PRESS CONNECTING COMPONENTS

Technical Handbook

INOX STEEL COPPER UNIPRESS

2016-1

www.pcc-press.de

Inhaltsverzeichnis

Certificates

Zertifikate in Vorbereitung

DVGW-Zertifikat	DVGW	approved
SVGW-Zertifikat	SVGW SSIGE	in preparation
CSTB-Zertifikat	CSTB	in preparation
FM-APPROVED	FM APPROVED	shortly available
Kiwa-KOMO-Zertifikat	kiwa	approved
Sintef-Zertifikat	SINTEF	in preparation
Sitac-Zertifikat	SITAC	in preparation
VA-Zertifikat	va	in preparation
EMI	ÉMI ÉPÍTÉSÜGYI MINŐSÉGELLENŐRZŐ INNOVÁCIÓS NONPROFIT KFT.	approved

1.0. Introduction

1.1. PCC GmbH

The company was founded in August 2008. Decades of experience in sales, together with highly motivated employees from our partners in construtions, development and production, are the basis of the success of the PCC products in Europe. PCC GmbH is a specialist and a reliable partner for components and special solutions for pressfitting-systems.

Head office of PCC GmbH
in Waiblingen near Stuttgart (Germany)

Up to today millions of pressfittings in copper, carbon steel, stainless steel and multilayer pipe have been installed. PCC products have been used for sanitary-, (floor-)heating-, air-conditioning and different industrial applications to the satisfaction of all customers.

The logistic center in Germany for all PCC products is located in Stuttgart. In cooperation with a professional logistics company, who is active world-wide, a fast delivery of all PCC products is guaranteed. In Stuttgart only, there are continuously thousands of pressfittings in stock.

Logistic center in Stuttgart (Germany)

1.2. Pressfittings for building services

Pressfitting technology has already been under development in Scandinavia for more than 50 years. Stainless steel press systems have been used for building services in the Central European market for approx. 25 years. The system pipes and fittings has been tried and tested for decades and is applicable as an extremely flexible and innovative connection technology. Particularly due to this time-saving and cold-forming (no risk of fire from open flames) connection technology, the customer-oriented machinery and equipment engineer is in the position to offer and implement an installation that is secure and fulfills the corresponding rulesets.

This is also reflected in the growing market shares compared to traditional connection technologies such as screwing, welding and soldering.

With the aid of a pressing tool, the PCC Press connections are made into an inseparable, permanently impervious friction-locking connection actuated by longitudinal and profile forces. PCC offers the user an extensive range of products made of different materials as well as dimensions between 15 and 108 mm.

The planer and the installation technician are therefore in the position to plan, produce and operate service facilities according to rulesets EN 806, EN1717, EN 12329, DIN 1988, DVGW W 551 and W 552 etc. This technical handbook provides important information, particularly for planers and executors, regarding the evaluation of pipework systems applications according to current technical requirements. This technical document refers to technical regulations applicable in Germany. If necessary, additional national provisions and rulesets as well as the "current state of technology" are to be observed.

2.0. System technology

2.1. PCC press technology

The PCC Press system consists of system pressfittings, system pipes and system gaskets.
System pressfittings and system pipes are comprised of:

PCC PRESS-INOX:

High-alloy, austenitic, non-rusting Cr-Ni-Mo steel with material no.1.4404 (AISI 316 L) according to EN 10088. Diameters correspond to the requirements of EN 10312 and/or DVGW GW 541.

PCC PRESS-STEEL:

Unalloyed steel pressfittings and pipes An electroplated layer of zinc protects against external corrosion.

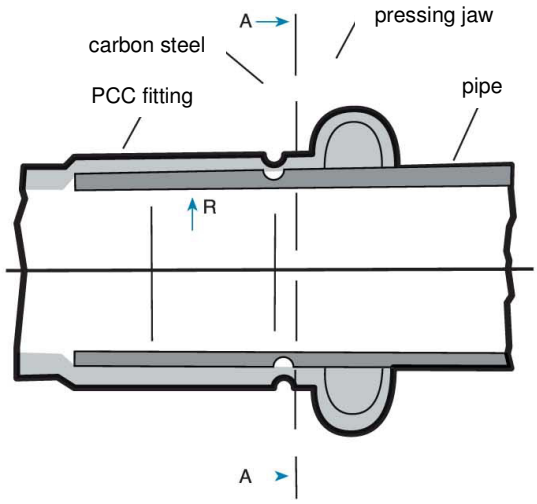
PCC PRESS-COPPER:

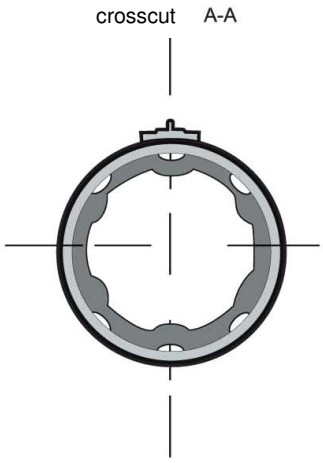
Copper and bronze pressfittings for commercial copper pipes.

PCC UNIPRESS

Brass UNIPRESS fittings are universal, radial press sleeve fittings for UNIPRESS ML-PIPE (metal composite pipes). The fittings are used for heating, sanitation and floor heating.

A contoured EPDM elastomer is used to make the connection impermeable. The inseparable, permanently impermeable, friction-locking press connection actuated by longitudinal and profile forces is achieved by cold forming the system press fittings. The creation of such a connection is executed with the aid of the pressing tool listed in this technical handbook. The contour that results from the pressing process is comprised of two pressing layers. In this way impermeability is achieved by compressing the elastomer in the first pressing layer. The system pressfittings and the pipe are plastically cold formed in the second layer in order to achieve the durability mechanically required of the connection.





2.2. Technical data system pipe PCC PRESSINOX PIPE

The PCC PRESSINOX PIPE is a longitudinally seam welded, thin-walled pipe. The pipe material is a high-alloy, austenitic, non-rusting Cr-Ni-Mo steel with material no. 1.4404 (AISI 316 L) according to EN 10088. These installation pipes correspond to the requirements of EN 10312, PrEN 10217 and DVGW GW 541. The internal and external surfaces of these pipes are metallically bare and therefore free of tarnish and corrosive materials. This has been verified and certified by the DVGW.

PCC PRESSINOX PIPE is supplied in 6-meter long rods.

nominal size DN	d x s in mm	d_i in mm	A_i in mm	linear density in kg/m	water content in l/m
12	15 x 1	13	1,33	0,351	0,133
15	18 x 1	16	2,01	0,426	0,201
20	22 x 1,2	19,6	3,02	0,625	0,302
25	28 x 1,2	25,6	5,15	0,805	0,514
32	35 x 1,5	32	8,04	1,258	0,804
40	42 x 1,5	39	11,95	1,521	1,194
50	54 x 1,5	51	20,43	1,972	2,042
65	76,1 x 2	72,1	40,83	3,711	4,080
80	88,9 x 2	84,9	56,61	4,352	5,660
100	108 x 2	104	84,95	5,328	8,490

2.3. Technical data system fitting PCC PRESS-INOX

The system pressfittings are comprised of high-alloy, austenitic, non-rusting Cr-Ni-Mo steel with material no. 1.4404 (AISI 316L) according to EN 10088. The diameters of these pressfittings are engineered for pipes according to the requirements of EN 10312 and/or DVGW GW 541 and are delivered with factory installed EPDM gaskets.

diameter in mm	wall thickness in mm
15 … 54	1,5
76,1 … 108	2

2.4. Technical data system pipe PCC PRESSSTEEL PIPE

The PCC PRESSSTEEL PIPE is a longitudinally seam welded, thin-walled precision steel pipe commensurate to DIN EN 10305-3.

The pipe is externally electrogalvanized and the weld seam is smoothed in order to guarantee a flawless leak-proof surface.

PCC PRESSSTEEL PIPE are supplied in 6-meter long rods.

nominal size DN	d x s in mm	di in mm	linear density in kg/m	water content in L/m
10	12x1,2	9,6	0,338	0,079
12	15x1.2	12,6	0,408	0,125
15	18x1,2	15,6	0,497	0,191
20	22x1,2	19,6	0,824	0,302
25	28x1,5	25	1,052	0,491
32	35x1,5	32	1,320	0,804
40	42x1,5	39	1,620	1,194
50	54x1,5	51	2,098	2,042
65	76,1x2	72,1	3,652	4,080
80	88,9x2	84,9	4,290	5,660
100	108x2	104	5,230	8,490

2.5. Technical data system fitting PCC PRESS-STEEL

Die PCC PRESS-STEEL pressfittings made of unalloyed steel E 195 (Rst 34-2) factory material no. 1.0034 according to DIN EN 10305-3 can be supplied in dimensions 12 - 108mm. The electrogalvanization protects the fitting against external corrosion. The fittings are permanently marked with the manufacturer’s logo and the "electroplated" label.

diameter in mm	wall thickness in mm
12 … 54	1,5
76,1 … 108	2

2.6. Technical data system fitting PCC PRESS-COPPER

pressfittings can be supplied in dimensions 15 - 54mm. This includes a complete range of copper and red bronze pressfittings with black, factory installed EPDM gaskets. The gasket fulfils all hygiene requirements, such as DVGW W 270.

diameter in mm	wall thickness in mm
15 … 42	1,5
54	2,0

2.7. Technical data system pipe PCC UNIPRESS ML-PIPE

The five-layer systempipe PCC UNIPRESS ML-PIPE is a temperature resistant polyethylene pipe with aluminium core (PE-RT/AL/-PE-RT).

Pipe design:

1. layer: internal pipe PE-RT Type II, DIN 16833
2. layer: adhesive layer
3. layer: butt-welded aluminium layer
4. layer: adhesive layer
5. layer: external layer PE-RT Type II or heat-resustant PE

The PCC UNIPRESS ML-PIPE is suitable for drinking water, it is gastight, corrosion-free, chemical-resistent, deposit free, flexible and dimensionally stable.
The pipe can be delivered as a insulated pipe. Insulation thicknesses 6mm to 20mm according to size.
PCC UNIPRESS ML-PIPE can also be delivered as an pipe in pipe system: drawn in corrugated protective pipe.
Length: rolls á 50m, 100m or 200m (abhängig vom Durchmesser) or bars á 5m.
Dimensions: DN 16 bis 32mm.

