Asennusopas
Monteringshjälp
Installation Assistant

Reference:

The technical references listed in this installation assistant serve as general information.

For a professionally implemented installation, observation of a **SANHA**® currently used specialized manual and/or the current technical information is absolutely necessary.

This installation assistant is only an excerpt of the current **SANHA**® specialized manual and/or the current technical information. The listed measurement data of the z-dimensions and press fitting combinations are subject to manufacturing-conditional tolerances. For installation according to the z-dimension method, the necessary current press fitting dimensions are always to be obtained beforehand by the user.

SANHA® reserves the right to technical changes.

The **SANHA**® application consultation is available to you for technical inquiries 01494 / 484255.

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1. Press connection

In the press fitting technology, a form-fitting connection is manufactured by common radial deformation of fittings and pipe. An additionally inserted ring gasket made of elastic polymer ensures the sealing function against leaks of the conducted medium The special features of both the **SANHA®**, press fittings of copper and copper alloys and the **NiroSan®** press systems of stainless steel are the construction and manufacture of the socket couplings. They enable reliable processing and ensure a permanently sealed connection. With both systems, the main feature in the development was that all pressing jaws employed for press connections, Type M-MM (mechanical connector of metal for metal pipes) and pressing tools can be approved. This applies in particular from the viewpoint of security. For the craftsman this means that there is no loss of the system guarantee due to a change of the pressing jaws in case of utilization of **SANHA®** products - which is different from products by other manufacturers.

NiroSan® press fitting system

Quick reference guide to **NiroSan®** press fitting system of stainless steel, Material No. 1.4404

Field of application	Dim./Nominal pressure	Seal	Tool
NiroSan®-Press (Series 9000) – Drinking water – Processed water – Heating system – Cooling water – Condensate – Utility and rain water	d = 15 - 22 mm PN 40 d = 28 - 35 mm PN 25 d = 42 - 108 mm PN 16	**EPDM** Color: black Max. continuous temp.: -30°C up to 120°C (short time up to 150°C) Requirements according to KTW satisfied	d = 15 - 54 mm Free selection of pressing tools and jaws and/or slings (see chapter 1.7) d = 76.1 - 108 mm ECO 3/ECO 301/HCP (see chapter 1.7)
NiroSan®-Press Gas (Series 17000) – Flammable gases according to DVGW G 260 and G 262	d = 15 - 108 mm PN 5 / GT 5 Underground laying not admissible **PN 5 GT / PN 5**	**HNBR** Color: yellow Max. continuous temp.: -20°C to 70°C Requirements according to DVGW VP 614 satisfied	d = 15 - 54 mm Free selection of pressing tools and jaws and/or slings (see chapter 1.7) d = 76.1 - 108 mm ECO 3/ECO 301/HCP (see chapter 1.7)
NiroSan®-Press Industry (Series 18000) – Compressed air – Solar thermal power – Cooling water – Bulk goods – Applications in industry	d = 15 - 22 mm PN 40 d = 28 - 35 mm PN 25 d = 42 - 108 mm PN 16 **HT**	**Special sealing ring** Color: red Max. continuous temp.: -20°C to 200°C (according to medium) Solar thermal power up to 200°C (short time up to 280°C) Resistant against oils and water-glycol mixture	d = 15 - 54 mm Free selection of pressing tools and jaws and/or slings (see chapter 1.7) d = 76.1 - 108 mm ECO 3/ECO 301/HCP (see chapter 1.7)
NiroSan®-Press SF (Series 19000) – Applications, which must be free of paint-wetting disturbing substances (automobile industry, paint industry, paint work, aircraft industry, etc:)	d = 15 – 22 mm PN 40 d = 28 – 35 mm PN 25 d = 42 – 108 mm PN 16 **SF**	**Spezialdichtring** Max. continuous temp.: -20°C to 200°C (according to medium) Solar thermal power to 200°C (short time up to 280°C) Resistant against oils and water-glycol mixture	d = 15 - 54 mm Free selection of pressing tools and jaws and/or slings (see chapter 1.7) d = 76.1 - 108 mm ECO 3/ECO 301/HCP (see chapter 1.7)

Materials:	
Fittings from pipe:	Material No.: 1.4404 according to EN 10088
Threaded fittings:	Material No.: 1.4571 according to EN 10088
Stainless steel parts:	Material No.: 1.4408 according to EN 10283
Pipes:	Material No.: 1.4404 according to EN 10088 Pipe dimensions according to EN 10312 and DVGW-GW 541 bright-annealed and solution-heat-treated, strength limited in upper values according to EN 10312, free of harmful component parts and according
Pipe inside surface:	to the special requirements of GW DVGW - Code of Practice 541

1.2. SANHA® press fittings of copper and copper alloys

Quick reference guide to **SANHA®** press fittings of copper and copper alloys

Field of application	Dim./Nominal pressure	Seal	Tool
SANHA®-Press (Series 6000/8000) – Drinking water – Heating system – Cooling water – Utility and rain water	d = 12 – 108 mm PN 16 Fittings without additional colored exterior identification	HNBR Max. continuous temp.: -30°C up to 120°C (short time up to 150°C) Requirements according to KTW satisfied	d = 12 – 54 mm selection of pressing tools and jaws and/or slings (see chapter 1.7) d = 64 - 108 mm ECO 3/ ECO 301 (see chapter 1.7)
SANHA®-Press Gas (Series 10000/11000) – Flammable gases according to G DVGW 260	d = 12 – 54 mm PN 5 / GT 5 Soil transfer not admissible PN 5 GT / PN 5	HNBR Color: yellow Max. continuous temp.: -20°C up to 70°C Requirements met to DVGW VP in 614 satisfied	d = 12 - 54 mm free selection of pressing tools and jaws and/or slings (see chapter 1.7)
SANHA®-Press Solar (Series 12000/13000) – Solar thermal power – Cooling water – Compressed air – Applications in industry	d = 12 – 54 mm PN 16 HT	Specialsealing ring colour :red Max. contious temp.: -20 °C bis 200 °C (depends on medium) Solar thermal power up to 200 °C (short time up to 280 °C) Resistant against oils and water-glycol mixture	d = 12 - 54 mm free selection of pressing tools and jaws and/or slings (see chapter 1.7)
Materials: Copperfittings: Fittings of copper alloys: Pipes:	Material No.: CW024A (Cu-DHP) according to EN 1254 Material No.: CC491 (CuSn5Zn5Pb5-C) according to EN 1282 with restrictions in accordance with DIN 50930-6 Material No.: CW024A (Cu-DHP) according to EN 1057 (See table in Chapter 1.5 "Approved copper pipes")		

1.3. **NiroTherm®** press system

Quick reference guide **NiroTherm®** press systems of rustproof steel
(not suitable for drinking water)

Field of application	Dim./Nominal pressure	Seal	Tool
NiroTherm® – Heating system – Cooling water – Condensate – Compressed air – Industry	d = 15 - 22 mm PN 40 d = 28 - 35 mm PN 25 d = 42 - 108 mm PN 16 Provide pipes with red longitudinal strip	EPDM Color: black Max. continuous temp -30°C to 120°C (short-term to 150°C)	d = 12 - 54 mm free selection of presses and jaws and/or loops (see chapter 1.7) d = 64 - 108 mm ECO 3/ECO 301/HCP (see chapter 1.7)

Materials:	
Fittings from pipe:	Material No.: 1.4404 according to EN 10088
Threaded fitting's:	Material No.: 1.4571 according to EN 10088
Stainless steel parts:	Material No.: 1.4408 according to EN 10283
Pipes:	Material-No.: 1.4301 according to EN 10088 Pipe dimensions according to EN 10312 Clean and solution-heat-treated, strength limited to upper value Marked with red longitudinal stripe and (among other things) the labeling heating, compresed air
Pipe inside surface:	According to EN 10312, Free from harmful component parts

The **NiroTherm®** system pipe can also be connected directly with the **SANHA®**-Therm press fittings.

1.4. SANHA®-**Therm** pressing systems

Quick reference guide **NiroTherm®** pressing systems of unalloyed steel and **SANHA® Therm** press fittings (not suitable for drinking water)

Field of application	Dim./Nominal pressure	Seal	Tool
SANHA®-Therm – Heating system – Cooling water – Compressed air (dry) – Industry	d = 15 – 108 mm PN 16	EPDM Color: black Max. continuous temp -30°C to 120°C (short-term up to 150°C)	d = 12 - 54 mm: free selection of presses and jaws and/or loops (see chapter 1.7) d = 78.1 - 108 mm ECO 3/ECO 301 (see chapter 1.7)
Materials: Copper fittings: Fittings of copper alloys: Pipes:	Material-N.: CW024A (Cu-DHP) according to EN 1254 Outside and inside surface refined Material No.: CC491 (CuSn5Zn5Pb5 C) according to EN 1282 Exterior and inside surface refined Material No.: 1.0034 (E 195) galvanized according to EN 10305 Pipe dimensions according to EN 10312 Externally zinc galvanized, layer thickness between. 7 - 15 µm		

The **NiroTherm®** press fittings can also be connected directly with the **SANHA® Therm** system pipe.

