool is correct for product range and fitting size NovoPress is the preferred tool manufacturer for this project.
- press jaws and sling/adapters are correct for tool and fitting offering an 'M profile'.
- the press cycle is allowed to fully complete.
- fittings are marked with an identification mark by the installer after inspecting the fitting for visual confirmation of correct installation.

post-installation checks

- fittings are correctly aligned with depth markings
- no marker pen is visible on the shoulder of the fitting
- fitting offers witness markings from the press jaw/sling
 - these present as a series of flat sections on the fitting socket outer wall
 - a 'X' or 'M' marking should also be present on the fitting following completion of the press cycle.

additional support

When using NovoPress tools equipped with Bluetooth an additional support for correct installation checks is available from NovoPress via the Novocheck app.

The app is available for both IOS and Android devices and when connected offers a visual record showing

- Tool calibration date and expiration date.
- Press cycle status
 - a green status = correct press cycle
 - an amber status = incorrect press cycle

These can either be delivered direct to the users mobile device, or downloaded to a master device at the end of each day/shift to allow the installation to be reviewed as part of installer quality checks./audits.

more information?

For a complete and up-to-date product range and our additional services, visit:

www.aalberts-ips.co.uk

Would you like to make an appointment to meet an account manager in your region or receive advice and support from one of our experts?

Please contact:

Aalberts integrated piping systems Customer Service

+44 (0)1302 560560

technical.uk@aalberts-ips.com