2.7.1. Pipe design PCC UNIPRESS ML-PIPE

characteristics	unit	PE-RT	PE-X
design	[-]	5-layer	5-layer
diffusion barrier	[-]	butt-welded alu	butt-welded alu
oxygen diffusion	Mg/l d	< 0,005	< 0,005
application		heating/sanitary	heating/sanitary

2.7.2. heating characteristics PCC UNIPRESS ML-PIPE

characteristics	unit	PE-RT	PE-X
prolonged load ISO 10508 class 4	bar	10bar	10bar
prolonged load ISO 10508 class 5	bar	8/10bardepending on design	8/10bardepending on design
heat conductivity	W / mk	0,430	0,430
heat expansion coefficient	mm / mk	0,026	0,026

2.7.3. Mechanical characteristics PCC UNIPRESS ML-PIPE

characteristics	unit	PE-RT	PE-X
surface roughness (Prandtel-Colebrook)	mm	0,007	0,007
Bending radii (23°C)	mm	5 dn	5 dn

2.8. Technical data system fitting PCC UNIPRESS

The PCC UNIPRESS fitting bodys are made of DZR brass in the dimensions 16 to 32 mm. PCC UNIPRESS fittings are universal pressfittings for PCC UNIPRESS ML-PIPE (multilayer pipe) and for other suitable multilayer pipes. UNIPRESS is suitable for heating-, sanitary- and floor heating systems. PCC UNIPRESS fittings are delivered with factory installed EPDM (black) gaskets. The elastomer (o-ring) is consistent with the requirements of the German Health Authority's KTW recommendation and is especially suitable for drinking water applications.

Diameter in mm	Wall thickness in mm
16	2,0
20	2,0
20	2,25
25	2,5
26	3,0
32	3,0

2.9. Technical data system elastomers

The sealing material utilized by PCC for the press connection consists of EPDM (ethylene propylene) and is factory installed in the system pressfittings. The gasket is furnished with a contour, so that any unpressed spots are immediately recognizable. This elastomer is consistent with the requirements of the German Health Authority's KTW recommendation and is especially suitable for drinking water applications.

PCC delivers the following gaskets for additional applications.

O-ring overview

EPDM, black

Temp: -10°C - +110°C (120°C) Diameter: Ø 12 - 108mm

applications:

- Drinking water
- Water for fire fighting
- Rain water
- Purified Water
- Water heating systems
- Circulation pipes
- Demineralised water

FPM (DIN ISO 1629) / FKM (ASTM D1418), green

Temp: -30°C - +180°C (230°C) Diameter: Ø 15 -108mm

applications:

- Compressed air systems
- Heating
- Mineral oil
- Fatty acids
- Compressed air systems

O-ring, HNBR, yellow

Temp: -20°C - +70°C (5bar) Diameter: Ø 15 - 35mm

applications:

- Gas installation with natural gas (NG) and liquefied petroleum gas (LPG) (upon request only, please contact us about our gas press fittings)

3.0. Areas of application

	INOX	STEEL	COPPER	UNIPRESS
DRINKING WATER	suitable	not suitable	suitable	suitable
HEATING	suitable	suitable	suitable	suitable
SOLAR	suitable with green gasket	Inquire	suitable with green gasket	not suitable
GAS	only as PRESS-INOX Gas	not suitable	only as PRESS-COPPER Gas	not suitable
HEATING OIL	suitable with green gasket	suitable	Inquire	not suitable
AIR PRESSURE	suitable up to Class 4	Inquire	suitable up to Class 4	Inquire
AIR PRESSURE	suitable	not suitable	Inquire	suitable
VAPOUR CONDENSATION	suitable	not suitable	Inquire	not suitable
INDUSTRY	Inquire	Inquire	Inquire	Inquire
SPRINKLER	suitable Currently in authorization process	suitable Currently in authorization process	not suitable	not suitable

3.1. Drinking water installation

As a basic principle, the respective valid and current provisions and rulesets for planning, evaluating, executing and operating drinking water installations must be observed. The requirements for drinking water are described in the 2001 drinking water ordinance. In order to avoid negative influence due to installation pipe materials on the hygienic requirements of the 2001 drinking water ordinance, they must be selected with the new prEN 12502 and national
residual standard DIN 50930-6 etc. The individual components are consistent with the requirements of the DVGW ruleset (GW 541, W 534 press connection, KTW recommendation, EPDM gasket, etc.) and can therefore be introduced in drinking water installations without restrictions according to DIN 50930-6. Furthermore, the PCC Press system is highly suited as well as authorized according to DIN 1988-6 and DIN 14462 for implementation in the following states:

- wet,
- dry-wet,
- dry

3.1.1. **Disinfection of drinking water**

If it is necessary to permanently disinfect drinking water, all disinfectants on the German Federal Environment Agency's list of treatment agents and disinfection processes, part 1 C can be utilized in connection with PCC press systems. For example, a constant chlorine allowance of maximum of 1,2 chlorine (free chloride in the disinfecting solution) can be added. The threshold of free chloride in purified drinking water may only amount to a maximum of 0,3 mg/l.
In an exceptional case, a maximum of 6 mg/l of chlorine (free chloride
in the disinfecting solution) is allowed in the event of high/increased microbial contamination. The content of free chloride in the drinking water may in this case be increased to a maximum of 0,6 mg/l.

3.1.2 **Disinfection of drinking water piping**

All disinfection processes for drinking water piping commensurate to DVGW W 291 and ZVSHK-bulletin "Flushing, disinfecting and initiating drinking water installations" may be implemented. In order to avoid the emergence of corrosion, a flush should be conducted after disinfection.

3.2. Purified water

The PCC press system, with the factory installed EPDM gasket, can be
used for all purified water. The water may be partially (softened, decarbonised) or
completely desalinated (also deionised, demineralised and distilled). Even for ultrapure water with a conductivity under 0,1µS/cm, PCC Press is suitable and absolutely non-corroding. All water purification procedures can thereby be used, such as ion exchangers or reverse osmosis, etc. If ultrapure water, pharmaceutical water, etc. requirements are raised in regards to drinking water quality, such as

- TOC < 500 ppb
- < 10 KBE
- smooth pipe wall surface finishes R < 0,8 µm
- seamless pipe connections

application of the PCC PRESS-INOX is not recommended.

3.3. Air Pressure installation

Compressed air systems are divided into 5 classes based on, among other things, their residual oil content according to DIN ISO 8573-1. This compressed air classification can be derived from the subsequent table. The PCC press system can be applied up to residual oil class 4. A maximum operating pressure of 16 bar is allowable for a professionally executed press connection.

3.4. Vacuum line

A low pressure test was conducted within the scope of the DVGW certification of the press connection according to DVGW W 534. This means that the PCC press system pipe connections downright passed the low pressure test at 200 mbar (reduction of the environmental air pressure from 1013 mbar to 813 mbar).

3.5. Special applications

In terms of professional customer consultation regarding the durability of the PCC press system for media uncommon in building services, the following information is required: Media labelling, media product and security data sheet, media operating temperature, media operating concentration, media operating pressure, pipe dimensions and system application type.
Several media types are listed in the subsequent table. This overview provides only standard values. Please contact PCC for accurate figures.

medium	1.4404	EPDM
Acetaldehyde	A	B
Acetone	A	A
Aluminium chloride (dry)	B	A
Formic acid (cold)	B	B
Ammonia 100% (dry)	A	B
Ammonium carbonate	B	A
Ammonium chloride 1%	B	A
Ammonium nitrate	A	A
Ammonium phosphate	B	A
Ammonium sulphate	B	A
Aniline	A	B/C
Malic acid 10-40% A	A	A
Acetylene	A	A
Barium chloride	C	A
Benzaldehyde	A	B
Benzen or Benzol	B	D
Benzine	A	D
Benzine Benzene 50/50	A	D
Benzine Benzene 60/50	A	D
Benzine Benzene 70/30	A	D
Benzine Benzene 80/20	A	D
Benzine Benzene Ethanol 50/30/20	A	D
Beer	A	A
Hydrogen cyanide	A	B
Bleaching solution	A	A
Borax	B	A
Boric acid	B	A
Bromine	D	C
Hydrobromic acid	D	B
Butadiene	A	D

Definition: A = very stable ; B = stable ; C = partially stable ;
D = not stable ; - = not tested

medium	1.4404	EPDM
Butane gas	A	D
Butanol	B	A
Butylene	A	D
Butryic acid 5%	B	-
Chlorine (moist)	D	C
Chlorine (dry)	B	B
Chlorobenzene	A	D
Chloroform (dry)	A	D
Chlorosulphonic acid	B	D
Zinc chloride	D	A
Chromic acid 5%	B	B/C
Coca-Cola	B	B
Cognac	B	A
Distilled water (up to 50ºC)	A	A
Diacetone alcohol	A	A
Dibenzyl ether	B	B
Dibutyl ether	B	C
Dichlorobenzene	B	D
Dichlorbutane	B	D
Dichlorethane	B	D
Dichlorhexylamine	B	-
Diesel	A	D
Diethanolamine	B	C/D
Diethylene glycol	B	A
Diethyl aether	B	D
Diisobutyl ketone	B	B
Dimethyl ether	B	B/C
Dimethylformamide	B	B
Dioxolan	B	B/C
Dioxane	B	B/C
Dipentene	B	D
Diphenyl aether	B	D
Iron chloride	D	A
Iron sulphate	B	A
Natural gas	A	D
Petroleum	A	-
Petroleum	A	D
Acetic acid 10%-50ºC	A	C/D
Acetic acid 25%-50ºC	A	D
Acetic acid 3,5-5%	A	B
Acetic acid 75%-50ºC	A	D
Acetic anhydride	B	B
Ethane	B	D
ethyl alcohol	B	A
Ethyl acetate	B	B/C
Ethyl chloride (dry)	A	D
Ethylene dichloride	B	-
Ethylene dichloride	B	D
Fatty acids	A	-
Aviation fuel JP3	A	D
Aviation fuel JP4	A	D
Aviation fuel JP5	A	D
Aviation fuel JP6	A	D
Flourine	B	-
Hydrosilicofluoric acid	B	A
Hydrofluoric acid	D	C
Freon (dry)	A	B
Gelatine	A	A
Tannic acid	B	B
Glucose	A	A
Glycerine	A	A
Glycerol chlorohydrin	B	B
Urea	B	A
Yeast	A	A
Heating oil	A	C