1.5 Approved copper pipes

Quick reference guide for connecting the **SANHA®** press fittings of copper and copper alloys of copper pipes approved according to EN 1057. For the manufacture of the pressed connection with the copper pipes listed in the following table, support sleeves are not required!

Outer diameters and wall thicknesses correspond to EN 1057, Table 3 S (mm)											
D (mm)	0,6	0,7	0,8	0,9	1,0	1,1	1,2	1,5	2,0	2,5	3,0
12	X	X	X		X						
14		X	X		X						
15		X	X		X		X	X			
16			X		X		X				
18			X		X		X	X			
22				X	X	X	X	X			
28				X	X		X	X			
35					X	X	X	X	X		
42					(1)	(1)	X	X			
54						(1)	X	X			
64								X			
66,7								X			
76,1								X	X	X	
88,9									X	X	X
108							(2)	(2)	X	X	X

(1) Only with pressing jaws and slings, whose pressing tracks are cleaned and lubricated.
(2) Only with "Copper only" press sling (**SANHA®** Type No.: 16934)

1.6. Areas of application

An overview of the areas of application is included in the following table. For the selection of the piping system for the area of application, both the requirements of the operator on the pipe system, as well as the respective national regulatory works are to be considered. Further applications can be requested from our application consultation.

Designation	**SANHA®** Products for pressing
Drinking water including fire-extinguishing water	**NiroSan®-Press** pressing system (Series 9000), **SANHA®-Press** press fittings from copper and red brass (Series 6000/8000)
Processed water	**NiroSan®-Press** pressing system (Series 9000), **SANHA®-Press** press fittings from copper and red brass (Series 6000/8000)
Rainwater	**NiroSan®-Press** System (Series 9000), **SANHA®-Press** press fittings from copper and red brass (Series 6000/8000)
Heating system	**NiroSan®-Press** pressing system (Series 9000), **SANHA®-Press** press fittings from copper and red brass (Series 6000/8000), **NiroTherm®** pressing system, **NiroTherm®** system pipe and **SANHA®-Therm** press fittings, **SANHA®-Therm** system pipe and press fittings
Cooling water	**NiroSan®-Press** pressing system (Series 9000), **SANHA®-Press** Systemfittings (Series 6000/8000), **NiroTherm®** pressing system, **NiroTherm®** system pipe and **SANHA®-Therm** press fittings, **SANHA®-Therm** system pipe and press fittings
Solar thermal power	**NiroSan®-Press** pressing system (Series 18000), **SANHA®-Press** press fittings from copper and red brass (Series 12000/13000)
Compressed air	**NiroSan®-Press** pressing system (Series 18000), **SANHA®-Press** press fittings from copper and red brass (Series 12000/13000)
	WITH RESTRICTION **NiroSan®-Press** pressing system (Series 9000), **SANHA®-Press** press fittings from copper and red brass (Series 6000/8000), **NiroTherm®** pressing system, **NiroTherm®** system pipe and **SANHA®-Therm** press fittings, **SANHA®-Therm** system pipe and press fittings
Technical Gases (not medical)	**NiroSan®-Press** pressing system (Series 9000), **SANHA®-Press** press fittings from copper and red brass (Series 6000/8000), **NiroTherm®** pressing system, **NiroTherm®** system pipe and **SANHA®-Therm** press fittings, **SANHA®-Therm** system pipe and press fittings

Continuation

Designation	SANHA® Products for the pressing
Technical vacuum	**NiroSan®-Press** pressing system, Series 9000, **SANHA®-Press** press fittings from copper and red brass (Serie 6000/8000), **NiroTherm®** pressing system, **NiroTherm®** system pipe and **SANHA®-Therm** press fittings, **SANHA®-Therm** system pipe and press fittings
Heating oil and diesel	**NiroSan®-Press** pressing system (Serie 18000), **SANHA®-Press** press fittings from copper and red brass (Serie 10000/11000)
Natural gas	**NiroSan®-Press** pressing system (Serie 17000), **SANHA®-Press** press fittings from copper and red brass (Serie 10000/11000)
Liquefied gas	**NiroSan®-Press** pressing system (Serie 17000), **SANHA®-Press** press fittings from copper and red brass (Serie 10000/11000)
Exhaust gas condensate	**NiroSan®-Press** pressing system (Serie 18000)
Vapor condensate	**NiroSan®-Press** pressing system (Serie 9000), **NiroSan®** pressing system
Wet, sprinkler	**NiroSan®-Press** pressing system (Serie 9000), **NiroSan®-Press** pressing system (Serie 18000)
Dry, sprinkler	**NiroSan®-Press** pressing system (Serie 18000)
Industr. applications	(on request)
Industr. applications, Free of paint wetting-disturbing substances	(on request)

1.7. Suitable and recommended pressing tools

For the **NiroSan®** pressing systems, the **NiroTherm®** pressing system, the **SANHA®-Therm** press fittings and the **SANHA®** press fittings of copper and copper alloys, the following pressing tools listed below, subject to observation of the maintenance and maintenance references, are suitable for the manufacture of a permanently sealed press connection.

Both pressing jaws - which wear off automatically in the course of operation - as well as press tools, must be accordingly subject to regular functional checks. Basically, all pressing jaws, as well as all pressing tools, should go through maintenance at least once a year, provided that no other maintenance intervals are stipulated by the manufacturer.

In order to achieve a permanent and secure press fit, pressing tools can be employed up to and including the dimension 54 mm, which generate a linear pressure of at least 30 kN during the pressing. If significantly higher linear pressures occur (e.g. above 34 kN), the pressing jaws could be damaged (caution, danger of injury!).

For the preparation of the press connections, all traditional pressing jaws and slings, up to and including the dimension 54 mm of the Type M-MM (mechanical connectors of metal for metal lines), can be employed. On the construction site it is unavoidable that pressing jaws and slings get dirty. In the same way, a coating consisting of metal abrasion residue is formed on the surface of the press contour with time, such that the friction between the metal surface of the fittings and the surface of the pressing jaw significantly increases. This coating can be removed, for example, with a metal-free fibrous mat (Catalog No. 961) in connection with a solvent, such as denatured alcohol. Furthermore, the hinge points are to be oiled in order to decrease the wear in the area of the pins. Following this, the entire jaw is to be sprayed with a rust and corrosion protection. In case of press slings, graphite oil is to be sprayed in addition between slide segments and press clamps. The segments must always be able to slide freely. Finally, in case of pressing jaws and intermediate jaws for electronically controlled pressing tools (Catalog No. 6920 and/or 6931), the contacts are to be cleaned.

A prerequisite is that, in case of all pressing tools and jaws or slings employed, a regular maintenance and/or verification has been carried out.

Suitable conventional pressing tools for the **NiroSan®**-pressing system, the **NiroTherm®**-pressing system, the **SANHA®-Therm** press fittings and the **SANHA®** press fittings of copper and copper alloys

Usable conventional pressing tools, up to d = 54 mm		
All pressing tools are suitable which satisfy the following requirements: • Minimum pressing force: 30 kN • Mandatory throughput control: - After the pressing procedure has been introduced, it must be ensured that the machine cannot be withdrawn from a possibly incompletely pressed-on connection point, without further measures (actuation of an emergency switch or similar). Alternatively, the manufacturer can verify the suitability of the pressing tool through certification by a recognized testing institute. • Bolt diameter of the pressing clamp retainer: 14 mm • Minimum width of the pressing clamp retainer: 33 mm		
For example:	**SANHA®**	**SANHA®**-ECO 1/ECO 201, mains power (Catalog No. 6902, 6903), **SANHA®**-ACO 1/ACO 201, rechargeable battery operation (Catalog No. 6908, 6909), **SANHA®**-EFP 201, mains power (Catalog No. 6915, 6916),
	Geberit	Mapress electromechanical pressing tool, Type EFP 2, Mapress ECO 1/ECO 201 or ACO 1/ACO 201, Geberit pressing machine PWH 75,
	Viega	Viega system press-on tool Type 2, Viega system press-on tool Type PT3-H, Viega rechargeable battery press hand-held unit, Viega rechargeable battery press machine REC SAN (up to 22 mm),
	REMS	REMS Power press machine, REMS rechargeable battery press machine,
	Roller	ROLLER'S Uni-Press 2000 main machine, ROLLER'S Multi-Press 2000 rechargeable battery press machine,
	Rothenberger	Romax Pressliner, Vario-Press 1000 APC, Romax Pressliner ECO, Romax AC ECO,
	Holger Clasen	Rechargeable battery pressing hand-held unit APH,
	Klauke	UAP 2,
	RIDGID	RP 10-B/S, PT 2 – H,
	VIRAX	Viper P 20+, Viper P 21+

