



Silenta Premium Product & Technical Guide



CONTENTS

GENERAL INFORMATION	2
ADVANTAGES	2
WORLDWIDE QUALITY ASSURANCE APPROVALS	3
- Systems Standards.....	3
- Approvals & Certificates.....	3
FIELDS OF APPLICATION	4
ALTERNATIVE TO CAST IRON	4
DESIGN	5
- Anti-Shrink System.....	5
TECHNICAL PROPERTIES	6
SOUND INSULATION PERFORMANCE	7
- Airborne noise.....	7
- Structure-borne noise.....	7
- Sound Reduction with SILENTA.....	7
- Why Sound Protection ?.....	8
CHEMICAL RESISTANCE	9-17
MARKING	18
ASSEMBLY	19-28
- Shortening and Chamfering the Pipes.....	19
- Connecting the Pipes with the Fittings.....	20
- Pipe Laying.....	21
- Installing Pipes in Concrete and Brickwork.....	21
- Floor Trap	22
- Installation of Ventilation Elbow.....	23
- Fastening with Clamps.....	24-25
- Fire Protection.....	27-28
PACKAGING- STORAGE - TRANSPORT	29-31
- Packaging.....	29
- Storage.....	30
- Outdoor Exposure.....	31
- Loading, Unloading and Transporting.....	31
TECHNICAL DRAWINGS & DIMENSIONS	32-41



GF HAKAN PLASTİK is one of the world's largest plastic piping systems manufacturers. The company develops, produces and markets a comprehensive range of piping systems and components in a variety of materials used worldwide to transport water and gas at the highest quality, service and the right price. GF HAKAN PLASTİK operates in three core segments of piping systems; Building Technology, Utility and Agriculture. Its certified products are used in more than 70 countries in 5 continents worldwide.

With more than 10.000 products, GF HAKAN PLASTİK manages a land and maritime transport operation seamlessly and is able to meet the needs of its clients fully wherever they may be in the world.

■ HISTORY

HAKAN PLASTİK was founded in 1965 by the Karadeniz family. Since its foundation, Hakan Plastik has continuously expanded its presence in the manufacturing and sales of plastic piping systems with a focus on innovation.

In 2002, the company invested in a state of art modern facility in Çerkezköy Industrial Zone (ÇOSB), one of the three largest industrial zones in Turkey. To increase its production capacity, HAKAN PLASTİK opened up its second facility in Şanlıurfa. Both facilities totally cover an area of 170.000 m².

In 2013, the leading plastic pipe manufacturer of Europe and the Middle East, HAKAN PLASTİK and the world's leading manufacturer of piping systems, Swiss-based Company, GEORG FISCHER joined forces under the name of "**GF HAKAN PLASTİK**" to provide a unique platform for further growth worldwide.

GEORG FISCHER, founded in 1802 is headquartered in Switzerland and has 125 companies, 48 of which are production facilities, in 32 countries with a workforce of 13,500 employees. The company generated sales of 3.6 billion Swiss francs in 2012. Georg Fischer operates in three core businesses GF Piping Systems, GF Automotive and GF Machining Solutions.

GF Piping System Division is a global supplier of plastic piping systems for the conveyance of liquids and gases in industry, building technology and utility applications. With over 5,000 employees, GF Piping Systems generated sales of about CHF 1.3 billion in over 100 countries in 2012.

■ ABOUT GF HAKAN PLASTİK

GF HAKAN PLASTİK operates in 2 production facilities equipped with the latest manufacturing technologies in Çerkezköy and Şanlıurfa with a workforce of 730 employees. Its headquarters is in Çerkezköy. The company has 6 regional directorates, offices and warehouses in Turkey.

The company has taken its place among the top 500 Enterprises in Turkey according to the worldwide known, prestigious Fortune 500 ranking and also one of the Top 500 Largest Companies in Turkey according to "Istanbul Chamber of Industry (ISO)."