Definition: A = very stable ; B = stable ; C = partially stable ;
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medium	1.4404	EPDM
Hydraulic fluid	A	D
Isoamyl alcohol	A	B
Iodine/iodide	D	A
Potassium bromide	A	A
Potassium carbonate	B	A
Potassium chlorate	B	A
Potassium chloride	C	A
Potassium cyanide	B	A
Potassium nitrate	B	A
Potassium sulphate	B	A
Milk of lime	A	D
Cold water	A	A
Calcium chloride	B	A
Calcium hydroxide	B	A
Camphor	A	D
Kerosene	A	D
Carbonic acid	B	A
Carboxylic acid anhydride	A	A
Carbon bisulphide	A	D
Carbon tetrachloride	B	D
Coconut oil	B	D
Coke gas	A	-
Nitrohydrochloric acid	A	D
Copper chloride	C	A
Copper nitrate	B	A
Nitrous oxide	B	B
Liquor	B	A
Magnesium chloride	B	A
Magnesium hydroxide	A	A
Magnesium sulphate	B	A
Margarine	B	D
Molasses	A	A
Methane	B	C
Methyl alcohol	B	A
Methyl chloride	A	D
Milk	A	A
Lactic acid 5%	A	A
Mineral oil	A	D
Motor oil	A	D
Naphtha	B	D
Naphthaline	B	D
Sodium bicarbonate	B	A
Sodium bisulphite	B	A
Sodium carbonate	B	A
Sodium chlorate	B	B
Sodium chloride 5%	B	A
Sodium cyanide	B	A
Sodium nitrate	B	A
Sodium phosphate	B	A
Sodium silicate	B	A
Sodium sulphate	A	A
Sodium sulphite	B	A
Nickel chloride	B	A
Nickel sulphate	B	A
Nitrobenzene	B	D
Olive oil	A	D
Oleic acid	A	C
Oxalic acid 5%	A	A
Active oxygen (moist)	A	C
Active oxygen (dry)	A	C
Palmitic acid	B	D
Paraffin	A	D
Pentane	A	D
Vegetable oil	A	C
Phosphoric acid 5%	A	A

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medium	1.4404	EPDM
Picric acid	B	A
Propane		
Mercury chloride	C	A
Salicylic acid	A	A
Nitric acid 10%-80ºC	A	D
Hydrochloric acid	D	A
Hydrochloric acid 10%-80ºC	D	A
Hydrochloric acid 30%	D	A
Hydrochloric acid 37%	D	A
Oxygen	A	B
Lubricant	A	D
Sulphur	B	B
Sulphuric acid 5% boiling	D	A
Hydrogen sulphide 100% moist	B	A
Sulphurous anydride	C	A
Soap	A	A
Silver nitrate	B	A
Soy bean oil	A	D
Stannic (or stannous?) chloride	D	A
Stearic acid	A	A
Nitrogen gas	A	C
Styrene	A	D
Tetrachloroethylene	C	D
Animal oil	A	D
Ink	A	A
Toluol	A	D
Transformer oil	A	D
Water (up to 100ºC)	A	A
Hydrogen	A	A
Hydrogen peroxide	A	A
Tartaric acid	B	A
Xylene	A	D
Zinc sulphate	B	A
Citric acid	A	A
Sugar syrup	A	A

Definition: A = very stable ; B = stable ; C = partially stable ;
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4.0 Areas of application PCC PRESS-INOX Gas

PCC PRESS-INOX Gas is authorized with a factory installed HNBR gasket for nature, liquefied petroleum and natural gas according to DVGW G260. PCC PRESS-INOX Gas is authorized for flush mount installations as well as surface wiring installations in buildings. Only above-ground installations are allowed for exterior installations.

The dimensions 42 and 54mm may only be implemented with press snares. Pressing operations with press jaws are not permitted.

The TRGI is to be observed for gas installations with PCC PRESS-INOX Gas.

5.0. Areas of application PCC PRESS-STEEL

5.1. Heating

PCC PRESS-STEEL with a black EPDM gasket is suitable for closed warm water systems up to a max of 120°C according to DIN 4751 and a max. 16bar pressure. The installations can occur for slush mount and well as surface wiring installations. PCC should be consulted before applying frost and/or corrosion protection materials.

5.2. Air pressure installation

PCC PRESS-STEEL is suitable for compressed air systems up to 16 pressure. It is to be noted that compression air classes 1-4 are possible for factory-installed black EPDM gaskets, consistent with ISO 8573-1 / 2001. A different gasket is to be utilized under application of compressed air class 5.

5.3. Cooling and refrigeration cycles

The black EPDM gasket is permitted for closed cooling and refrigeration cycles at temperatures between -20°C and +120°C.

PCC should be consulted before applying frost and/or corrosion protection materials.

5.4. Vacuum and solar lines

PCC PRESS-STEEL is also suitable for vacuum and solar lines. Replacing the gasket is mandatory, because higher tempteratures can destroy the black EPDM gasket. The green FPM gasket is supplied in bulk and must be replaced by the processor. Humidification of the gasket is recommended for improved sealing.

5.5. Special applications

As a basic principle, PCC Press is to be contacted before executing special applications.

6.0. Areas of application PCC PRESS-COPPER

6.1. Drinking water installation

As a basic principle, the respective valid and current provisions and rulesets for planning, evaluating, executing and operating drinking water installations must be observed. The requirements for drinking water are described in the 2001 drinking water ordinance. In order to avoid negative influence due to installation pipe materials on the hygienic requirements of the 2001 drinking water ordinance, they must be selected with the new prEN 12502 and national residual standard DIN 50930-6 etc.
PCC PRESS-COPPER as well as copper pipes are inspected and approved according to DIN/EN 1057 and DVGW-GW392 for drinking water.

6.2. Air pressure installation

PCC PRESS-COPPER is suitable for compressed air systems up to 16 pressure. It is to be noted that compression air classes 1-4 are possible for factory-installed black EPDM gaskets, consistent with ISO 8573-1 / 2001. A different gasket is to be utilized under application of compressed air class 5.

6.3. Vacuum and solar lines

PCC PRESS-COPPER is also suitable for vacuum and solar lines.
Replacing the gasket is mandatory, because higher temperatures can destroy the black EPDM gasket. The green FPM gasket is supplied in bulk and must be replaced by the processor. Humidification of the gasket is recommended for improved sealing.

6.4. Heating

PCC PRESS-COPPER with a black EPDM gasket is suitable for closed warm water systems up to a max of 120°C according to DIN 4751 and a max. 16bar pressure. The installations can occur for slush mount and well as surface wiring installations. PCC Press should be consulted before applying frost and/or corrosion protection materials.

6.5. Special applications

As a basic principle, PCC is to be contacted before executing special applications.

7.0. Areas of application PCC PRESS-COPPER Gas

As a basic principle, PCC PRESS-COPPER gas fittings are to be externally colour-coded.
They are suitable according to DVGW-VP 614 in connection with copper pipes consistent with DVGW.GW392 for:
Gases according to DVGW worksheet G 260
Building conduits consistent with TRGI, TRF and TRR100 through PN5
Exterior pipes installed above ground and on-site according to TRGI, TRF, and TRR 100 through PN5.

8.0. Areas of application PCC UNIPRESS

8.1. Drinking water installation

As a basic principle, the respective valid and current provisions and rulesets for planning, evaluating, executing and operating drinking water installations must be observed. The requirements for drinking water are described in the 2001 drinking water ordinance. In order to avoid negative influence due to installation pipe materials on the hygienic requirements of the 2001 drinking water ordinance, they must be selected with the new prEN 12502 and national residual standard DIN 50930-6 etc.
PCC UNIPRESS has been tested and approved for drinking water.

8.2. Heating

PCC UNIPRESS is resilient for closed warm water systems up to a max of 90°C at 6 bar or 70°C at 10 bar. The installations can occur for slush mount and well as surface wiring installations. PCC UNIPRESS is also suitable for floor heating. PCC should be consulted before applying frost and/or corrosion protection materials.

8.3. Special applications

As a basic principle, PCC is to be contacted before executing special applications.

9.0. Corrosion

9.1. PCC PRESS-INOX

9.1.1. Internal corrosion resistance

Stainless steel consistent with DVGW GW 541 and W 534 commensurate to DIN 50930-6 can be used for drinking water without restrictions. Stainless steel behaves neutrally in drinking water due to the passive layer forming in connection with oxygen. This denotes that reactions with substances found in drinking water do not occur. Washed-in corrosion products from other metallic pipe materials do not therefore elicit corrosion processes on properly designed passive layers in PCC PRESS-INOX. A mixed installation of PCC PRESS-INOX and all non-ferrous metals can be executed directly and independent of the sequence.

The direct joining of stainless steel with galvanized materials results in bi-metal corrosion of the galvanized steel. A separation of these two pipe materials using a non-ferrous metal armature can occur according to DIN 1988-7 in order to avoid this. Empirically, the installation of a spacer at least 50 mm in length is sufficient for avoiding this type of corrosion.

Pitting corrosion can occur through certain factors, such as sensitisation of the material, false use of desinfectants or excessive chloride contents in drinking water (over 250 mg/l). The sensitisation of the stainless steel can be elicited through the formation of oxide layers and tarnish if heat treatment is improperly conducted (for example, from welding, separation with fast running saws or circular saws) and should be avoided. Only slow running saws are therefore permissible. Likewise, the hot bending of steel pipes is not permissible.

Such a sensitisation of stainless steel can surely be avoided by plastically cold forming the pressing.

9.1.2. External corrosion resistance

For stainless steel pipes that are laid underground or flush-mounted, corrosion protection bands and heat-shrinkable sleeves consistent with DIN 30672 pressure class A (non-corrosive soil) and/or pressure class B (corrosive soil) can be used for retroactive external corrosion protection. Empirically, coatings consistent with DIN 55928 (protective coats) can applied if they are universal and free of defects. Stainless steel pipes can be utilizedwith insulation materials according to 1988 with a maximum per cent weight of 0,05% water-soluble chloride ions. Insulating materials of AS-quality, (AS = austenitic steels) consistent with AGI-Q 135, are therefore of particular recommendation for stainless steels.

Stainless steel pipes that are installed in chlorine-containing environments (swimming pools for example) require a suitable coating.

9.2. PCC PRESS-STEEL

9.2.1. Internal corrosion resistance

Closed heating and cooling systems are generally free of atmospheric oxygen and therefore corrosion risk is non-existent. When filling, the traces of oxygen in the system can be disregarded, because it degrades in a reaction with the system's internal surface.

The oxygen is released when heated and discharged through the vent valve.

The application of oxygen-binding materials requires the approval of PCC Press.

9.2.2. External corrosion resistance

Galvanization protects PCC PRESS-STEEL against external corrosion; however, additional corrosion protection measures must be applied to PCC PRESS-STEEL fittings and pipes in the case of moisture with longer-term impact.
PCC PRESS-STEEL is protected against external corrosion as follows:

- Corrosion protection bands
- Closed-cell insulating material
- Coating application
- Coat of paint
- By avoiding higher corrosion risk areas

9.3. PCC PRESS-COPPER

9.3.1. Internal corrosion resistance

Open systems:
Copper forms a protective layer when in contact with oxygen. The protective layer prevents a reaction between material and the water (and its contents). PCC PRESS-COPPER can be utilized for all drinking water of the following conditions are fulfilled.

The pH-value is at least 7.4

or

the pH-value is less than 7.4 but greater than 7.0 and the TOC content is not more than 1,5g/m³.

Closed systems
Closed heating and cooling systems do not contain atmospheric oxygen and any risk of corrosion does therefore not exist in their application.

The oxygen is released when heated and discharged through the vent valve.

The application of oxygen-binding materials requires the approval of PCC.