Usable pressing jaws and slings to d = 54 mm (Continuation)	
- Pressing jaws and slings are suitable for connections of M-MM type with - **SANHA®-**, **Mapress-** or **Viega-**profile (Note: It is an requirement that all measurements of the press contour incl. all tolreances must be in accordeance with the original press profiles)	
For example: **SANHA®**	Service Plus pressing jaws and slings 12 mm - 54 mm (Catalog No. 6940, 6930, 6932), Standard pressing jaws 12 mm - 54 mm (Catalog No. 6958),
Geberit	Mapress pressing jaws 12 mm - 54 mm, Mapress pressing slings 42 mm - 54 mm,
Viega	Viega pressing jaw for Profipress and Sanpress 12 mm - 54 mm
REMS	REMS pressing clamps V 12 mm - 54 mm, M 12 mm - 35 mm, SAT 12 mm - 35 mm
Roller	ROLLER'S pressing clamps V 12 mm - 54 mm, M 12 mm - 35 mm, SAT 12 mm - 35 mm
Rothenberger	Vario-Press pressing jaws V 12 mm – 54 mm, M 12 mm – 54 mm

Suitable electronic pressing tools for the **NiroSan®**-pressing system, the **NiroTherm®**-pressing system, the **SANHA®-Therm** press fittings and that **SANHA®** press fittings of copper and copper alloys

Usable electronically controlled pressing tools, up to d = 54 mm and/or d = 108 mm	
For example: **SANHA®**	**SANHA®**-EFP 3, electronic pressing tools, mains operation, for dimensions 12 mm - 54 mm, **SANHA®**-AFP 3, electronic pressing tools, rechargeable battery operation, for dimensions 12 mm - 54 mm, **SANHA®**-ECO 3/ECO 301, electronic pressing tools, mains operation, for dimensions 12 mm - 108 mm (Catalog No. 6900, 6901), **SANHA®**-ACO 3, electronic pressing tools, rechargeable battery operation, for dimensions 12 mm - 54 mm (Catalog No. 6904, 6905),
Geberit	Mapress electronic pressing tools Typically EFP 3/AFP 3, ACO 3 (to 54 mm), Mapress type electronic pressing tool ECO 3/ECO 301 for dimensions 12 mm - 108 mm.
Usable pressing jaws and slings for d = 12 mm to d = 108 mm	
For example: **SANHA®**	**SANHA®** press jaws and slings with intermediate jaw, 12 mm, - 54 mm (Catalog No. 6920, 6931.1, 6932) for electronic pressing tools Type EFP 3/AFP 3, ACO 3 and ECO 3/ECO 301, **SANHA®** press slings and intermediate jaws 64 mm - 108 mm (Catalog No. 6933, 6931.1, 6931.2, 6931.3), electronic **SANHA®** or Geberit pressing tool ECO 3/ECO 301
Geberit	Mapress pressing jaws and slings, 12 mm, - 54 mm, for electronic pressing tools Type EFP 3/AFP 3, ACO 3 and ECO 3/ECO 301, Mapress press slings and Intermediate jaws Super Size 76.1 mm - 108 mm only for electronic **SANHA®** or Mapress pressing tools ECO 3/ECO 301

Suitable, non-compatible pressing tool for the **NiroSan®** pressing systems and the **NiroTherm®** pressing system

Other pressing tools for d = 76.1 mm to d = 108 mm	
Geberit	Hydraulic cylinder HCP in connection with hydraulics unit of H5 and HCP press slings

Concerning the usability of presses and jaws and loops not listed in the above tables, our application consultation is available under +49 (0) 2054 925 - 164/165/166 to provide information. The complete technical documents are required for the evaluation of the inquired press.

2. Processing directives

2.1. Storage and transport of pipes and fittings

In case of storage and transport of pipes and fittings, damage and contamination through e.g. mortar, soil, sludge, rain or dirt water must be avoided.

It is recommended to transport and to store the pipes in a suitable manner. They are to be laid effectively on squared timbers on the loading space of the truck, both during the transport as well as in case of storage. In this way it is assured that the pipes and fittings are stored dry and not placed directly on the ground. Fittings are to be taken from the original packing only directly prior to installation.

2.2. Bending of stainless steel, carbon steel and copper pipes

The hot bending of stainless steel pipes is not allowed. Copper pipes in drinking water installations up to dimension 28 mm (inclusive) may not be hot bent.

SANHA®-NiroSan® system pipes up to dimension 28 mm and copper pipes according to EN 1057 must be cold bent with suitable bending tools up to dimension 18 mm.

The system pipe **NiroTherm®** and the **SANHA®-Therm** system pipe can be cold bent up to dimension 28 mm. In this case, a bending radius, measured in the neutral axis of the bend, of at least R = 3.5x d for **SANHA®** system pipe of stainless steel and unalloyed steel and for copper of at least R = 3x d, is to be kept.

It is to be ensured that, after the bending, a sufficiently long cylindrical pipe piece is available for further processing. In case of items larger than the above-mentioned dimensions, the manufacturer of the bending device is responsible for a successful bending result.

2.3. Cutting of stainless steel, carbon steel and copper pipe

The cutting of stainless steel, carbon steel and copper pipes is implemented preferably with a fine-toothed metal saw or a pipe cutter. If electrically driven saws are employed for the cutting of stainless steel pipes, the cutting speed may be only so high that no annealing colors arise at the interface, in order to avoid a sensitization of the material. If, contrary to expectations, annealing colors should arise, these must be eliminated on the inside and outside surface of the stainless steel pipes. Experience in-



dicates that even a straw-yellow discoloration of the stainless steel can lead to a sensitization of the material. Particularly suitable for the cutting of pipes of stainless steel or copper is the planetary saw RA 21 +GF+, with which the outside cut edges are also deburred simultaneously with the cutting.
The utilization of cutting disks (flexible) or even flame cutter is not permissible for the shortening of stainless steel pipes.

Caution:
After shortening, the pipe ends are to be carefully deburred inside and outside.

2.4. Sealing materials and sealing auxiliary materials

Sealing materials and sealing auxiliary materials may not give off chloride ions in case of utilization of stainless steel pipes and fittings. With the employment of copper pipes and fittings, no ammonium ions may be released.

In drinking water installations, compressed air installations etc. (however not in gas installations according to TRGI and according to TRF), it is recommended to employ a permanently elastic screw thread caulking material instead of the time-consuming hemp-insertion.

2.5. Electrical trace heating

Shut off lines which do not possess their own safety systems must not be heated, in order to avoid inadmissible increases of pressure in these areas. In connection with electrical trace heating, it is absolutely necessary that EN 1717 and the state of the art of the technology be observed.

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

Short-term temperature exceedings of approx. 70°C are permissible for the purpose of thermal disinfection. In case of copper lines, there are no temperature restrictions in connection with electrical trace heating, provided that inadmissible increase of pressure is avoided.

2.6. Electrical protective measures

Equipotential bonding is to be carried for all electrically conducting pipes. Stainless steel and copper pipes form, with their corresponding fittings (also using press fittings), a continuous electrically conducting connection and the equipotential bonding must be included.

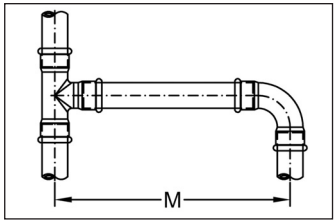
The installer of the electric systems is responsible for the implementation of the electrical protective measures.

2.7. Z-dimension method and fitting combinations

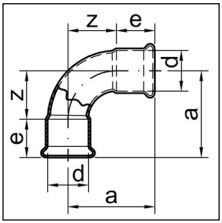
The z-dimension method is a prefabrication method which is described more detailed in the **SANHA**® specialist manual.

These z-dimensions of the **SANHA**® products can be found on the Internet under: www.sanha.com/catalog/index.html, the tables of the associated **SANHA**® product overview (please request separately). In case of application of the z-dimension method, both planners, as well as fitters, by all means must request the valid z-dimension from the parts' manufacturer.

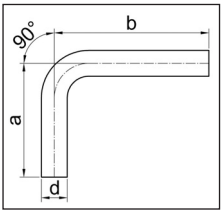
The **>center-to-center<** measurement method (Illustration 2.1) is the basis of the



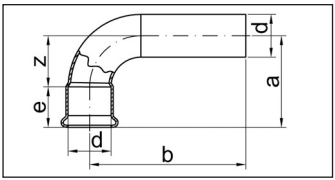
Illus. 2.1: Measurement method in case of the z-dimension method



Illus.2.2: Socket-coupling special fitting



Illus. 2.3: Nozzle special fitting



Illus. 2.4: Socket-coupling nozzle special fitting

z-dimension installation. The measurement of pipe axis to pipe axis allows the precise stipulation of the corresponding pipe lengths with the knowledge of the z-dimension.