GF Hakan Plastik Çerkezköy Factory

The system quality of GF HAKAN PLASTİK has been certified by BVQI, ISO 9001 and ISO 14001. As a result of a meticulous quality control approach and continuous research and development, product quality of GF HAKAN PLASTİK is confirmed by its international quality certificates.

The company gives top priority to using the highest standards of technology to manufacture user-friendly products with the highest quality and service.

GENERAL INFORMATION

GF HAKAN PLASTIK SILENTA PREMIUM is a sound-insulating 3-layered sewer pipe system made of Silenta PP which is specially formulated and reinforced for non-pressurized domestic drainage in accordance with System Standards of DIN 4109, DIN 4102.

- Silenta Premium reaches a sound-intensity level of 13 dB at 4lt/s flow rate by the officially recognized Fraunhofer Institute, Germany.
- Silenta Premium has a density of $\sim 1,7 \text{ gr/cm}^3$ * according to DIN 53479.
- Silenta Premium is suitable for hot/cold water and acidic liquid transfers.
- Silenta Premium can be used at above and underground drainage systems, even at areas with high traffic load.
- Silenta Premium Products consist of pipes from 58mm to 200mm with and without socket and fittings with complementing accessories.
- Silenta Premium is GF Hakan Plastik' s globally registered trademark.

BENEFITS

Silenta Premium is a high quality sound insulating multilayer pipe system which is made of mineral reinforced polypropylene.

- Provides excellent sound insulation, creates ideal conditions for buildings and contributes to an increase in the property value along with the quality of life.
- Reduces the vibrations and unfamiliar sounds coming from the plumbing system.
- Flame-retardant, according to **DIN 4102** standard.
- High impact resistance.
- Does not require additional sound insulation systems.
- The coefficient of thermal expansion is only 0.04 mm/m°K.
- Operation and installation temperature climbs down to -20° C.
- Resistant to organic and inorganic acids.
- Suitable for ph value between 2 & 12.
- Alternative to cast iron.

* *Density of sound insulation layer.*



WORLDWIDE QUALITY ASSURANCE APPROVALS

SYSTEM STANDARDS

DIN 4109 > Sound protection in structural engineering

DIN 4102 > Flame Resistance

EN 476 > General requirements for components

EN 1451-1> Specifies the requirements for pipes fittings and the systems of polypropylene solid

EN 14366> Noise from waste water installations

- DIN EN 12056 >

Gravity drainage systems inside buildings;
Part 1: General and performance requirements
Part 2: Sanitary pipework, layout and calculation
Part 3: Roof drainage, layout and calculation
Part 4: Sewerage lifting plants, layout and calculation
Part 5: Installation and testing, instructions for operation, maintenance

- DIN 1986-100 >

Drainage systems;
Part 100: Additional requirements for DIN EN 752 and DIN EN 12056
DIN 1986-3:
Drainage systems;
Part 3: Regulations on operation and maintenance
DIN 1986-4:
Drainage systems;
Part 4: Areas of use of sewer pipes and fittings made of various materials
DIN 1986-30:
Drainage systems;
Part 30: Service
Waste water, drainage and discharging systems

APPROVALS & CERTIFICATES



GERMANY - FRAUNHOFER INSTITUT
[P-BA 186 / 09 P-BA187 / 09]



GOST-R

RUSSIA
GOST-R [0303657]
GOST-R HYGIENE
[13.07.05 / 2737974]



Ukr SEPRO

UKRAINE
UKR SEPRO [10964]



TURKEY
YILDIZ TECHNICAL UNIV.
[23.02.06/210]



TURKEY
TURKISH STANDARTS
INSTITUTE
[59/14.02.76]



GERMANY
HOCH

FIELDS OF APPLICATION

Silenta noise-insulating products are used wherever sound protection and high impact resistance is required. Silence plays a big role in areas such as;

DRAINAGE SYSTEMS

- Working Areas

Office buildings, conference rooms, etc.

- Studying Areas

Schools, colleges, libraries, community centers, tutoring centers, etc.

- Sleeping Areas

Hospitals, houses, residences, hotels, apartments, etc.