9.3.2. External corrosion resistance

PCC PRESS-COPPER fittings are to be protected against external corrosion. This is possible using corrosion protection bands or heat-shrinkable sleeves according to DIN 30672.

9.4. PCC UNIPRESS

9.4.1. Internal corrosion resistance

No special arrangements must be made for PCC UNIPRESS when applied in closed circuits, which is also the case for drinking water installations according to the 2001 drinking water ordinance.

9.4.2. External Corrosion Resistance

PCC UNIPRESS fittings are to be protected against aggressive media with insulating materials and/or corrosion protection bands.

10.0. Fire/Noise protection

10.1. Fire protection

In Germany, the valid provisions of each respective federal state are applicable for fire protection. These provisions are described in the respective regional building laws and their associated administrative regulations. Furthermore, the foundation for piping systems building requirements are established in the prototyping building code "PBC" (PBC 2002), the prototyping piping systems guidelines "PPSG" (PPSG 03/2000) as well as other technical regulations and standards.
PCC PRESS-INOX, -STEEL und -COPPER corresponds to DIN 4102-1 of building material class A (non-flammable).

10.2. Soundproofing

Sources of noise may be, for example, armatures, fixtures and sanitation objects. Noise does not originate from pipes, however, they can conduct noise. Avoiding noise in structures is achieved using suitable conduit mountings (for example, rubber strips) and insulation material. Noise insulation is described in DIN 4109.

11.0. Installation

11.1. Thermal elongation

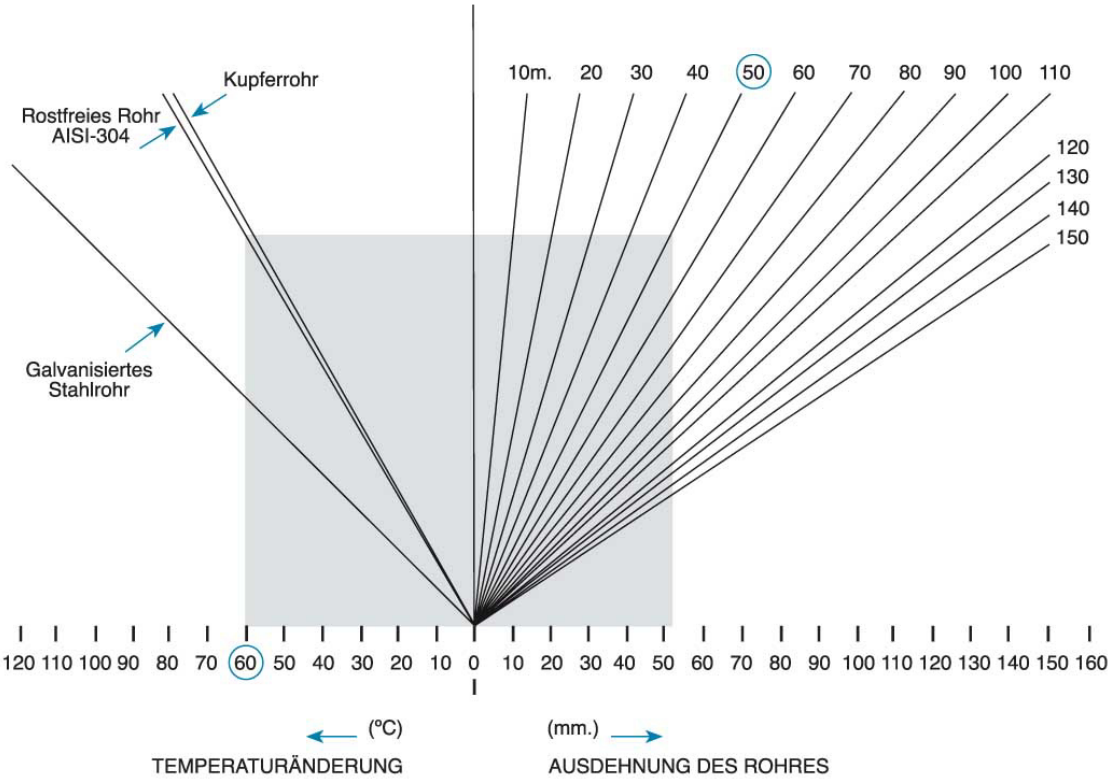
During operation, fluid pipeline installations contract and expand due to temperature fluctuations. Accordingly, the following must be provided:

- enough space for longitudinal expansion.
- correct mounting of the corresponding mounting points.
- expansion compensators if necessary

The corresponding equation to achieve this is:

$$\Delta L = L * \alpha * \Delta T$$

whereby:
ΔL= total extension in mm.
L= length of the pipe in m.
ΔT = Temperature fluctuation in ºK.
α = Linear expansion coefficient (α = 0,0166 mm/m for stainless steel).



Application methods for the diagram.

Example: Determine the extension of a 50 m long pipe with a fluid temperature change of 60ºC. We go from the 60ºC position "temperature change" vertically up to the sloping line of the "rust-proof" pipe. We then turn right up to the other sloping line, which indicated the meters (50m). Then we go vertical
Solution: 51,5 mm.

The following tables, as well as the diagram, can be used for calculating the extension.

ΔT (ºK) THERMAL JUMP										
L (m)	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
1	0,16	0,33	0,50	0,70	0,82	1,00	1,15	1,32	1,50	1,65
2	0,33	0,66	1,00	1,32	1,65	2,00	2,31	2,64	3,00	3,30
3	0,50	1,00	1,50	2,00	2,50	3,00	3,50	4,00	4,50	5,00
4	0,66	1,32	2,00	2,64	3,30	4,00	4,62	5,30	6,00	6,60
5	0,82	1,65	2,50	3,30	4,12	5,00	5,77	6,60	7,42	8,25
6	1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00	9,00	10,00
7	1,15	2,31	3,50	4,62	5,78	7,00	8,09	9,24	10,40	11,55
8	1,32	2,64	4,00	5,28	6,60	8,00	9,24	10,56	11,90	13,20
9	1,48	3,00	4,50	6,00	7,50	9,00	10,50	12,00	13,50	15,00
10	1,65	3,30	5,00	6,60	8,25	10,00	11,55	13,20	14,85	16,50
12	2,00	4,00	6,00	8,00	10,00	12,00	14,00	16,00	18,00	20,00
14	2,31	4,62	7,00	9,25	11,55	14,00	16,20	18,50	20,80	23,10
16	2,64	5,28	8,00	10,56	13,20	15,84	18,48	21,12	23,76	26,40
18	3,00	6,00	9,00	12,00	15,00	18,00	21,00	24,00	27,00	30,00
20	3,30	6,60	9,90	13,20	16,50	19,80	23,10	26,40	29,70	33,00

11.1.1. Room for expansion

Modern installations are, with the exception of industrial installations, seldom visibly installed and are usually installed as flush-mounted and floating along floor coverings. In the case of visibly installed installations or those that run under galleries, - there is usually enough space, certainly in the case of piping that has to be cleaned - an elastic protective filling made of insulation material must be used, such as glass wool or plastic (closed-cell foam) (Image 1). If an installation is carried out under floating floors, the pipes are installed within the insulating layer so they can expand unhindered. The vertical outlets and junctions must be equipped with elastic sockets made of insulating material or insulating plastic (Image 2).In the same way, fillings must be used for wall and ceiling pipes so they can move in every direction (Image 3).

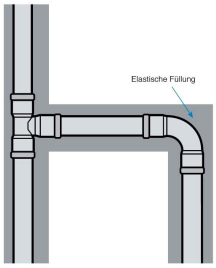


Abb.1

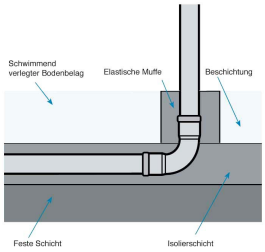


Abb.2

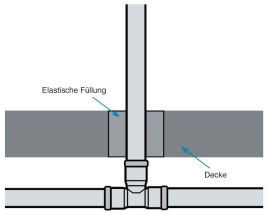
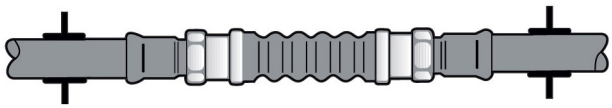


Abb.3

11.1.2. Expansion compensators



If piping length fluctuations cannot be absorbed by their own elasticity or with enough space, expansion compensators must be applied. There are three types of expansion compensators: U or Z form or those with internal threading, allowing it to be screwed onto the fixture. The compensators can be bent in a U or Z form or also originate from a straight pipe and angled attachment (Images 5, 6, 7 and 8 on the following pages). The following method of calculation can be used for calculating the length of the angular offset:

- Calculation of the thermal expansion (use the form in section ...)
- Calculation of the angular offset length (in the case of compensator 2)

$$L = K\sqrt{de.\Delta l}$$

whereby:

K = Material constants = 45 (STAINLESS STEEL)
De = Outer diameter of the pipe
Δl = the thermal expansion to be compensated

If the U type is utilized, the length of the angular offset must be divided by 2 according to the named formula, because there are two expansion arms. For the sake of accuracy, the divided value must equal L/1,8 and not 2.

11.1.3. Expansion bend

As shown in images 5, 6, 7 and 8, correct compensation depends on the adjustment of the fixation and displacement points. A fixation point may not be applied near the fixture. It must also be observed that the floating points may not be applied in such a way that they act as a fixation point. For a straight pipe or expansion compensator, only one fixation point may be applied in order to avoid deformation, namely in the centre of the straight section if possible in order to distribute the expansion.

On the basis of the thermal expansion of the pipe, the PCC connection attachments can disrupt pressures by twisting. It must be observed that the permissible torsion angles not be larger than 50º and the length of the lever is dependent on the free length of the pipe. The attached diagram 12 can be used to calculate the lengths of the lever on the compression equipment.

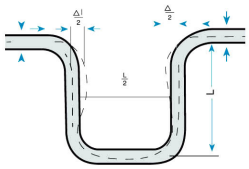


Abb.5

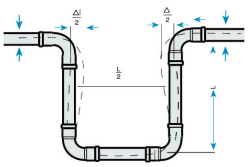


Abb.6

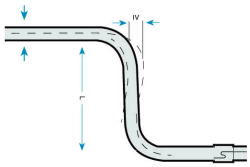


Abb.7

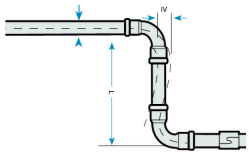


Abb.8

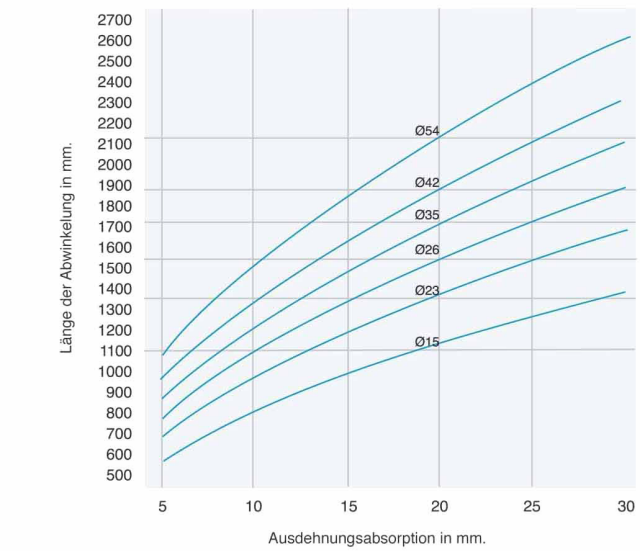


Abb.10 Bestimmung der Länge der Abwinkelung für den Z-Bogen-Ausdehnungskompensator.