The z-dimension >z< in case of socket-coupling special fittings results as a difference from the structural length >a< minus the socket insertion depth >e<. The nozzle dimension is always the structural length of the special fitting (see Illustration 2.2 - 2.3).

The following applies:

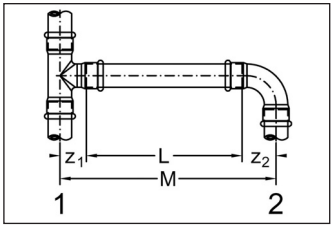
$$z = a - e$$

The pipe length >L< is determined from the center-to-center measurement >M< minus the z-dimension >z< of the fittings involved (Illustration 2.2 - 2.3).

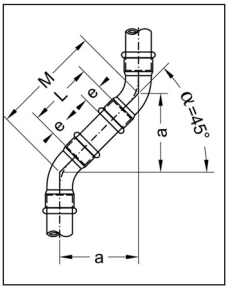
The following applies:

$$L = M - (z1 + z2)$$

If a certain misalignment "a" is required (as in case of an off-set bend) (see Illustration 2.5) and 45° bends should be employed for that to avoid unnecessary pressure losses, the measure >M< is to be calculated thus.



Illus. 2.5: Determination of the pipe length



Illus 2.6: Calculation of off-set bends

The following applies:

$$\sin \alpha = \frac{a}{M} \qquad \sin \alpha_{45°} = 0{,}7071$$

$$M = \frac{a}{0{,}7071}$$

Some of the most important fitting combinations used in practice for the application are listed in the following tables.

2.8. Fire protection

The fire protection is to be implemented according to the respective national regulatory works and/or specifications.

2.9. Acoustic insulation

The acoustic insulation is to be implemented according to the respective national regulatory works and/or specifications.

Pipes including fittings itsself generate no noise.

But armatures that are poorly constructed or poor dimensioned can generate flow noise that will be transmitted on the pipework.

Pipes should always be acoustically insulated against structure-borne noise in wall break-through penetrations, or on installation walls (clamps with acoustic insulation liner, **SANHA**® Catalog No. 9918) or should be laid in utility shafts.

2.10. Thermal insulation

Thermal insulation of pipes is appropriate for reasons of cost-effectiveness and environmental protection (decrease of CO_2 emissions). This is stipulated in the respective nationally applicable regulatory works.

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

Standard values for the minimum insulation layer thickness for the insulation of tubes for drinking water cold according to DIN 1988-2, scale 9

Installation location	Insulation layer thickness with a thermal conductivity of λ = 0,04 W m^{-1} K^{-1} *)
Pipe work single laid in not heated rooms	4 mm
Pipe work single laid in heated rooms	9 mm
Pipe work in a duct, without warm pipes	4 mm
Pipe work in a duct, beside warm pipes	13 mm
Pipe work in a wall slot, riser pipes	4 mm
Pipe work in wall cut-outs, beside warm Pipes	13 mm
Pipe word on the concrete floor	4 mm

*) For other thermal ciondivities the insulation thickness must be converted, based on a diameter of d = 20 mm.

In case of operating conditions usual in residential buildings, sufficient insulation thickness is to be selected in such cases (see above table). In case of stagnated flow of the drinking water, thermal insulation also cannot offer any permanent protection against heating. The specifications in the table can also be employed for protection against water condensate on the insulation material surface, with assumption of a drinking water temperature of 10°C. Protection against water condensate is not necessary if the pipe has a suitable jacket covering (e.g. **WICU**® pipe).

Standard values according to EnEV for **NiroSan**®, **NiroTherm**®, **SANHA**®-**Therm** system pipes and copper pipes can be taken from the following table.

Insulation thickness for **NiroSan®-, NiroTherm®-, SANHA®-Therm** *System pipes*

Tube outside diameter d [mm]	Insulation thickness 100 % λ = 0,035 W m-11 K-1	Total outside diameter D [mm]
12/15/18/22	20 mm	52/55/58/62
28/35	30 mm	88/95
42/54/76,1/88,9/108	same as DN	122/154/216/249/308
Tube outside diameter d [mm]	**Insulation thickness 100 % λ = 0,04 W m^{-1} 1 K^{-1}**	**Total outside diameter D [mm]**
12/15/18/22	26 mm	64/67/70/74
28/35	38 mm	104/111

*) Measurements refer to a ROCKWOOL insulation jacket RS 800 und RS 835, by usage of insulation materials of other producers (Missel, Armaflex etc.) the diameters must be verified by the producer informations

In refrigeration systems **cooling water pipes** are frequently operated with temperatures from 4°C to 6°C. To decrease the energy losses and for avoidance of water condensate (undershooting of the dew-point temperature of the ambient air), these lines must be water-blocking thermally-insulated.

These requirements apply not only for newly built systems, but also for those laid during renovation in existing buildings.

2.11. Pipe fastenings

Fastening spacing for pipes with **NiroSan®***-pressing systems,* **NiroTherm®** *pressing system,* **SANHA®-Therm** *press fittings and* **SANHA®** *press fittings of copper and copper alloys*

Nominal diameter [DN]	Pipe outside diameter [mm]	Spacing [m]
10	12	1,25
12	15	1,25
15	18	1,50
20	22	2,00
25	28	2,25
32	35	2,75
40	42	3,00
50	54	3,50
-	64 / 66,7	4,00
65	76,1	4,25
80	88,9	4,75
100	108	5,00

Pipes are to be connected directly to building by means of standard clamps and must not be attached to other lines. In order to fulfill the acoustic protection requirements, clamps with rubber inserts are to be employed (**SANHA®** Catalog No. 9918). The maximum clamp separations are stipulated for the different applications in the respective regulatory works. If no specifications are available in this connection, these can be taken from the above table. Clamps are always to be attached on the pipe only, not on the fittings. With the arrangement of pipe fastening - in particular in the area of pipe bypasses and branches (bends, T-joints etc.) - the references of the Chapter "Thermally caused change in length of pipes" are to be considered.

2.12. Thermally caused changes in length of pipes

Heat transition pipes and lines which are exposed to a high level of heat radiation (e.g. solar radiation etc.), expand differently according to material.

If the lines are hindered in case of this thermally caused change in length, then damage can arise (mostly in the form of fatigue failures). In order to avoid this, sufficient space for expansion must be allowed for the pipe.

To achieve this, the elasticity of the pipe network can frequently be exploited. For this it is necessary to obtain sufficiently easily bent line sections in the area of line bypasses through correct arrangement of the pipe brackets.

The basic principle is that sufficient expansion possibility must always be available between two fixed points.

Provided that the natural line routing does not enable sufficient compensation of the thermal expansion, this must be realised through the installation of special component parts, such as e.g. metal bellows compensators (**SANHA**® Catalog No. 9872, see Illustration 2.6). If sufficient space is available, a U-pipe compensator can also be employed, as indicated in Illustration 2.11.



Illustration 2.7: Axial compensator with **NiroSan**® *press sockets (***SANHA**® *Catalog No. 9872)*

In case of concealed installation, the unobstructed thermal expansion is to be ensured such that the lines are coated with elastic material of sufficient thickness. In particular, ceiling penetrations are to be cushioned carefully - provided that a fixed point has not been intentionally placed there (see Illustrations 2.8 - 2.10).

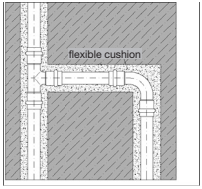


Illustration 2.8: Pipes under plaster

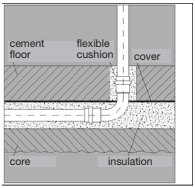


Illustration 2.9: Pipes under composition floor (in thermal and footfall acoustic insulation)

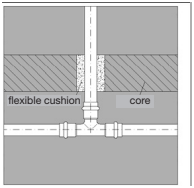


Illustration 2.10: Pipes in ceiling penetrations

Thermal expansion "Δl" of **NiroSan®-, NiroTherm®** *system pipes and copper pipes*

Thermal expansion "Δl" of stainless steel and copper [mm]							
	10	**20**	**30**	**40**	**50**	**60**	**70**
1	0,17	0,33	0,50	0,66	0,83	0,99	1,16
2	0,33	0,66	0,99	1,32	1,65	1,98	2,31
3	0,50	0,99	1,49	1,98	2,48	2,97	3,47
4	0,66	1,32	1,98	2,64	3,30	3,96	4,62
5	0,83	1,65	2,48	3,30	4,13	4,95	5,72
6	1,00	1,98	2,97	3,96	4,95	5,94	6,93
7	1,16	2,31	3,47	4,62	5,78	6,93	8,09
8	1,33	2,64	3,96	5,28	6,60	7,92	9,24
9	1,49	2,97	4,46	5,94	7,43	8,91	10,40
10	1,66	3,30	4,95	6,60	8,25	9,90	11,55