- Commercial Kitchens

Restaurants, Industrial kitchens

- Under Ground Drainage Systems

All underground drain systems btw. the building and the main pipe line

VENTILATION SYSTEMS

Office buildings, conference rooms, schools, colleges, libraries, community centers, tutoring centers, hospitals, houses, residences, hotels, apartments, etc.

CENTRALISED VACUUM CLEANING SYSTEMS

Sustainable / green buildings.

EXHAUST GAS SYSTEMS

Waste gas transport at industrial areas.

CHEMICAL TRANSFER SYSTEMS

Industrial areas (short and long term usage)

Silenta pipes and fittings are not suitable for:

Waste water containing petrol or benzene transfers.

Installations at temperatures below -20 °C.

ALTERNATIVE TO CAST IRON (CI)

	Silenta Premium	Cast Iron
Chemical Resistance	High-Used for ph value between 2&12	Low
Corrosion	Corrosion Free	Corrosion Gradually
Incrustation Loss	Smooth Bore No Incrustation Loss	Losses 25% to 50% of its inner dia
Vibration	Low Reflection of Vibrations	Reflection of Vibrations
Installation	Easy because of less weight	CI weigh 3 times more
Noise Levels	In given conditions Silenta produces 13 dB	CI produces 40 dB
Clamping	Normal commercial clamps	Heavy clamps required
Durability	50 years	Unknown
Wall Thickness	High e.g. 100mm pipe - Wall thickness 5.3mm	Unknown
Coefficient of Thermal Expansion	0,04 mm/m°K	0,105 mm/m°K
Tensile Strength	13 N/mm2	150-260N/mm2
Fire Resistance	DIN 4102	NA
Water Absorbtion	No Absorbtion	%20
Maintenance	No maintenance required	Expensive



DESIGN

Silenta Premium features a three-layer wall construction. The multi-layer structure increases pipe rigidity. Technically desirable characteristics are optimized in a targeted way.



■ ANTI-SHRINK SYSTEM

“Anti-Shrink System” is a manufacturing process of SILENTA PREMIUM that prevents any kind of deformation in case of ambient temperature or heat variations. If this system is not applied during the manufacturing process, the socket may be subject to shape deformations. SILENTA Anti-Shrink System, avoids problems such as changes in shape, fluid flow obstacles, complicated assembly and leakages.

TECHNICAL PROPERTIES

Silenta Premium has 13dB sound transmission in 4lt/s. Silenta Premium products meet the requirements for DIN-4109, which has been proven by the Fraunhofer Institute (Germany). Silenta continues to be one of the most performant soundproof pipe systems worldwide.

■ TECHNICAL DATA

SOUND TRANSMISSION	13 dB/4lt in given conditions (DIN 4109)
INCRUSTATION LOSS	Smooth Bore-No incrustation loss
VIBRATION	Low Reflection of Vibrations
INSTALLATION	Easy because of less weight
CLAMPING	Normal Commercial Clamps
DENSITY	~ 1.7 gr/cm ³ *
COEFFICIENT of THERMAL EXPANSION	0,04 mm/m°K
TENSILE STRENGTH	13 N/mm ²
CHEMICAL RESISTANCE	resistant to organic and inorganic acids suitable for ph value between 2 & 12
FIRE RESISTANCE	DIN 4102
WATER ABSORPTION	No Absorption
MAINTENANCE	No maintenance required
TYPE	With and without socket
STRUCTURE	3-LAYER (PP-MINERAL REINFORCED PP-PP)
COLOUR	Light grey (halogen and cadmium free)
OPERATION & INSTALLATION	-20°C /60°C
TEMPERATURE	
TEMPERATURE OF OPERATING MEDIA	min : 0°C (lower temperatures for various chemicals) max : 97°C
SERVICE LIFE	50 Years Long-term : 97°C 10 min/day = 3000 h/50 years Short-term : 97°C 30 sec/day = 152 h/50 years Permanent : 60°C 5h/day = 87.600 h/50 years
APPLICATION CLASS	B/D (building / drainage)
MARKING	Manufacturer's Logo, Manufacturer's Trade Name, Manufacturer's Trade Mark, nominal diameter (DN), Angle specification (with elbows and branches), material, standard numbers, Mark of Quality, machine number, date of manufacture, EAN code
CONNECTIONS	Push-fit sockets with factory-inserted lip seals.
RING RIGIDITY	ISO/DIN 9969. The rigidity is at least 4.0 kN/m ² over the entire range of – dimensions da 58 – da 200
E-MODULUS	2400 – 3800 MPa according to ISO 178
IMPACT STRENGTH	EN 1451
PRODUCT QUALITY	authorised German plastics testing institutes (Fraunhofer, Hoch) and TSE
DIAMETERS	58 Ø,78 Ø,90 Ø,110 Ø,135 Ø,160 Ø, 200 Ø
PIPE LENGTHS	0.15m-6m