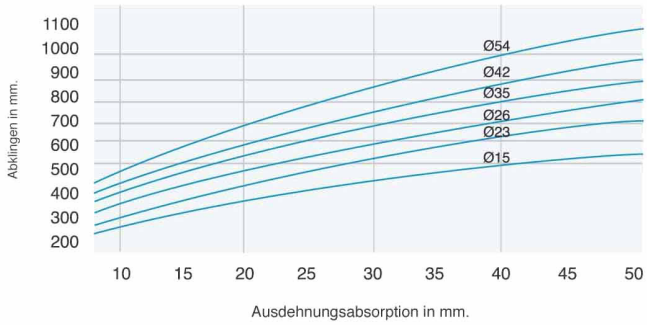


Abb.11 Bestimmung des Abklingens für den U-Bogen-Ausdehnungs-kompensator.

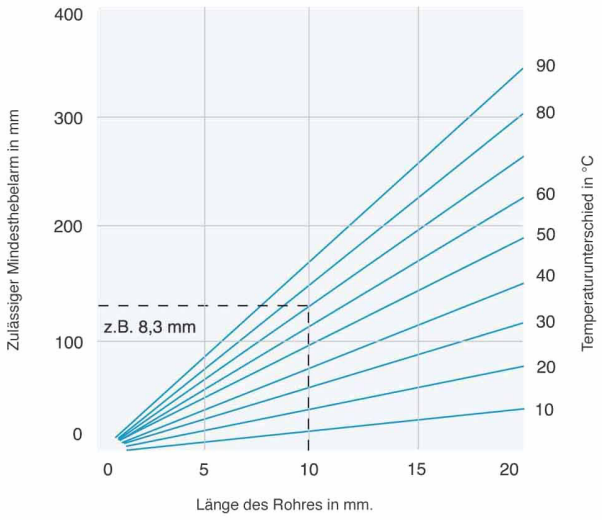


Abb.12 Bestimmung der Länge des Hebelarms.

11.1.4. Zeta-value PCC UNIPRESS

dimension da x s (mm)	diameter outside da (mm)	wall thickness S (mm)	diameter inside di (mm)	bend 90° Zeta-value z	reduction Zeta-value z	Abzweig bei Stromtrennung Zeta-value z	turn-off Durchgang Zeta-value z	turn-off Gegenlauf Zeta-value z
16 x 2,0	16	2,00	12	3,4	1,3	4,0	0,9	3,5
20 x 2,0	20	2,00	16	2,6	1,0	3,1	0,7	2,8
20 x 2,25	20	2,25	15,5	2,6	1,0	3,1	0,7	2,8
25 x 2,5	25	2,50	20	2,4	0,9	2,8	0,7	2,5
26 x 3,0	26	3,00	20	2,4	0,9	2,8	0,7	2,5
32 x 3,0	32	3,00	26	2,1	0,8	2,4	0,6	2,1

11.2. Conduit mounting

Conduit mountings serve to mount pipes to ceilings, walls or floors. By setting fixation and floating points, the elongation of the pipe resulting from temperature fluctuations is guided in the desired direction.
Pipe clamps may not be applied as fittings. Fixing floating points must occur so that the elongation of the pipe is not hindered.
Unless otherwise established in the rulesets, clamp intervals can be used as guides for PCC.

DN	d x s in mm	mounting intervals in m according to DIN 1988
12	15 x 1	1,25
15	18 x 1	1,50
20	22 x 1,2	2,00
25	28 x 1,2	2,25
32	35 x 1,5	2,75
40	42 x 1,5	3,00
50	54 x 1,5	3,50
65	76,1 x 2	4,25
80	88,9 x 2	4,75
100	108 x 2	5,00

11.3. Piping heat output

d x s	temperature difference in K									
in mm	10	20	30	40	50	60	70	80	90	100
	heat output in W/m									
15 x 1	2,7	5,4	8,1	10,8	13,4	16,1	18,8	21,5	24,2	26,9
18 x 1	3,3	6,5	9,8	13,0	16,3	19,5	22,8	26,0	29,3	32,5
22 x 1,2	4,0	7,9	11,9	15,9	19,9	23,8	27,8	31,8	35,8	39,7
28 x 1,2	5,1	10,2	15,3	20,4	25,5	30,6	35,7	40,8	45,9	51,0
35 x 1,5	6,4	12,7	19,1	25,5	31,8	38,2	44,6	50,9	57,3	63,7
42 x 1,5	7,7	15,3	23,0	30,7	38,4	46,0	53,7	61,4	69,1	76,7
54 x 1,5	9,9	19,8	29,7	39,7	49,6	59,5	69,4	79,3	89,2	99,1
76,1 x 2	14,0	28,0	41,9	55,9	69,9	83,9	97,9	111,8	125,8	139,8
88,9 x 2	16,4	32,7	49,1	65,5	81,8	98,2	114,6	130,9	147,3	163,6
108 x 2	19,9	39,8	59,8	79,7	99,6	119,5	139,5	159,4	179,3	199,2

11.4. Electrical heat tracing

When using electrical heat tracing systems in connection with PCC PRESS-INOX the temperature of the inner pipe wall may not exceed 60° Celsius. A temporary temperature increase to 70° C (1 hour per day) is permitted for necessary thermal disinfection measures. For systems equipped with an accumulation safety device or backflow preventer, an impermissible increase in pressure as a result of heating is to be avoided.

11.5. Potential equalization

A potential equalization must be implemented for all electricity conducting pipes.
PCC must be included in the main potential equalization. The raiser of the electrical system is responsible for the potential equalization.

11.6. Compression tests

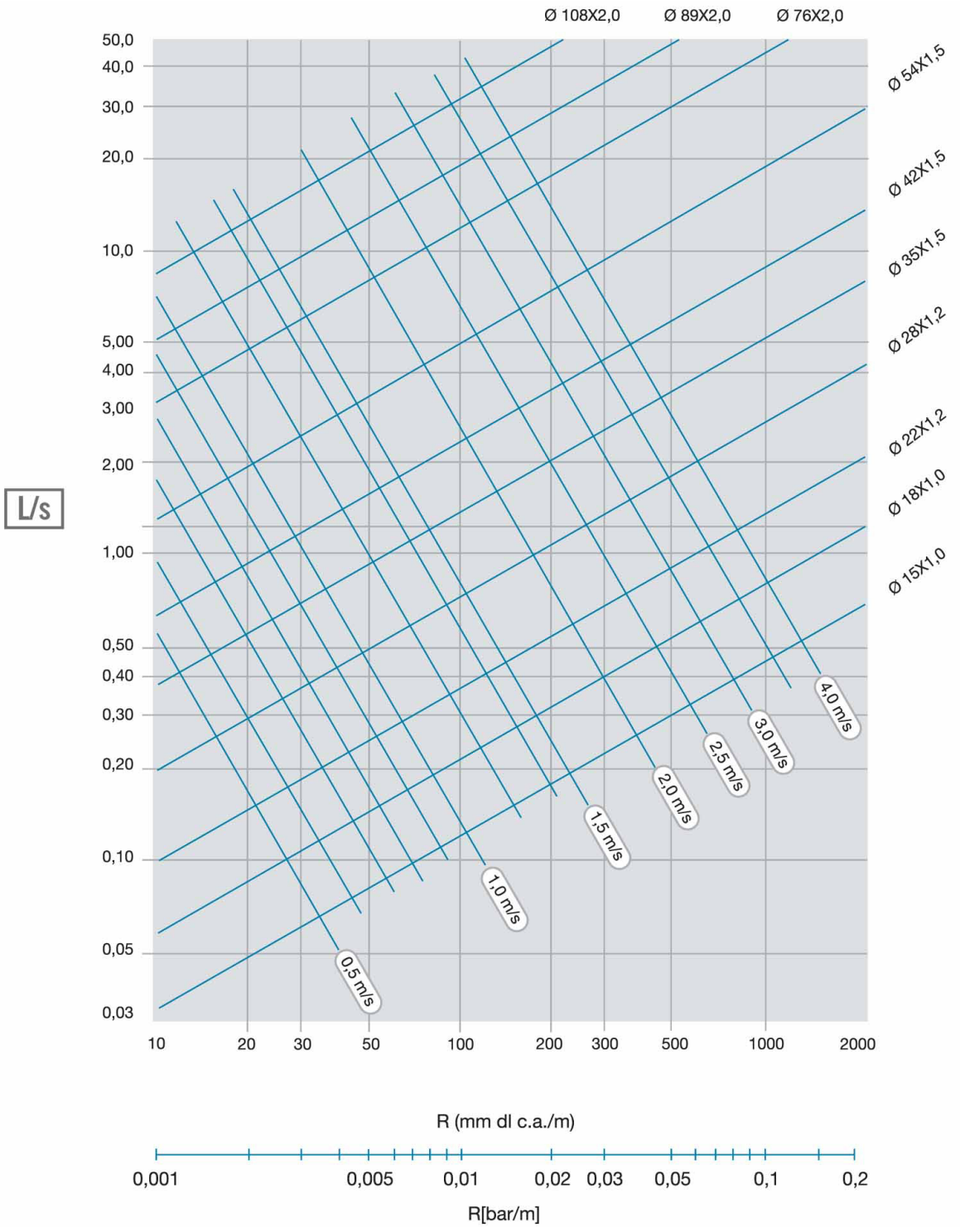
Drinking water systems pressure testing occurs in line with DIN 1988-2 and VDI 6023 with filtered drinking water right before the start-up of operations. If drinking water systems are not be launched right away, the pressure test is to be conducted according to the ZVSHK bulletin "Impermeability Testing for Drinking Water Installations with Compressed Air, Inert Gas or Water."

11.7. Flushing

Flushing is to be conducted immediately following the pressure test and start-up of the system according to DIN 1988-2 and VDI 6023. This occurs with a water-air mixture using filtered drinking water. An additional flushing procedure is described in the ZVSHK bulleting "Flushing, Disinfecting and Launching Drinking Water Installations". The flushing procedure to be used is agreed upon in advance with the principal.