Thermal expansion "Δl" of **SANHA®-Therm** *system pipes*

Thermal expansion "Δl" of carbon steel [mm]							
	10	**20**	**30**	**40**	**50**	**60**	**70**
1	0,12	0,24	0,36	0,48	0,60	0,72	0,84
2	0,24	0,48	0,72	0,96	1,20	1,44	1,68
3	0,36	0,72	1,08	1,44	1,80	2,16	2,52
4	0,48	0,96	1,44	1,92	2,40	2,88	3,36
5	0,60	1,20	1,80	2,40	3,00	3,60	4,20
6	0,72	1,44	2,16	2,88	3,60	4,32	5,04
7	0,84	1,68	2,52	3,36	4,20	5,04	5,88
8	0,96	1,92	2,88	3,84	4,80	5,76	6,72
9	1,08	2,16	3,24	4,32	5,40	6,48	7,56
10	1,20	2,40	3,60	4,80	6,00	7,20	8,40

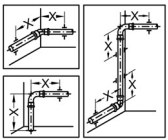


Illustration 2.11:
Minimum separation distance "X" of the clamps to the shaped pieces with heating pipes (see Table A 3.3 and A 3.4)

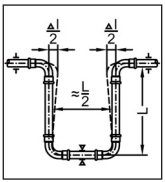


Illustration 2.12:
Necessary length of leg "L" of the double U-bend, as expansion compensating element, to take up the thermal expansion (see Table A 3.5 and A 3.6)

Minimum separation distance "X" of the clamps to the shaped pieces, dependent on the change in length of heating pipes (see Illustration 2.11)

Necessary length of pipe leg "X" of the NiroSan®-, NiroTherm® pressing systems, as well as SANHA®-Therm system pipe with SANHA®-Therm press fittings [m]

d [mm]	Expansion take-up [mm] 10	20	30	40	50	60	70
15	0,57	0,80	0,98	1,13	1,27	1,39	1,50
18	0,62	0,88	1,08	1,24	1,39	1,52	1,64
22	0,69	0,97	1,19	1,37	1,54	1,68	1,82
28	0,77	1,10	1,34	1,55	1,73	1,90	2,05
35	0,87	1,22	1,50	1,73	1,94	2,12	2,29
42	0,95	1,35	1,64	1,90	2,12	2,32	2,51
54	1,08	1,52	1,86	2,15	2,41	2,63	2,85
76,1	1,28	1,81	2,21	2,55	2,86	3,13	3,38
88,9	1,38	1,95	2,39	2,76	3,09	3,38	3,65
108	1,52	2,15	2,63	3,04	3,40	3,73	4,02

Necessary length of leg "X" for copper pipes with SANHA® press fittings of copper and copper alloys [m]

d [mm]	Expansion take-up [mm] 10	20	30	40	50	60	70
12	0,67	0,94	1,16	1,34	1,49	1,64	1,77
14	0,72	1,02	1,25	1,44	1,61	1,77	1,91
15	0,75	1,06	1,29	1,49	1,67	1,83	1,98
16	0,77	1,09	1,34	1,54	1,72	1,89	2,04
18	0,82	1,16	1,42	1,64	1,83	2,00	2,16
22	0,90	1,28	1,57	1,81	2,02	2,21	2,39
28	1,02	1,44	1,77	2,04	2,28	2,50	2,70
35	1,14	1,61	1,98	2,28	2,55	2,79	3,02
42	1,25	1,77	2,16	2,50	2,79	3,06	3,31
54	1,42	2,00	2,45	2,83	3,17	3,47	3,75
64	1,54	2,18	2,67	3,08	3,45	3,78	4,08
66,7	1,57	2,23	2,73	3,15	3,52	3,86	4,17
76,1	1,68	2,38	2,91	3,36	3,76	4,12	4,45
88,9	1,82	2,57	3,15	3,64	4,06	4,45	4,81
108	2,00	2,83	3,47	4,01	4,48	4,91	5,30

Necessary length of leg "L" of the double U-bend, as expansion compensating element, to take up the thermal expansion (see Illustration 2.12)

Necessary length of pipe leg "X" of the NiroSan®-, NiroTherm®-, pressing systems as well as SANHA®-Therm system pipe with SANHA®-Therm press fittings [m]

d [mm]	Expansion take-up [mm] 10	20	30	40	50	60	70
15	0,33	0,46	0,57	0,65	0,73	0,80	0,87
18	0,36	0,51	0,62	0,72	0,80	0,88	0,95
22	0,40	0,56	0,69	0,79	0,89	0,97	1,05
28	0,45	0,63	0,77	0,89	1,00	1,10	1,18
35	0,50	0,71	0,87	1,00	1,12	1,22	1,32
42	0,55	0,77	0,95	1,10	1,22	1,34	1,45
54	0,62	0,88	1,08	1,24	1,39	1,52	1,64
76,1	0,74	1,04	1,28	1,47	1,65	1,81	1,95
88,9	0,80	1,13	1,38	1,59	1,78	1,95	2,11
108	0,88	1,24	1,52	1,76	1,96	2,15	2,32

Necessary length of leg "L" for copper pipes with SANHA® press fittings of copper and copper alloys [m]

d [mm]	Expansion take-up [mm] 10	20	30	40	50	60	70
12	0,39	0,55	0,67	0,77	0,86	0,94	1,02
14	0,42	0,59	0,72	0,83	0,93	1,02	1,10
15	0,43	0,61	0,75	0,86	0,96	1,06	1,14
16	0,45	0,63	0,77	0,89	1,00	1,09	1,18
18	0,47	0,67	0,82	0,94	1,06	1,16	1,25
22	0,52	0,74	0,90	1,04	1,17	1,28	1,38
28	0,59	0,83	1,02	1,18	1,32	1,44	1,56
35	0,66	0,93	1,14	1,32	1,47	1,61	1,74
42	0,72	1,02	1,25	1,44	1,61	1,77	1,91
54	0,82	1,16	1,42	1,64	1,83	2,00	2,16
64	0,89	1,26	1,54	1,78	1,99	2,18	2,36
66,7	0,91	1,29	1,57	1,82	2,03	2,23	2,40
76,1	0,97	1,37	1,68	1,94	2,17	2,38	2,57
88,9	1,05	1,48	1,82	2,10	2,35	2,57	2,78
108	1,16	1,64	2,00	2,31	2,59	2,83	3,06

2.13. Space required for the manufacture of the press connections

For the manufacture of press connections, the minimum separation distances to walls and in corners and wall slots listed below must be adhered to – in order to be able to apply the pressing tool without any problems.

For a cost and time-saving installation, for compliance with the minimum separation distance between two fittings, adapter pieces already produced ex-works are available (**SANHA**® Catalog No. 9050).

The minimum space requirement for the manufacture of the press connections is indicated in the following tables.

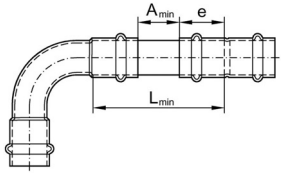


Illustration 2.13: Minimum distance between two pressing locations for the **NiroSan®-** *and* **NiroTherm®** *pressing systems*

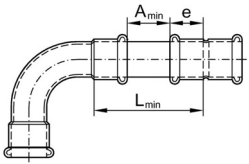


Illustration 2.14: Minimum distance between two pressing locations for the **SANHA®-Therm** *press fittings* **SANHA®** *press fittings of copper and copper alloys*

Minimum distances between two pressing locations for the pressing systems **NiroSan®-** *and* **NiroTherm®-**, *as well as for the* **SANHA®-Therm** *press fittings and for the press fitting* **SANHA®** *copper and copper alloys (Illustrations 2.13 and 2.14)*

NiroSan®- and **NiroTherm®** pressing system					**SANHA®-Therm** pressing systems and **SANHA®** press fittings of copper and copper alloys			
e [mm]	A_{min} [mm]	L_{min} [mm]	**d** [mm]	**DN**	**d** [mm]	**e** [mm]	A_{min} [mm]	L_{min} [mm]
				10	**12**	16	10	42
25	10	60	**15**	**12**	**15**	18	10	46
25	10	60	**18**	**15**	**18**	20	10	50
28	10	66	**22**	**20**	**22**	24	10	58
29	10	68	**28**	**25**	**28**	27	10	64
30	10	70	**35**	**32**	**35**	32	10	74
38	20	96	**42**	**40**	**42**	38	20	96
44	20	108	**54**	**50**	**54**	43	20	106
				--	**64**	**47**	30	124
				--	**66,7**	**48**	30	126
50	30	130	**76,1**	**65**	**76,1**	50	30	130
57	30	144	**88,9**	**80**	**88,9**	56	30	142
69	30	168	**108**	**100**	**108**	70	30	170

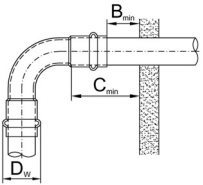


Illustration 2.15: Minimum distance between two pressing locations for the **NiroSan®**- *and* **NiroTherm®** *pressing systems*