*Density of sound insulation layer.



SOUND INSULATION PERFORMANCE

The sound-insulating domestic waste water system **SILENTA PREMIUM** guarantees quality, peace and living comfort. In practice-oriented measurements carried out by the officially recognized Fraunhofer Institute for Building Physics in Stuttgart, Germany **SILENTA PREMIUM** reached a sound-intensity level of 13 dB at 4lt/s flow rate.

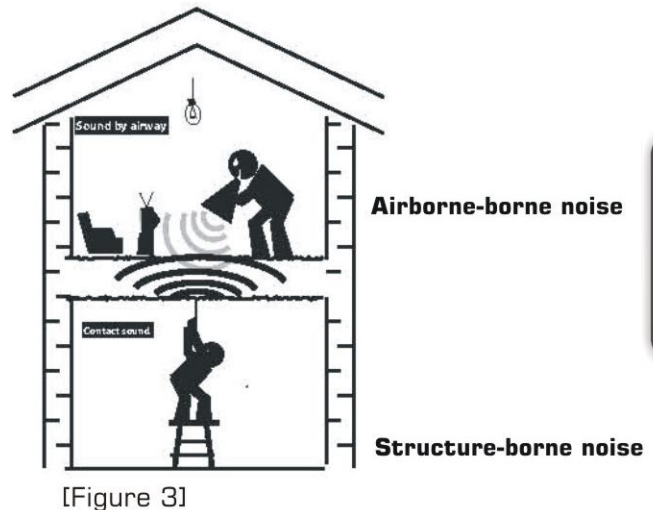
Noise is generated by moving parts or by flowing media. Pipes for waste water evacuation are prone to vibration, particularly where water flows through downpipes or is forced to change direction in correspondence with joints and elbows (noise due to impact or shock). Experience shows that the greatest problems are typically caused by the transmission of structural noise, particularly in the proximity of pipe clamps and brackets or where pipe-work is run through walls or ceilings. In every area of building construction, especially the construction of multi-storey apartment blocks, hospitals and convalescent homes, sound insulation plays an increasingly important role. One of the most significant sources of sound within buildings is the sanitation set-up and the accompanying domestic waste pipe system. An unsuitable sewer pipe system and type of attachment are considerable contributors to disturbing noise. SILENTA, a system-tested, universal sound-insulating domestic waste water system, puts things right.

■ Airborne noise

Airborne noise is present if the noises of a sound source are transferred directly through the air to people. [see figure 3]

■ Structure-borne noise

With structure-borne noise, the sound transfer first occurs through a solid body. This body vibrates and passes the vibrations on to people as airborne noise. [see figure 3]