11.8. Pipes dimensioning

Every liquid that flows through a network of pipes experiences a drop in pressure due to constantly rubbing against the inner wall of the pipe, changes in direction and turbulences caused by resistances, all of which make its calculation complex.
The attached diagram can be utilized for avoiding complicated calculations. It allows the user to quickly and reliably determine water column loses in mm.
The nomogram below is valid for drinking water (10°C).


Ø 108X2,0
Ø 89X2,0
Ø 76X2,0
Ø 54X1,5
Ø 42X1,5
Ø 35X1,5
Ø 28X1,2
Ø 22X1,2
Ø 18X1,0
Ø 15X1,0
L/s
50,0
40,0
30,0
20,0
10,0
5,00
4,00
3,00
2,00
1,00
0,50
0,40
0,30
0,20
0,10
0,05
0,03
0,5 m/s
1,0 m/s
1,5 m/s
2,0 m/s
2,5 m/s
3,0 m/s
4,0 m/s
10
20
30
50
100
200
300
500
1000
2000
R (mm dl c.a./m)
0,001
0,005
0,01
0,02
0,03
0,05
0,1
0,2
R[bar/m]

12.0. Creation of the PCC press connection

12.1. PCC PRESS-INOX, -STEEL, -COPPER

12.1.1. Transport and storage

In transport and storage, PCC press fittings and system pipes and fittings are to be protected against damage, moisture, UV-radiation and defilement.

12.1.2. Separation and deburring

PCC system pipes can be cut to length using commercial cutting tools suitable for metallic materials. It should be ensured that tarnishing does not result from performing cutting procedures on PCC PRESS-INOX.

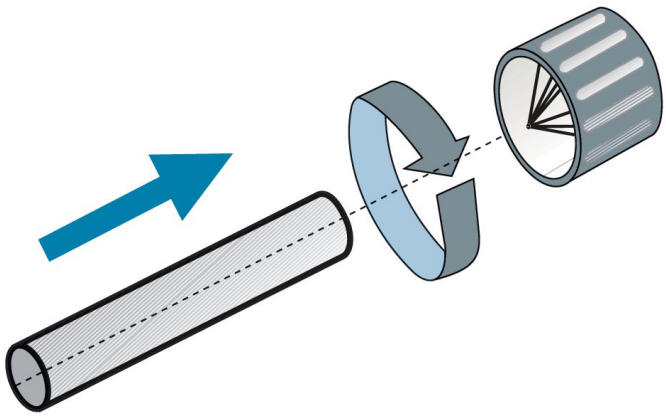
We recommend the use of:

- pipe cutters
- fine-toothed hand saws
- slow running electronic machine saws

The following tools are not permitted:

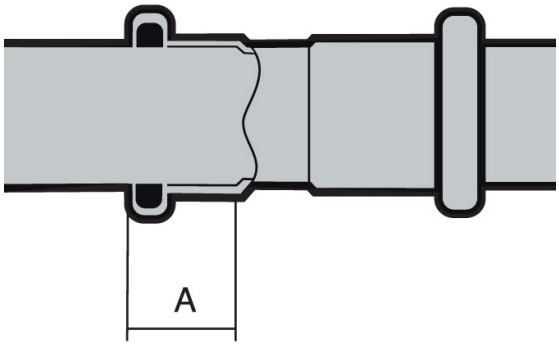
- tools that cause tarnishing
- oil-cooled saws
- angle grinders

After cutting procedures, the pipe ends must be finished internally and externally with a commercial device for processing stainless steel or a suitable file. This serves to ensure that the gasket is not damaged when inserting the pipe section into the press fittings.



12.1.3. Marking of the insertion depth PCC PRESS-INOX und PCC PRESS-STEEL

A permanent marking on the system pipe or moulding with spigots, I-A arcs and pass arcs, serve to achieve the required mechanical solidness of the press connection. This marking is to be applied before attaching to the end of the pipe.



d in mm	insertion depth "A“ in mm
15	20
18	20,5
22	21,5
28	23
35	25
42	30
54	35
76,1	53
88,9	60
108	75

12.1.4. Insertion into the pressfitting

Before inserting the end of the pipe into the moulding press socket, it is necessary to inspect the sealing element for proper placement, damage and defilement. Light force and turning are then used to insert he pipe section into the pressfitting up to the insertion depth marking

.

12.1.5. Manufacturing the press connection PCC PRESS-INOX und PCC PRESS-STEEL

Upon merging the PCC system pipe section with the PCC system fitting, the press fitting can be conducted with the aid of the permitted pressing tools. The press connections of the pipe dimensions can only be manufactured with pressing devices, including the press jaws and press snares with contour M.
Depending on the dimension of the press fitting, the associated press jaws are to be inserted into the press device / proper press snare/chain on the moulding. In doing so, the press jaw / press snare notch must rest on the pressfitting bead of the moulding. After pressing operations, the correctness and proper execution as well as compliance with the designated insertion depth are to be inspected. The user must affirm that all connections have been pressed. After the pressing locations have undergone pressing operations, the pipes may no longer be adjusted. Threaded connections must be executed in advance.

12.2. PCC UNIPRESS

12.2.1. Transport and storage

In transport and storage, PCC system pipes and fittings are to be protected against damage, moisture, UV-radiation and defilement.

12.2.2. Separation and deburring

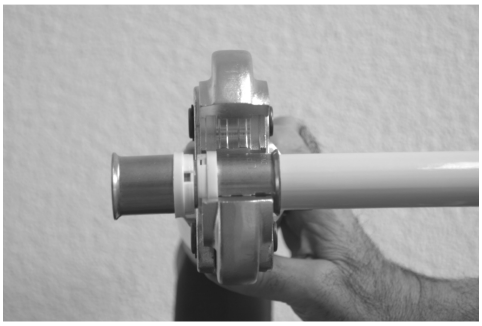
Cut the PCC UNIPRESS Systemrohr to length with the pipe cutter or cutting shears. Cut the pipe straight and perpenidularly to the correct length without using a device (use cutting shears). Do not saw! Calibrate the pipe wiht a PCC UNIPRESS calibration tool (note the diameter).

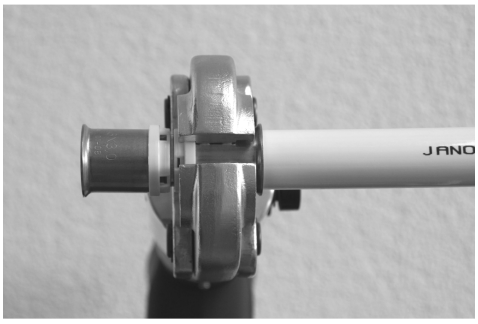
12.2.3. Insertion into the pressfitting

Shove the pipe into the fitting with a light twisting motion until it stops. Check with the holes in the press sleave that the pipe has been inserted all the way until the stopping point (push in further if necessary).

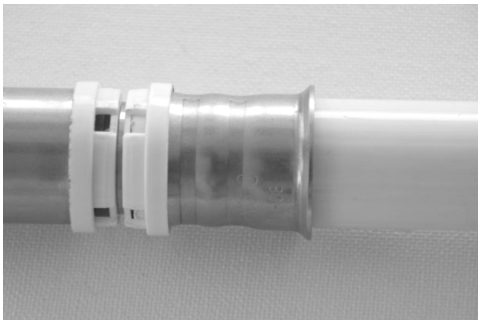
12.2.4. Manufacturing the press connection PCC UNIPRESS

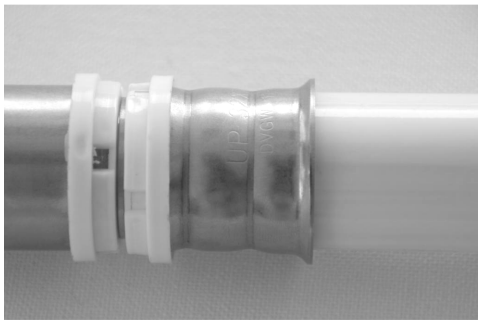
Before pressing, ensure that the fitting is correctly positioned, because it cannot be moved or twisted once the pressfitting is complete. Attach the press jaws with the correct diameter and press contour (see Tabel below) to the plastic position ring, establish the correct positioning and begin the pressing process.





Now run the press cycle and ensure that the press jaws are closed completely. Once the cycle is finished the pressfitting is complete. Only interrupt the pressing cycle in case of emergency. When establishing the connection, ensure that the pipe extends out of the fitting by a length of at least 3 cm.





12.2.5. Press contours for PCC UNIPRESS

dimension PCC UNIPRESS in mm	press contours (press profiles)
16 x 2,0	TH, F, B, U, H
20 x 2,0	TH, F, B, U, H
20 x 2,25	U
25 x 2,5	U
26 x 3,0	TH, F, B, H
32 x 3,0	TH, F, B, U, H

13.0. Press tools - overview

PCC PRESS-INOX	PCC PRESS-STEEL	PCC PRESS-COPPER

Novopress	diameter (mm)										
	12	15	18	22	28	35	42	54	76	89	108
Presskid	✓	✓	✓	✓	✓	×	×	×	×	×	×
AFP 101 (*)	✓	✓	✓	✓	✓	×	×	×	×	×	×
EFP 201	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
AFP 201	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
EFP 2	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
ECO 201	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
ACO 201	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
ACO 3	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
ECO 301 (*)	✓	✓	✓	✓	✓	✓	Δ	Δ	Δ	Δ	Δ

Klauke	diameter (mm)										
	12	15	18	22	28	35	42	54	76	89	108
MAP 1(*)	✓	✓	✓	✓	✓	×	×	×	×	×	×
UAP 2	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
UNP 2	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
UAP 4	✓	✓	✓	✓	✓	✓	Δ	Δ	Δ	Δ	Δ
UAP 100	✓	✓	✓	✓	✓	✓	Δ	Δ	Δ	Δ	Δ

Rems	diameter (mm)										
	12	15	18	22	28	35	42	54	76	89	108
Mini-Press (*)	✓	✓	✓	✓	✓	×	×	×	×	×	×
Power-Press E	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
Power-Press 2000	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
Power-Press ACC	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
Akku-Press	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×
Akku-Press ACC	✓	✓	✓	✓	✓	✓	Δ	Δ	×	×	×

Rothenberger	diameter (mm)										
	12	15	18	22	28	35	42	54	76	89	108
Romax Pressliner	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Romax Pressliner ECO	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Romax AC ECO	✓	✓	✓	✓	✓	✓	×	×	×	×	×

Virax	diameter (mm)										
	12	15	18	22	28	35	42	54	76	89	108
Viper i21 (*)	✓	✓	✓	✓	✓	×	×	×	×	×	×
Viper M20 (*)	✓	✓	✓	✓	✓	×	×	×	×	×	×
Viper P20	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Viper P21	✓	✓	✓	✓	✓	✓	×	×	×	×	×

Roller	diameter (mm)										
	12	15	18	22	28	35	42	54	76	89	108
Uni-Press E	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Uni-Press 2000	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Uni-Press ACC	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Multi-Press	✓	✓	✓	✓	✓	✓	×	×	×	×	×
Multi-Press ACC	✓	✓	✓	✓	✓	✓	×	×	×	×	×

✓ Only use with your own M-press jaws or suitable press jaws from other manufacturers.
Δ Only with M-press snares
× Not permitted.
* Only with press jaws that belong to the machine.