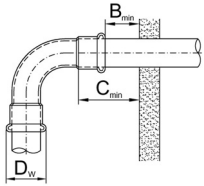


Illustration 2.16: Minimum distance between two pressing locations for the **SANHA®-Therm** *press fittings* **SANHA®** *press fittings of copper and copper alloys*

Minimum distances between two pressing locations for the pressing systems **NiroSan®** *and* **NiroTherm®***, as well as for the* **SANHA®-Therm** *press fittings and for the press fitting* **SANHA®** *copper and copper alloys (Illustrations 2.15 and 2.16)*

NiroSan®- and **NiroTherm®** pressing system					**SANHA®-Therm**-pressing systems and **SANHA®** press fittings of copper and copper alloys			
D_w [mm]	B_{min} [mm]	C_{min} [mm]	d [mm]	DN	d [mm]	D_w [mm]	B_{min} [mm]	C_{min} [mm]
				10	**12**	19	60	76
23	60	85	**15**	**12**	**15**	23	60	78
26	60	85	**18**	**15**	**18**	26	60	80
31	60	88	**22**	**20**	**22**	31	60	84
37	60	89	**28**	**25**	**28**	37	60	87
45	60	90	**35**	**32**	**35**	45	60	92
53	60	98	**42**	**40**	**42**	54	60	98
65	60	104	**54**	**50**	**54**	67	60	103
				--	**64**	80	60	107
				--	**66,7**	82	60	108
95	60	110	**76,1**	**65**	**76,1**	94	60	110
109	60	117	**88,9**	**80**	**88,9**	109	60	116
133	60	129	**108**	**100**	**108**	131	60	130

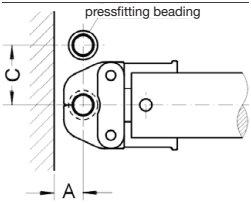


Illustration 2.17: A minimum separation distance of the lines to the wall and minimum separation distance C of the lines between each other

NiroSan®, **NiroTherm®** *pressing systems,* **SANHA®-Therm** *press fittings and* **SANHA®** *press fitting of copper and copper alloys*			
d [mm]		**A [mm]**	**C [mm]**
12	**Jaw**	20	56
15	**Jaw**	20	56
18	**Jaw**	22	60
22	**Jaw**	25	65
28	**Jaw**	25	75
35	**Jaw**	30	83
42	**Sling**	65	90
42	**Jaw**	45	140
54	**Sling**	70	100
54	**Jaw**	45	140
64	**Sling**	100	145
66,7	**Sling**	100	145
76,1	**Sling**	110	160
88,9	**Sling**	120	180
108	**Sling**	130	200

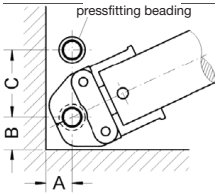


Illustration 2.18: A minimum separation distance of the lines to the wall, minimum separation distance B of the lines to the corner and minimum separation distance C of the lines between each other

NiroSan® , **NiroTherm®** *pressing systems,* **SANHA®-Therm** *press fittings and* **SANHA®** *press fitting of copper and copper alloys*			
d [mm]	**A [mm]**	**B [mm]**	**C [mm]**
12 Jaw	28	40	75
15 Jaw	28	40	75
18 Jaw	28	43	75
22 Jaw	31	50	80
28 Jaw	31	54	80
35 Jaw	31	61	84
42 Sling	65	65	90
42 Jaw	60	110	155
54 Sling	70	70	100
54 Jaw	60	110	155
64 Sling	100	100	145
66,7 Sling	100	100	145
76,1 Sling	110	200	220
88,9 Sling	120	200	220
108 Sling	130	200	230

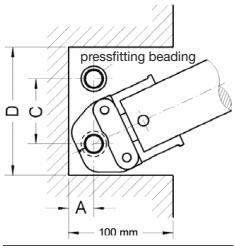


Illustration 2.19: Minimum width D of niches, minimum separation distance A of the lines to the niche back wall and minimum separation distance C of the lines between each other

NiroSan®, **NiroTherm®** *pressing systems,* **SANHA®-Therm** *press fittings and* **SANHA®** *press fitting of copper and copper alloys*				
d [mm]		**A [mm]**	**B [mm]**	**C [mm]**
12	**Jaw**	31	80	155
15	**Jaw**	31	80	155
18	**Jaw**	31	80	161
22	**Jaw**	31	80	173
28	**Jaw**	31	80	181
35	**Jaw**	31	84	206
42	**Sling**	65	90	220
42	**Jaw**	60	155	375
54	**Sling**	70	100	240
54	**Jaw**	60	155	375
64	**Sling**	100	145	345
66,7	**Sling**	100	145	345
76,1	**Sling**	110	220	640
88,9	**Sling**	120	220	640
108	**Sling**	130	230	640

2.14. Pressure test

Designation		Test conditions with	
		Water	**Inert gas**
Drinking water installations DIN 1988 (D)	Preliminary test (applies also for non-pressed, non-sealed press fittings)	p_{test} = 1 bar with $t_{test} \geq$ 10 min (with moderate flow velocity)	p_{test} = 110 mbar with $V_{pipe} \leq$ 100 l of t_{test} 30 min (for every further 100 l, increase $t_{test} \geq$ 10 min in each case)
	Final test	$p_{test} = p_{allowed}$ x 1,5 with $\Delta\vartheta <$ 10 k of 10 min and $\Delta\vartheta \geq$ 10 k of $t_{test} \geq$ 10 min	p_{test} = 3 bar (up tp DN 50) and p_{test} = 1 bar (greater than DN 50) with $V_{pipe} \geq$ 100 l of $t_{test} \geq$ 30 min (for every further 100 l, increase $t_{test} \geq$ 10 min in each case)
Heating installations	Preliminary test (applies also for non-pressed, non-sealed press fittings)	p_{test} = 1 bar with $t_{test} \geq$10 min (with moderate flow velocity)	p_{test} = 110 mbar with $V_{pipe} \leq$ 100 l of $t_{test} \geq$ 30 min (for every further 100 l, increase $t_{prüf} \geq$ 10 min in each case)
	Final test	$p_{test} = p_{allowed}$ x 1,3 with $\Delta\vartheta <$ 10 k of $t_{test} \geq$ 10 min	$p_{test} = p_{allowed}$ x 1,3 or $p_{test,max.}$ = 3 bar von $t_{test} \geq$ 30 min

The times for the equalization of temperature are not included in the minimum test times indicated in the above table and these minimum test times thus have to be added. Measuring devices which enable a sufficient accuracy of reading are to be employed for the pressure test. According to the areas of application, the implementation regulations for the pressure test described in the respective national regulatory works and standards are to be considered.

2.15. Flushing

Drinking water lines are to be flushed thoroughly with filtered drinking water immediately after the pressure test, independent of the type of material employed. The cold and hot water lines are to be flushed separately with an air-water mixture, intermittently under pressure. The flushing with drinking water is to be implemented so that a minimum flow velocity of 0.5 m/s is achieved in the largest pipe to be flushed. A minimum number of extraction points must be opened for this purpose (see the following tables).

The process for line flushing is to be coordinated beforehand with the builder and carried out and recorded in the presence of the builder and/or one of his agents.

Basically, the respective national regulatory works are to be considered in the flushing of drinking water lines.

Minimum number of the extraction points to be opened for the flushing system, with a minimum flow velocity of 0.5 m/s

	Largest dimension of the distribution line						
Nominal diameter DN	**25**	**32**	**40**	**50**	**65**	**80**	**100**
Outside diameter [mm]	**28**	**35**	**42**	**54**	**76,1**	**88,9**	**108**
Minimum volume flow at full filling of the distribution line [l/min]	15	25	38	59	100	151	236
Minimum number of extraction points DN 15 to be opened	1	2	3	4	6	9	14

Minimum quantity of the tapping points to be opened for the flushing acc. to ZVSHK-leaflet with a flush duration of 5 minutes at the last opened tapping point

	Largest dimension of the distribution line						
Nominal diameter DN	**25**	**32**	**40**	**50**	**65**	**80**	**100**
Outside diameter [mm]	**28**	**35**	**42**	**54**	**76,1**	**88,9**	**108**
Minimum number of extraction points DN 15 to be opened	2	4	6	8	12	18	28

2.16. Disinfection

Disinfection of drinking water pipes

Drinking water installations are to be flushed thoroughly with filtered drinking water before operational startup, to establish hygienically trouble-free conditions.

If a disinfection of drinking water pipes is necessary, the respective national regulatory works and/or specifications are to be considered.

An intensive flushing with clear drinking water must be carried out directly after the disinfection. No remains of disinfection agents may be measured in the drinking water at the tappings and respectively the tapping measure values may not be higher than the values at the hand over point (house service connection). It is essential for the success of the flushing that the flow rate in each pipe section is high enough. Intermitted flushing is recommended the mixture of air and water. After the flushing cycle the pipe work must be exhausted from air.