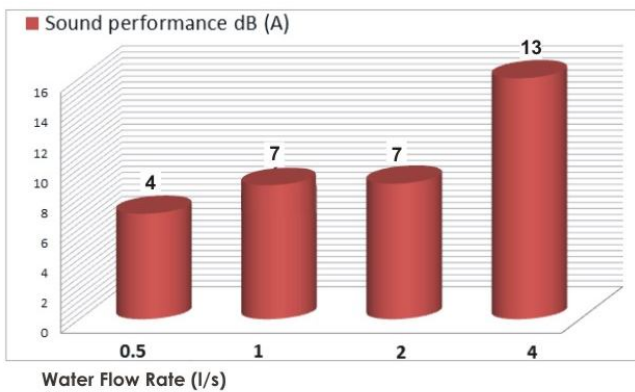
■ Sound reduction with SILENTA

Both structure-borne and airborne noise occurs in sewer pipe systems. The pipe wall of the sewer pipe vibrates due to currents and flow noises. The type and intensity of these pipe vibrations depend on a variety of factors, such as the mass of the pipe, the pipe material and its inner damping. The pipe vibrations are emitted directly from the pipe as airborne noise and are transferred as structure-borne noise via the pipe attachments to the wall fastening panel. When developing a sound-insulating domestic waste water system, both types of sound distribution must be taken into account.

SOUND INSULATION PERFORMANCE

- Structure borne noise is reduced by special rubber clamps and perfect planning.

Air-borne noise is reduced with SILENTA thanks to special materials, sound dampening fillers and increased weight of the pipe system. Targeted mass optimization in sound-sensitive areas of fitting elbows of nominal diameter DN 58 to DN 200 provides further improvement at redirection points.



[Figure 4]

WHY SOUND PROTECTION ?

Sound protective measures in a building pursue the purpose of minimizing noise pollution in rooms. Occupants need to be protected from disturbing air-borne and structure-borne sound. Architectural sound protection measures can be applied to the buildings and the elements of them where people spend longer period of time (offices, flats). Disturbing noise caused by sources within the building directly (structure-borne noise) or indirectly (e.g. noise deriving from building engineering systems) can easily be solved by SILENTA.

The following formula applies to a number x of equal sources with a sound level L: $L_{ges} = L + 10 \log(x)$

X number of equal sources of sound	1	2	3	4	5	6	7	8	9	10	100	1000
10 · log(x) Increase in dB	0	3	5	6	7	8	8	9	10	10	20	30

Example :

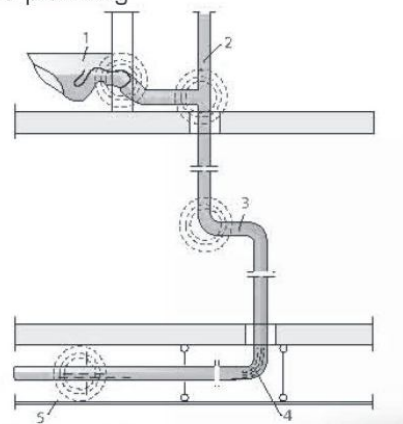
Two sources of sound with equal sound level lead to an increase of the sound level by +3dB.

70 dB + 70 dB amount to 73 dB!

At sound levels of approximately 15-30 dB, as they are usual in building engineering, an increase or reduction by 3 – 5 dB leads to double or half the sound impact.

- The sources of sounds in buildings can be listed as;

- Water shrinks
- The change of direction of the water
- High water velocities
- Crossing points
- Narrowing the formation of cavitation
- Flushing the toilets
- Unloading
- Incorrect planning



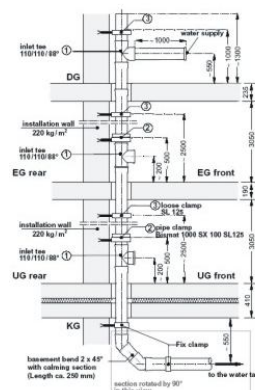
[Figure 5]

Due to critical drainage conditions, the pipe system experiences local vibrations at redirections. This can have a negative effect on sound-related properties.

To minimize this effect and counteract negative influences, targeted mass optimization was carried out in sound-critical areas of elbows with a nominal diameter of DN 58 to DN 200. This stabilizes the sound behaviour, reduces noise and thus achieves even better noise damping in the impact area.