Attention: PCC recommends always using press machines and jaws/snares from the same manufacturer. In other cases, always contact PCC technical consultants beforehand.

Compatibility list	PCC UNIPRESS				
Vetec	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
SPM32	✓	✓	✓	✓	✓
Novopress	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
EFP1 (bis Ende 1995)	✓	✓	✓	✓	✓
EFP2 (ab Serie 30001)	✓	✓	✓	✓	✓
ECO1	✓	✓	✓	✓	✓
ACO1	✓	✓	✓	✓	✓
ACO201	✓	✓	✓	✓	✓
AFP201	✓	✓	✓	✓	✓
Geberit	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
PWH 75	✓	✓	✓	✓	✓
Joiner´s Bench	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
APS32	✓	✓	✓	✓	✓
Rems	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
Power-Press E	✓	✓	✓	✓	✓
Power-Press 2000	✓	✓	✓	✓	✓
Power-Press ACC	✓	✓	✓	✓	✓
Akku-Press	✓	✓	✓	✓	✓
Akku-Press ACC	✓	✓	✓	✓	✓
Rothenberger	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
Romax Pressliner (Eco u. AC)	✓	✓	✓	✓	✓
Viega	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
Typ 2	✓	✓	✓	✓	✓
Typ 3	✓	✓	✓	✓	✓
Typ PT3-H	✓	✓	✓	✓	✓
Roller	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
Uni-Press E	✓	✓	✓	✓	✓
Uni-Press 2000	✓	✓	✓	✓	✓
Uni-Press ACC	✓	✓	✓	✓	✓
Multi-Press	✓	✓	✓	✓	✓
Multi-Press ACC	✓	✓	✓	✓	✓
Klauke	PCC pressing jaws with press contours (press profiles)				
	TH	U	F	B	H
UAP1 (UP63)	✓	✓	✓	✓	✓
UAP2 (UP75)	✓	✓	✓	✓	✓
UNP2	✓	✓	✓	✓	✓
UP2EL (UP50EL)	✓	✓	✓	✓	✓
UP2EL14 (UP50EL)	✓	✓	✓	✓	✓

Further contours on enquiry.

Attention: Other than the listed compatibilities no pressing machines are allowed to be used if they have a linear pressing power of more than 40.000 Newton (momentarily or at all times).

14.0. Rulesets and standards

Identification	Title
EnEV	Ordinance on energy-saving heat protection and energy-saving systems engineering for buildings (Energy Conservation Ordinance – EnEV), Edition: 2004-12-02
EnEG	Act for energy conservation in buildings (Energy-Saving Law – EnEG), Edition: 1976-07-22
EnWG	Act reforming the energy industry law; (Article 1 Act on the electricity and gas supply (Energy Management Act – EnWG)) Edition: 1998-04-24
85/374/EWG	Council Directive of July 25th, 1985, concerning the approximation of the laws, regulations and administrative provisions of the Member States on the liability of defective products, Edition: 1985-07-25
89/391/EWG	Council Directive of June 12th, 1989, concerning the implementation of measures for the improvement of the safety and health of employees in the workplace, Edition: 1989-06-12
89/106/EWG Leitpapier D, E, FBek	Guiding documents D, E and F for the Building Products Guideline 89/106/EWG, Edition: 2000-03-13
98/37/EG	Directive 98/37/EG of the European Parliament and the Council of June 22nd, 1998, concerning the approximation of the laws, regulations and administrative provisions of the Member States for machinery Edition: 1998-06-22
98/83/EG	Council Directive 98/37/EG on November 3rd, 1998, on water quality for human consumption, Edition: 1998-11-03
99/34/EG	Directive 1999/34/EG of the European Parliament and the Council of May 10th, 1999, concerning the alteration of the Council Directive 85/374/EWG concerning the approximation of the laws, regulations and administrative regulations of the Member States on the liability of defective products, Edition: 1999-05-10
00/60/EG	Directive 2000/60/EG of the European Parliament and the Council of October 23rd, 2000 concerning the creation of a regulation framework for measures of the association in the division of water rights, Edition: 2000-10-23
DIN EN 671	Stationary extinguishing systems – waterhydrants, Edition: 2001-08
DIN EN 737	Pipework System for medicinal Gasses, Edition: 1998-02
DIN EN 764	Printing machines, Edition: 2004-09
DIN EN 805	Water supply – requirements on water supply systems and their components outside of buildings, Edition: 2000-03
DIN EN 806 Teil 1 - 3	Technical regulations for drinking water installations – Part 1: General, Edition: 2001-12 Part 2: Planning Edition: 2005-06 Part 3: Calculation of the pipe internal diameter, (standard draft) Edition: 2003-07

Identification	Title
DIN EN 764	Printing machines, Edition: 2004-09
DIN EN 805	Water supply – requirements on water supply systems and their components outside of buildings, Edition: 2000-03
DIN EN 806 Teil 1 - 3	Technical regulations for drinking water installations – Part 1: General, Edition: 2001-12 Part 2: Planning Edition: 2005-06 Part 3: Calculation of the pipe internal diameter, (standard draft) Edition: 2003-07
DIN EN 1092	Flanges and their connectors – round flanges for pipes, armatures, moulding and accessories, identified by PN Edition: 2005-04
DIN EN 1254	Copper and copper alloys – fittings Edition: 1998-03
DIN EN 1264	Floor heating – systems and components Edition: 1997-11
DIN EN 1412	Copper and copper alloys – European material number system, Edition: 1995-12
DIN EN 1717	Protection of drinking water from impurities – installations and general requirements for safety equipment concerning the prevention of drinking water impurities from backflow – technical regulations of the DVGW, Edition: 2001-05
DIN EN 1982	Copper and copper alloys – ingot metal and cast iron, Edition: 1998-12
DIN EN 10020	Terminology for the classification of steel, Edition: 2000-07
DIN EN 10088	Stainless steel, Edition: 2001-11
DIN EN 10204	Metallic production – types of inspection documents, Edition: 2005-01
DIN EN 10226	Pipe thread for connections sealed in the thread, Edition: 2004-10
DIN EN 10312	Welded pipes made of stainless steel for the transport of aqueous liquid, including drinking water – technical delivery conditions, Edition:2003-04
DIN EN 12164	Copper and copper alloys – rods for machining, Edition: 2000-09
DIN EN 12168	Copper and copper alloys – hollow rods for machining Edition: 2000-09
DIN EN 12449	Copper and copper alloys – seamless round pipes for general use, Edition: 1999-10
DIN EN 12502	Corrosion protection from metallic materials – instructions for the estimation of the corrosion possibility in the water distribution and storage systems, Edition: 2005-03

Identification	Title
DIN EN 12828	Heating systems in buildings – planning of hot water and heating systems Edition: 2003-06
DIN EN 12831	Heating systems in building – procedure for the calculation of the standard heating load, Edition: 2003-08
DIN EN 12952	Water boiler and system components, Edition: 2002-05
DIN EN 12953	Large volume water boiler, Edition: 2002-05
DIN EN 12975 (Norm-Entwurf)	Solar heating system and its components – collectors Edition: 2004-05
DIN EN 12976 (Norm-Entwurf)	Solar heating system and its components – prefabricated systems, Edtion: 2004-08
DIN EN 13121	Aboveground GFK-tanks and containers, Edition: 2003-10
DIN EN 13348	Copper and copper alloys – seamless round pipes made of copper for medicinal gasses or vacuum Edition: 2005-06
DIN EN 13480	Metallic industrial pipes, Edition: 2002-08
DIN EN 13501	Classification of construction products and techniques to their fire resistance.
DIN EN 14336	Heating systems in buildings – installation and removal of hot water-heating systems, Edition: 2005-01
DIN EN 14489	Fire-resistant hydraulic fluid – classification and specification – selection guidelines for the guarantee of safety, health and environmental protection; German version prEN 14489:2002, Edition: 2003-01
DIN EN 14905	Copper and copper alloys – fittings – assembly recommendations for fittings made of copper and copper alloys, Edition: 2004-05
DIN EN 29453	Soft solder; chemical compound and delivery forms, Edition: 1994-02
DIN EN ISO 228	Pipe threads for connections not sealed in the thread, Edition: 2003-05
DIN EN ISO 8044	Corrosion of metals and alloys – basic principles and definitions, Edition: 1999-11
DIN EN ISO 9001 : 2000	Quality management systems – requirements, Edition: 2000-12

Overview of the most important national norms and regulations (Germany)

Identification	Title
BauO ...	Regional building codes for …. (LBO), Edition
FeuerAnlV ...	Ordinance concerning requirements on firing systems, heating and fuel supply systems (firing ordinance – FeuVO), Edition:
KTW-Empfehlung	Sanitary assessment of synthetics and other non-metal materials in line with the Foodstuffs and Commodities Act for the division of drinking water
MBO	Model Building Regulation, Edition: 2002-11
TrinkwV	Ordinance concerning the amendment of the Drinking Water Ordinance (Article 1 Ordinance on Water Quality for Human Consumption (Drinking water ordinance – TrinkwV 2001); Article 2 Amendment of other legal provisions), Edition: 2001-05-21
WHG	Water Resources Act June 18, 2002
DIN 1053	Masonry, evaluation and construction, Edition 11-1996
DIN 1988 Teile 1 - 8	Technical regulations for drinking water-installation (TRWI); Part 1: General, Edition 12-1988, Part 2: Planning and implementation; components, apparatuses, materials, Edition 12-1988, Part 2 Supplemental Sheet: compilation of standards and other technical regulations concerning materials, components and apparatuses, Edition 12-1988, Part 3: Determination of the pipe diameter, Edition 12-1988, Part 3 Supplemental Sheet: Calculation examples, Edition 12-1988, Part 4: Protection of drinking water, maintenance of drinking water quality, Edition 12-1988, Part 5: Pressure increase and decrease, Edition 12-1988, Part 6: Fire-extinguishing and protection systems, Edition 05-2002 Part 7: Prevention of corrosion damage and buildup of sediments, Edition 12-2004, Part 8: Handling of the systems, Edition 12-1988
DIN 1989 Teil 4	Rain water utilization systems – Part 4: Components concerning control and makeup, Edition 08.2004
DIN 2470 Teil 1	Steel pipe gas lines with acceptable workings pressures up to 16 bar, demands on pipe line parts, Edition 12-1987
DIN 3387 Teil 1	Removable pipe connections for metallic gas lines; Edition: 1991-01
DIN 4102	Resistance to fire of construction materials and parts, Edition: 1998-05
DIN 4108	Heat protection in structural engineering, Edition: 1982-04