The implementation of a thermal disinfection of the drinking water lines with hot water, at a temperature between 70°C and 95°C, and a disinfection time of approx. 1 hour in every line section, is sufficient in most cases.

The thermal disinfection of stainless steel and copper lines can be implemented with

considerably higher temperatures. The temperature is limited to 120°C in case of press fittings because of the elastomer. However, there is no restriction on the disinfection duration.

Disinfection of drinking water

The disinfection of drinking water is to be implemented according to the respective national regulatory work and/or specifications

2.17. Inner corrosion protection in open systems

Stainless steel

Stainless steel forms a passive layer (chromic oxide layer for the most part) on contact with oxygen and/or oxygenated water (e.g. drinking water). This passive layer prevents any reaction between the material and the water and its material contents. In this way, the water is not influenced in any manner by the pipe material.

Since stainless CrNiMo steels do not add any materials to the drinking water due to the passive layer formed, they can be connected with all other materials authorized for drinking water installation, without compliance with a flow-direction regulation, i.e. in arbitrary precedence. For this reason, the **NiroSan®** press system is also particularly suitable for partial clean-ups of existing drinking water installations - independent of their pipe materials.

However, stainless steel and carbon steel must not be connected directly with each other. Rather a bracket is to be installed of non-ferrous heavy metal, through which the separation distance between the component part of carbon steel and the component part of stainless steel corresponds to the pipe outside diameter at least (see Illustration 6.110). This is achieved e.g. through the installation of a non-ferrous metal valve (brass or red brass) between the stainless steel and carbon steel materials.

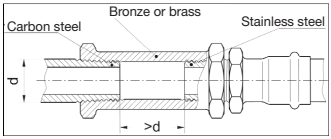


Illustration 2.20: Permissible connection between stainless steel and carbon steel

In case of the installation of stainless steel with copper materials, experience indicates that a minimum relationship of the water-contacting surfaces between copper materials (copper and brass and red brass together) and stainless steel should not be fallen below considerably.

A sensitization of the stainless steel is possible through oxide layers, annealing colours, incorrect heat treatment (e.g. during the welding, separation with fast-running saws or with cutting disks) of the component parts, and must be securely avoided. The hot bending of the pipes is not permissible.

$$\left(\frac{A_{Copper}}{A_{Stainless\ Steel}}\right)_{min} = 0{,}02$$

In case of an impact chlorination for the disinfection of a pipe, the national standards and regulatory works are to be considered, since strong oxidizing agents, as they are used in this case, can damage the passive layer in case of non-professional application.

Copper

Direct connection of copper with carbon steel is possible, subject to observation of the flow regulation which states that copper is always to be arranged downstream of component parts of carbon steel, seen in the direction of flow of the water. Otherwise the carbon steel would be prone to hole-corrosion through the precipitation of copper ions on the surface of the carbon steel pipes.

The assembling of stainless steel and copper is possible for stainless steel as described above.

2.18 Inner corrosion protection in closed systems

In closed systems which are operated with water which is approximately oxygen-free, such as e.g. heating plant, solar energy plants etc., no corrosion processes can take place on metal pipe materials. For this reason, all usual pipe materials, as well as unalloyed steel, can be employed in heating plants. The combination of the different metal pipe materials (copper, unalloyed steel, stainless steel etc.) is possible in arbitrary precedence without restrictions. However, in closed systems no oxygen must then penetrate.

Zinc can erode with higher pH-values - as they generally occur in heating plants - also with absence of oxygen and with hydrogen formation. This leads to the separation of the zinc layer in case of carbon steel pipes, however not to damage to the pipe, since the unalloyed steel is not attacked. However, the hydrogen formation generally leads to plant malfunctions (gas cushion formation). For this reason galvanized ferrous materials are to be dispensed with in heating plants.

2.19. External corrosion protection

In some in the following cases, which are described in detail, suitable coatings (subsequently applied protective paint coats) are permissible. However, it is to be considered that e.g. in the area of the pipe fixing and/or pipe passages, a continuously trouble-free surface paint coating can be achieved in rare cases only. Improperly protected spots are generally exposed to a concentrated corrosion attack. Subsequent paint coating of already installed pipes is thus not to be recommended.

Underground Pipes

Basically, pipes and pipe connectors and valves laid underground must be protected against mechanical action (e.g. through laying in a protective conduit). Metal pipes additionally require protection against external corrosion attacks.

For **stainless steel** and **copper pipelines**, anti-corrosive tape and heat-shrinkable sleeves, in accordance with DIN 30672, Class A (non-corrosive ground), Class B (corrosive ground), can be employed as subsequent external corrosion protection. Copper pipes coated by the manufacturer can also be employed in case of copper pipes, provided that the requirements on DIN 30672, Class B (except for the peeling resistance) (e.g. WICU pipe), are satisfied. In every case, the fittings are to be provided with anti-corrosive tapes or heat-shrinkable sleeves.

The pipes of unalloyed steel are to be provided with a subsequent external corrosion protection in accordance with DIN 30672 of the Contamination Class C.

Below the pavement, pipes laid (not in the pavement, but within the thermal and footfall acoustic insulation and/or in recesses in the unfinished ceiling) are to be protected as described above for underground pipes.

Exterior installed pipe work

Basically, metal pipes and pipe connectors and, where appropriate, valves laid in the open must be protected against mechanical action and (provided the danger exists) against the admission of halogens (fluorine, chlorine, bromide and iodine).

Stainless steel pipelines do not require any additional corrosion protection.

Copper pipes generally do not require any additional corrosion protection, except where gas conduits according to TRGI are in-

volved. In this case, the line is to be protected as described above for underground pipes.

Pipes of unalloyed steel are to be protected against corrosive damages as described in the section "Underground pipes". Alternatively suitable corrosion coatings and/or zinc coatings can be employed. The hot-dip galvanizing can be used in this case on the exterior surface which, depending on the type of atmosphere, represents a long-term corrosion protection. As equivalent corrosion protection with respect to the hot-dip galvanizing, the galvanized pipe surface with a coating thickness of 7 - 15 µm can be considered.

Pipes laid concealed

Stainless steel pipelines do not require any additional corrosion protection, provided that the surrounding materials do not include any chloride-content additives (e.g. frost protection additive). In the latter case, direct contact of the material with the pipe material must be avoided through suitable coatings or jacketing.

Copper pipes do not require any additional corrosion protection, provided that the surrounding materials do not include any ammonium-content additives (e.g. retarding admixtures). In the latter case, direct contact of the material with the pipe material must be avoided through suitable coatings or jacketing.

Galvanized steel pipes do not require in general any additional corrosion protection, except where action from moisture is expected over a longer period or additives are employed in the covering material that can cause corrosion processes at the galvanized steel. In these cases, an additional corrosion protection is to be implemented as described in the Section "Underground pipe".

Surface-mounting laid pipes

Stainless steel pipelines do not require any additional corrosion protection, except in chlorine-content atmospheres (e.g. swimming pool). In the latter case the pipes must be provided with suitable coatings or jacketing.

Copper pipes generally do not require any additional corrosion protection, except for ammonia, (pipes laid in animal stables) or bivalent sulfur (e.g. hydrogen sulfide of biogases) existing in the room air. This applies also for lines in rooms of the meat processing industry (also e.g. cold shelf), since animal protein can convert into sulfidic products. In these cases, the lines are to be

protected as described above for underground pipes.

Galvanized steel pipes do not require in general any additional corrosion protection, except where action from moisture is expected over a longer period or additives are employed in the covering material that can cause corrosion processes at the galvanized steel. In these cases, an additional corrosion protection is to be implemented as described in the Section "Underground pipe".

Suitable insulation materials

Thermal insulation is to be kept permanently dry in order to retain the thermal insulation effect. For this reason, they are always to be implemented water-blocking. In this connection, closed-cell insulation materials are especially to be recommended.

Insulation materials for **stainless steel pipelines** must not exceed a mass content of 0.05% of water-soluble chloride ions. Insulation materials in AS quality (AS = Austenitic Steels), fall significantly below this mass content and are therefore particularly suited for stainless steel.

Insulation materials for **copper pipes** must be nitrite-free and must not exceed a mass content of 0.02% ammonia.

2.20. Manufacture of the press connections

The procedure for the manufacture of a press connection is indicated below in the example of the **SANHA®** press fittings of copper, in association with copper pipes approved by **SANHA®** (see table in the Chapter "Approved to header pipes").

For the press system **NiroSan®**, **Niro-Therm®** and the connecting of the **Niro-Therm®** and **SANHA®-Therm** system pipe with the **SANHA®-Therm** press fittings, the same procedure applies.

The pipe ends must be clean for the manufacture of trouble-free press connections. The pipe exterior surfaces may indicate no scratches or grooves over a length which corresponds to the inserted length at least. In case of dismantling of works-coated plastic pipes, it is to be particularly ensured that the pipe surface is not damaged in this area. Through visually identifiable, in part only scarcely identifiable, incisions with the fitting knife, such damage can easily arise.