Flow rate [l/s]	0,5	1,0	2,0	4,0
Insulation sound level L _i [dB(A)] measured in the basement test-room (UG floor *)	43	45	48	50
Insulation sound level L _i [dB(A)] measured in the basement test-room (UG rear *)	6	9	9	13
Airborne sound pressure level L _a [dB(A)]	43	45	48	50
Structure-borne sound characteristic level L _w [dB(A)]	4	7	7	13

GF Hakan Plastik measurements of August 18, 2009. Sound pressure levels measured in the installation test facility. Test object was the waste water system "HAKAN SILENTA Premium Highly Noise-Insulated" (manufacturer Hakan). The waste water system consisted of straight plastic pipes and fittings, nominal width OD 110 and pipe clamps "Bismat 1000 Sx100 Sx125" (manufacturer BIS Walraven).



Sample Test Layout



CHEMICAL RESISTANCE

GF HAKAN SILENTA products resist corrosion by acids and inorganic reduces with **pH 2-12** values.

The table in this document summarises the data given in a number of polypropylene chemical resistance tables at present in use in various countries, derived from both practical experience and test results.

Source: ISO/TR 10358

The table contains an evaluation of the chemical resistance to a number of fluids judged to be either aggressive or not towards polypropylene. This evaluation is based on values obtained by immersion of polypropylene test specimens in the fluid concerned at 20, 60 and 100°C and atmospheric pressure, followed in certain cases by the tensile characteristics.

DEFINITIONS, SYMBOLS and ABBREVIATIONS

The criteria of classifications, definitions, symbols and abbreviations adopted in this document are as follows:

S = Satisfactory

The chemical resistance of polypropylene exposed to the action of a fluid is classified as "satisfactory" when the results of test are acknowledged to be "satisfactory" by the majority of the countries participating in the evaluation.

L = Limited

The chemical resistance of polypropylene exposed to the action of fluid is classified as "**limited**" when the results of tests are acknowledged to be "**limited**" by the majority of the countries participating in the evaluation.

Also classified as "limited" are the resistances to the action of chemical fluids for which judgements "**S**" and "**NS**" or "**L**" are pronounced to an equal extent.

NS = Not satisfactory

The chemical resistance of polypropylene exposed to the action of a fluid classified as "not satisfactory" when the results of test are acknowledged to be "not satisfactory" by the majority of the countries participating in the evaluation.

Also classified as "not satisfactory" are materials for which judgement "**L**" and "**NS**" are pronounced to an equal extent.

Sat.sol Saturated aqueous solution, prepared at 20C

Sol Aqueous solution at a concentration higher than 10 % but not saturated

Dil.sol Dilute aqueous solution at a concentration equal to or lower than 10 %

Work.sol Aqueous solution having the usual concentration for industrial use

Solution concentrations reported in the text are expressed as a percentage by mass. The aqueous solutions of sparingly soluble chemicals are considered, as far as chemical action towards polypropylene in concerned, as saturated solutions.

In general, common chemical names are used in this document.

The table is made as a first guideline for user of polypropylene. If a chemical compound is not to be found or if there is an uncertainty on the chemical resistance in an application, please contact GF Hakan Plastik for advise and proposal on testing.

CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical Resistance of Polypropylene, Not Subjected to Mechanical Stress, to Various Fluids at 20, 60 and 100°C