Identification	Titl
DIN 4140	Insulation work on operational and domestic engineering systems – implementation of heating and cooling insulation, Edition: 1996-11
DIN V 4701	Energetic evaluation of heating and ventilation conditioning systems – Part 10: Heating, heating treatment of water, ventilation, Edition: 2003-08 Part 10 Supplemental 1: Diagram and planning aids for selected systems with standard components, Edition: 2002-02
DIN 4725	Warm water-floor heating – systems and components – Part 200: Determination of heat capacity, Edition: 2001-03
DIN 4755	Oil burning installations – technical regulations oil burning installation (TRO) – Inspection, Edition: 2004-11
DIN 4757 Teil 2	Solar heating plant with organic heat carrier; requirements for the safety-related performance, Edition: 1980-11
DIN 4807	Expansion tanks, Edition: 1991-05
DIN 14461	Fire-extinguisher hose connector fittings, Edition: 2003-07
DIN 14462	Fire-extinguishing water fittings, Edition: 2003-07
DIN 14463	Fire-extinguishing systems, Edition: 1999-07
DIN 14489	Sprinkler systems; general principles, Edition: 1985-05
DIN 14494	Spray extinguishing systems, stationary, with open nozzles, Edition: 1979-03
DIN 17455	Welded circular pipe made of stainless steel for general requirements; technical delivery conditions, Edition: 1999-02
DIN 18202	Tolerances in structural design – structures, Edition: 1997-04
DIN 18380	German Construction Contract Procedures Part C: General technical terms of contract for constructions contracts (ATV); heating systems and central water heating systems, Edition: 2002-12
DIN 50929	External corrosion protection from buried pipelines, Edition: 1992-09
DIN 52613	Heating insulation technical verification; determination of the heat conductivity according to pipe procedure, Edition: 1977-01
DIN 18381	German Construction Contract Procedures Part C: General technical terms of contract for constructions contracts (ATV); Gas, water and drainage systems within buildings, Edition: 2002-12
DIN 18560	Pavement in civil engineering, Edition 04-2004
DIN 30672	Organic casing for corrosion protection from pipelines lain in ground and water for continuous operation temperatures up to 50 °C without cathodic corrosion protection – bindings and shrinking materials, Edition: 2000-12

Identification	Title
DIN 30675	External corrosion protection from buried pipelines, Edition: 1992-09
DIN 50900 Teil 2	Corrosion of metals – Terms – Part 2: Electrochemical terms, Edition: 2002-06
DIN 50930 Teil 6	Corrosion of metals – corrosion of metallic materials in the interior of pipelines, cases and apparatuses of the corrosion stress from water – Part 6: Influence of drinking water consistency
DIN 50934	Corrosion of metals, Edition: 2000-04
DIN 54400	Ion exchange, Edition: 2004-08
DVGW-G 260	Gas consistency, Edition: 2000-01
DVGW-G 262	Use of gases from regenerative sources in the public gas supply; worksheet, Edition: 2004-11
DVGW-G 459	Gas-house connection for operating pressures up to 4 bar Part 1: Planning and installation, Edition: 1998-07 Part 1 Supplemental Sheet: Gas-house connections, Edition: 2003-12 Part 3: Cost-reduction potential in the house connection technique, Edition: 1997-12
DVGW-G 459 Teil 2	Gas-pressure regulation with inlet pressure up to 5 bar in connecting pipelines, Edition: 2005-05
DVGW-G 462 Teil 1	Construction gas lines up to 4 bar positive operating pressure for steel pipes, Edition: 1976-09
DVGW-G 496	Pipework in gas systems, Edition:1986-12
DVGW-G 600 • TRGI 1988/96	Technical regulations for gas installations, Edition:1996
DVGW-GW 2	Copper pipe connections for gas and drinking water installation, on-site and in-building Edition: 2002-06
DVGW-GW 392	Seamless copper pipes for gas and drinking water installations and seamless, internally galvanized copper pipes for drinking water installations - requirements and inspections We can order these items for you, although delivery may take longer as a result. Edition: 2002-06
DVGW-GW 541	Stainless steel pipes for gas and drinking water installations – requirements and inspections; work sheet, Edition: 2004-10
DVGW-VP 614	Permanent pipe connections for metallic gas lines – press connectors We can order these items for you, although delivery may take longer as a result. Edition: 2005-05
DVGW-W 270	Increase in microorganisms in the area of materials used for drinking water – inspection and evaluation, Edition: 1999-11
DVGW-W 291	Purification and disinfection of water distribution systems, Edition: 2000-03

Identification	Title
DVGW-W 405	Preparation of fire-extinguishing water in the public drinking water supply We can special-order these items for you, although delivery may take longer as a result. Edition: 1978-07
DVGW-W 534	Pipe connector and pipe connections in drinking water installation, Edition: 2004-05
DVGW-W 541	Stainless steel and titanium pipes for drinking water installations – requirements and inspection We can order these items for you, although delivery may take longer as a result. Edition: 1996-06
DVGW-W 551	Heating and pipe installation for drinking water – technical measures for avoiding Legionella growth - planning, formation, operation and sanitation of drinking water installations, Edition: 2004-04
DVGW-W 553	Measurement of circulation systems in central drinking water heating systems Edition: 1998-12
DVGW-W 555	Edition: 2002-03 Using rainwater (roof run-off) in the household
VDI 2055	Heat and cold protection for operational and building facilities systems - calculations, guarantees, measurement and inspection procedures, quality control, delivery conditions, Edition: 1994-07
VDI 4100	Sound insulation for apartments - criterion for planning and evaluation, Edition: 1994-09
VDI 2067	Economics of building services systems - facilities and cost calculation Edition: 2000-09
VDI 2073	Hydraulic circuitry in air conditioning systems, Edition: 1999-07
VDI 2715	Minimizing noise in hot water heating systems, Edition: 2005-08
VDI 3733	Piping noises, Edition: 1996-07
VDI 3822	Damage analysis, Edition: 2004-03
VDI 6030 Blatt 1	Design of open heated room surfaces- principles – design space heaters, Edition: 2002-07
VDMA 24186 Teil 2	Product range for the maintenance of technical systems and equipment in buildings, part 2: Heating devices and systems Edition: 2002-10
VDMA 24186 Teil 6	Product range for the maintenance of technical systems and equipment in buildings, part 6: Sanitation devices and systems Edition: 2002-10
TRbF110VV BW	Administrative regulations on the execution of the technical guidelines for liquids (TRbF 110 "position"); storage of flammable liquids in protecting strips for storing flammable liquids classified as A I, A II and B, Edition: 1981-09-09

Identification	Title
TRF 1996	Technical regulations regarding liquefied petroleum gas, Ausgabe: 1996
TRB /TRR	Technical regulations on pressure vessel regulation – pressure tank (TRB) – pipes (TRR) Editions: newest version
AGI-Q 135	Insulation work – water-soluble chloride in mineral wool insulation materials - provision, limit, marker, Ausgabe: 1990-10
AGI-Q 151	Insulation Work – corrosion protection for heating and cooling insulation in operational systems, Ausgabe: 2003-01
ZVSHK-Merkblatt	Flushing, disinfection and start-up of drinking water Installations Edition: 08.2004
ZVSHK-Merkblatt	Drinking water installations leakage tests using compressed air, inert gas or water Edition: 2004
ZVSHK-Merkblatt	Rainwater utilisation systems: Planning, construction, operation and maintenance, Edition: March 1998
twin Nr. 5	Information regarding drinking water installations: supplemental rain water systems
twin Nr. 6	Information regarding drinking water installations: supplemental DVGW agreement regarding 1988 DVGW materials used in drinking water installation
twin Nr. 7	DVGW information regarding drinking water installations: materials used in drinking water installation

* The completeness and topicality cannot be guaranteed.

Reference Addresses for Rulesets:

Identification	Address
DIN EN Standards **DIN Standards**	Beuth Verlag GmbH Burggrafenstraße 6 10787 Berlin Telefon: +49 (0) 30 - 2601-0 Telefax: +49 (0) 30 - 2601-1260 postmaster@beuth.de www.beuth.de
DVGW Rulesets **Twin**	Deutsche Vereinigung des Gas- und Wasserfaches e.V. Technisch-wissenschaftlicher Verein Josef-Wirmer Straße 1-3 D-53123 Bonn Telefon: +49 (0)228 - 91 88-0 Telefax: +49 (0)228 - 91 88-990 info@dvgw.de www.dvgw.de
TRF	Deutscher Verband Flüssiggas e.V. EnergieForum Berlin Stralauer Platz 33-34 10243 Berlin Telefon: +49 (0) 30 - 29 36 71-0 Telefax: +49 (0) 30-/ 29 36 71-10 info@dvfg.de www.dvfg.de
VDI Guidelines	Verein Deutscher Ingenieure e.V. Postfach 10 11 39, 40002 Düsseldorf Telefon: + 49 (0) 211-/ 62 14-0 Telefax: + 49 (0) 211 - 62 14-1 75 kundencenter@vdi.de www.vdi.de
National Laws and Ordinances	Bundesanzeiger Verlagsges.mbH, Amsterdamer Straße 192, 50735 Köln Telefon: +49 (0) 221 - 9 76 68-0 www.bundesanzeiger.de
Guidelines and Bulletins	Carl Heymanns Verlag, Luxemburger Straße 449, 50939 Köln Telefon: +49 (0) 221 - 94 37 3-0 Telefax: +49 (0) 221-/ 94 37 3-310 marketing@heymanns.com www.heymanns.com
VdTÜV-Bulletins	TÜV-Verlag GmbH TÜV Rheinland Group Am Grauen Stein 51105 Köln Telefon: +49 (0) 221 - 80 6-0 Telefax: +49 (0) 221-/ 80 6-3510 tuev-verlag@de.tuv.com Internet: http://www.tuev-verlag.de
Kiwa Rulesets and Gastec Rulesets	Kiwa Water Research Groningenhaven 7 3433 PE Nieuwegein Postbus 1072 3430 BB Nieuwegein Tel.: +31 (0) 30 - 60 69 511 Fax: +31 (0) 30 - 60 61 165 alg@kiwa.nl www.kiwa.nl

Identification	Address
SVGW Rulesets	SVGW Zürich Grütlistrasse 44 8002 Zürich Telefon: +41 (0) 44 - 288 33 33 Telefax: +41 (0) 44 - 202 16 33 info@svgw.ch www.svgw.ch
ÖNORM	ÖVGW - Österreichische Vereinigung für das Gas- und Wasserfach A-1010 Wien, Schubertring 14 Tel.: +43 (0) 15 13 - 15 88-0 Fax: +43 (0) 15 13 - 15 88-25 office@ovgw.at www.ovgw.at

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