Dimensions to d = 54 mm



1. Cut off pipes with fine-toothed hacksaw in right-angled form



Alternative: Separate pipes with a pipe cutter.



2. Deburr pipes carefully inside and outside



*3. Mark the insertion depth on the pipe with felt-tipped pen and template (***SANHA®** *Catalog No. 4980 for the* **SANHA®**-**Therm** *and* **SANHA®** *press fittings of copper and copper alloys [green color] -* **SANHA®** *Catalog No. 4981 for* **NiroSan®** *and* **NiroTherm®** *pressing system of stainless steel [black color]). The marker must be water-proof.*
Check **SANHA®** *press fittings for correct seating of the ring gasket and insert pipes into the fittings coupling up to the stop, using slight rotation. The fitting outer edge must line up with the marker.*



4. Select press jaw according to the fitting dimension and employ in the press machine. Close the retention bolts of the machine.



5. Check whether fitting outer edge lines up with the marker. Open press jaw and place at right angles on to the **SANHA®** *press fitting unit such that the bead of the fittings inserts into the slot of the press jaw.*



6. Release pressing procedure through actuating the start key. In case of compatible machines, the pressing procedure cannot be interrupted prematurely. In this way, it is ensured that a tight, permanently sealed form and longitudinal force-closed connection always results. In case of danger, an interruption of the pressing procedure is possible through actuation of the Emergency Off button[1)].

[1)] After reset of the Emergency Off situation, a post-pressing or, where appropriate, a new pressing must be implemented

In case of **the dimensions 42 mm and 54 mm, press slings are preferably employed** because of the easier handling. The installation is implemented first of all as described above for the steps 1 to 3, Section "Dimension to 54 mm". Then the procedure is continued with the dimensions 42 mm and 54 mm with the operation steps 4. to 7.



4. Select the appropriate press sling. Ensure that the marker strokes form a line on the slide segments and the clamps. If this is not the case, make the slide segments movable. Then place the press sling around the **SANHA®** *press fitting such that the bead of the fitting is inserted into the slot of the press sling. Close press sling. Shift lock strap into locking pins. Note that the press sling fits closely on the fittings. Then rotate the press sling into position, so that the press can be applied properly.*

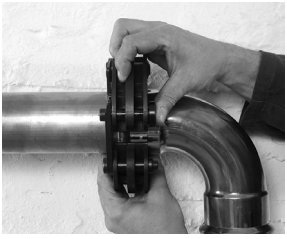


*5. Select appropriate intermediate jaw for the dimension: In case of electronic pressing tools for the dimensions 42 mm and 54 mm, insert the intermediate jaw ZB 302 (***SANHA®** *Catalog No. 6931.1) - and for conventional press tools, the intermediate jaw ZB 202 (***SANHA®** *Catalog No. 6930), into the press tool and close the retention bolts.*



6. Open the intermediate jaw by depressing the jaw levers and attach to the press sling so that the claws of the intermediate jaw grip around the pins of the press sling. Check whether fittings outer edge lines up with the marker of the insertion depth - release pressing procedure through actuating the start key. The pressing procedure cannot be interrupted prematurely. In this way, it is ensured that a permanently sealed connection always results. An interruption of the pressing procedure in the case of danger is possible through pressing the Emergency Off button[1)].

[1)] After reset of the Emergency Off situation, a post-pressing or, where appropriate, a new pressing must be implemented



7. Loosen the press sling through stripping the lock strap. In this case, locking pins protrude from the opposite side.

Dimensions
d = 64 mm up to d = 108 mm

For the dimensions from 64 mm to 108 mm, the electronic press tool (see "Suitable and recommended pressing tools") from **SANHA**® (**SANHA**® Catalog No. 6900 and as a set in a casing with 6 press jaws 12 mm to 35 mm **SANHA**® Catalog No. 6901) or Mapress is required. In addition, press slings of the corresponding dimensions (**SANHA**® Catalog No. 6933) are required, as well as the intermediate jaw ZB 302 (**SANHA**® Catalog No. 6931.1) for the dimensions 64 mm and 66.7 mm and the intermediate jaw ZB 321 (**SANHA**® Catalog No. 6931.2) for the dimensions 76.1 mm and 88.9 mm. Alternatively, press slings and intermediate jaws from Mapress can also be employed.

For the dimension 108 mm, as well as the corresponding press sling (**SANHA**® Catalog No. 6933) in addition to the intermediate jaw ZB 321 (**SANHA**® Catalog No. 6931.2), the intermediate jaw ZB 322 (**SANHA**® Catalog No. 6931.3) and corresponding press sling and intermediate jaws are required by Mapress.



1. Cut off pipes to size: Preferably with a planetary saw (Illustration) or miter saw.



Alternative: cut pipes with a pipe cutter.



Alternative: cut off pipes with fine-toothed hacksaw at right-angles.

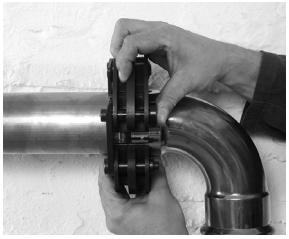


2. Deburr cut edges on the outside carefully. Preferably with special deburring device (Illustration: Novopress RE1 pipe deburrer, **SANHA**® *Catalog No. 4984). Alternative: Semicircular smooth file.*

3. Deburr cut edges inside. Preferably with special deburring device (Illustration: Novopress RE1 pipe deburrer, **SANHA**® *Catalog No. 4984). Alternative: Semicircular smooth file.*

*4. Mark insertion depth on the pipe by means of felt-tipped pen and template (***SANHA**® *Catalog No. 4990). The marker must be water-proof*

Dimensions d = 64 mm up to d = 88,9 mm



3. Insert pipe end into the fittings coupling up to the stop, with slight rotation. The fitting outer edge must line up with the marker. Select appropriate press sling. The marker must be waterproof the clamps. If this is not the case, make slide segments movable.

Place press sling around the **SANHA**® *press fitting so that the bead of the fittings is inserted into the slot of the press sling and, in this case, the centering-plate of the press sling must always point in the direction of the insertion of the press fitting (e.g. 45° bend with internal and external pressing end). Close press sling. Shift lock strap into locking pins. Note that the press sling fits closely on the fittings. Rotate press sling into position so that the pressing can be applied properly.*



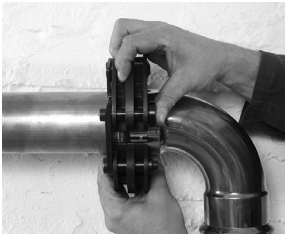
4. ***Dimensions 64 mm and 66,7 mm:***
   Insert intermediate jaw with the designation ZB 302 *(***SANHA®** *Catalog No. 6931.1) in the press tool and close retention bolts.*
   Dimensions 76.1 mm and 88.9 mm:
   Insert intermediate jaw with the designation ZB 321 *(***SANHA®** *Catalog No. 6931.2) in the press tool and close retention bolts.*



5. *Open the intermediate jaw by depressing the jaw levers and attach to the press sling so that the claws of the intermediate jaw grip around the pins of the press sling.*
   Check whether fitting outer edge lines up with the marker of the insertion depth - release the pressing procedure through actuation of the start push button. The pressing procedure cannot be interrupted prematurely. In this way, it is ensured that a permanently sealed connection is always created. In case of danger an interruption of the pressing procedure is possible through actuation of the Emergency Off button [1)].

[1)] After reset of the Emergency Off situation, a post-pressing or, where appropriate, a new pressing must be implemented

Dimension d = 108 mm



6. Loosen the press sling through stripping the lock strap. In this case locking pins protrude from the opposite side.



5. Apply press sling of the dimension 108 mm as described in Step 3. of the Section "Dimension 64 mm up to 88.9 mm". Ensure the marker strokes form a line on the slide segments and the clamps. If this is not the case, make the slide segments movable. Press in the press sling first of all with intermediate **jaw ZB 321** *(***SANHA®** *Catalog No. 6931.2) as described in Step*
3. Remove intermediate jaws ZB 321 by depressing of a jaw lever of the press sling. The press sling remains at the pressing location (press sling can not be detached).



6. Put intermediate **jaw ZB 322** *(see* **SANHA®** *Catalog No. 6931.3) into the press tool and carry out the second pressing procedure. The pressing procedure cannot be interrupted prematurely. In this way it is ensured that a permanently sealed connection always results. An interruption of the pressing procedure in case of danger is possible through pressing the Emergency Off button[1)].*

[1)] After reset of the Emergency Off situation, a post-pressing or, where appropriate, a new pressing must be implemented



7. Open the press sling by depressing the lock lever and remove from the connection point.

NOTE:
Installation tube made of copper d = 108 mm with a wallthickness of 1.2 mm or 1.5 mm must be used with press slings marked "COPPER ONLY", article number 16934, only.