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Acetic acid	Up to 40 %	S	S	-
Acetic acid	50 %	S	S	L
Acetic acid, glacial	> 96 %	S	L	NS
Acetic anhydride	100 %	S	-	-
Acetone	100 %	S	S	-
Aceptophenone	100 %	S	L	-
Acrylonitrile	100 %	S	-	-
Air		S	S	S
Allyl alcohol	100 %	S	S	-
Almond oil		S	-	-
Alum	Sol	S	S	-
Ammonia, aqueous	Sat.sol	S	S	-
Ammonia, dry gas	100 %	S	-	-
Ammonia, liquid	100 %	S	-	-
Ammonium acetate	Sat. sol	S	S	-
Ammonium chloride	Sat.sol	S	S	-
Ammonium fluoride	Up to 20 %	S	S	-
Ammonium hydrogen carbonate	Sat.sol	S	S	-
Ammonium metaphosphate	Sat.sol	S	S	S
Ammonium nitrate	Sat.sol	S	S	S
Ammonium persulphate	Sat.sol	S	S	-
Ammonium phosphate	Sat.sol	S	-	-
Ammonium sulphate	Sat.sol	S	S	S
Ammonium sulphide	Sat.sol	S	S	-
Amyl acetate	100 %	L	-	-
Amyl alcohol	100 %	S	S	S
Aniline	100 %	S	S	-
Apple juice		S	-	-
Aqua regia	HCl/HNO ₃ =3/1	NS	NS	NS
Barium bromide	Sat.sol	S	S	S
Barium carbonate	Sat.sol	S	S	S
Barium chloride	Sat.sol	S	S	S

CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Barium hydroxide	Sat.sol	S	S	S
Barium sulphide	Sat.sol	S	S	S
Beer		S	S	-
Benzene	100 %	L	NS	NS
Benzoic acid	Sat.sol	S	S	-
Benzyl alcohol	100 %	S	L	-
Borax	Sol	S	S	-
Boric acid	Sat.sol	S	-	-
Boron trifluoride	Sat.sol	S	-	-
Bormine, gas		NS	NS	NS
Bromine, liquid	100 %	NS	NS	NS
Butane, gas	100 %	S	-	-
Butanol	100 %	S	L	L
Butyl acetate	100 %	L	NS	NS
Butyl glycol	100 %	S	-	-
Butyl phenols	Sat.sol	S	-	-
Butyl phthalate	100 %	S	L	L
Calcium carbonate	Sat.sol	S	S	S
Calcium chlorate	Sat.sol	S	S	-
Calcium chloride	Sat.sol	S	S	S
Calcium hydroxide	Sat.sol	S	S	S
Calcium hypochlorite	Sol	S	-	-
Calcium nitrate	Sat.sol	S	S	-
Camphor oil		NS	NS	NS
Carbon dioxide, dry gas		S	S	-
Carbon dioxide, wet gas		S	S	-
Carbon disulphide	100 %	S	NS	NS
Carbon monoxide, gas		S	S	-
Carbon tetrachloride	100 %	NS	NS	NS
Castor oil	100 %	S	S	-
Caustic soda	Up to 50 %	S	L	L
Chlorine, aqueous	Sat.sol	S	L	-
Chlorine, dry gas	100 %	NS	NS	NS
Chlorine, liquid	100 %	NS	NS	NS
Chloroacetic acid	Sol	S	-	-

CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Chloroethanol	100 %	S	-	-
Chloroform	100 %	L	NS	NS
Chlorosulphonic acid	100 %	NS	NS	NS
Chrome alum	Sol	S	S	-
Chromic acid	Up to 40 %	S	L	NS
Citric acid	Sat.sol	S	S	S
Coconut oil		S	-	-
Copper (II) chloride	Sat.sol	S	S	-
Copper (II) nitrate	Sat.sol	S	S	S
Copper (II)	Sat.sol	S	S	-
Corn oil		S	L	-
Cottonseed oil		S	S	-
Cresol	Greater than 90 %	S	-	-
Cyclohexane	100 %	S	-	-
Cyclohexanol	100 %	S	L	-
Cyclohexanone	100 %	L	NS	NS
Decalin (decahydronaphthalene)	100 %	NS	NS	NS
Dextrin	Sol	S	S	-
Dextrose	Sol	S	S	S
Dibutyl phthalate	100 %	S	L	NS
Dichloroacetic acid	100 %	L	-	-
Dichloroethylene (A and B)	100 %	L	-	-
Diethanolamine	100 %	S	-	-
Diethyl ether	100 %	S	L	-
Diethylene glycol	100 %	S	S	-
Diglycolic acid	Sat.sol	S	-	-
Diisooctyl	100 %	S	L	-
Dimethyl amine, gas		S	-	-
Dimethyl formamide	100 %	S	S	-
Dioctyl phthalate	100 %	L	L	-
Dioxane	100 %	L	L	-
Distilled water	100 %	S	S	S
Ethanolamine	100 %	S	-	-
Ethyl acetate	100 %	L	NS	NS

CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Ethyl alcohol	Up to 95 %	S	S	S
Ethyl chloride, gas		NS	NS	NS
Ethylene chloride (mono and di)		L	L	-
Ethyl ether	100 %	S	L	-
Ethylene glycol	100 %	S	S	S
Ferric chloride	Sat.sol	S	S	S
Formaldehyde	40 %	S	-	-
Formic acid	10 %	S	S	L
Formic acid	85 %	S	NS	NS
Formic acid, anhydrous	100 %	S	L	L
Fructose	Sol	S	S	S
Fruit juice		S	S	S
Gasoline, petrol (aliphatic hydrocarbons)		NS	NS	NS
Gelatine		S	S	-
Glucose	20 %	S	S	S
Glycerine	100 %	S	S	S
Glycolic acid	30 %	S	-	-
Heptane	100 %	L	NS	NS
Hexane	100 %	S	L	-
Hydrobromic acid	Up to 48 %	S	L	NS
Hydrochloric acid	Up to 20 %	S	S	S
Hydrochloric acid	30 %	S	L	L
Hydrochloric acid	From 35 to 36 %	S	-	-
Hydrofluoric acid	Dil.sol	S	-	-
Hydrofluoric acid	40 %	S	-	-
Hydrogen	100 %	S	-	-
Hydrogen chloride, dry gas	100 %	S	S	-
Hydrogen peroxide	Up to 10 %	S	-	-
Hydrogen peroxide	Up to 30 %	S	L	-
Hydrogen sulphide, dry gas	100 %	S	S	-
Iodine, in alcohol		S	-	-
Isoctane	100 %	L	NS	NS

CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Isopropyl alcohol	100 %	S	S	S
Isopropyl ether	100 %	L	-	-
Lactic acid	Up to 90 %	S	S	-
Lanoline		S	L	-
Linseed oil		S	S	S
Magnesium carbonate	Sat.sol	S	S	S
Magnesium chloride	Sat.sol	S	S	-
Magnesium hydroxide	Sat.sol	S	S	-
Magnesium sulphate	Sat.sol	S	S	-
Maleic acid	Sat.sol	S	S	-
Mercury (II) chloride	Sat.sol	S	S	-
Mercury (II) cyanide	Sat.sol	S	S	-
Mercury (I) nitrate	Sol	S	S	-
Mercury	100 %	S	S	-
Methyl acetate	100 %	S	S	-
Methyl alcohol	5 %	S	L	L
Methyl amine	Up to 32 %	S	-	-
Methyl bromide	100 %	NS	NS	NS
Methyl ethyl ketone	100 %	S	-	-
Methylene chloride	100 %	L	NS	NS
Milk		S	S	S
Monochloroacetic acid	>85 %	S	S	-
Naphtha		S	NS	NS
Nickel chloride	Sat.sol	S	S	-
Nickel nitrate	Sat.sol	S	S	-
Nickel sulphate	Sat.sol	S	S	-
Nitric acid	Up to 30 %	S	NS	NS
Nitric acid	From 40 to 50 %	L	NS	NS
Nitric acid, fujming (with nitrogen dioxide)		NS	NS	NS
Nitrobenzene	100%	S	L	-
Oleic acid	100 %	S	L	-
Oleum (sulphuric acid with 60 % of SO ₃)		S	L	-



CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Olive oil		S	S	L
Oxalic acid	Sat.sol	S	L	NS
Oxygen, gas		S	-	-
Paraffin oil (FL65)		S	L	NS
Peanut oil		S	S	-
Peppermint oil		S	-	-
Perchloric acid	(2 N) 20 %	S	-	-
Petroleum ether (ligroine)		L	L	-
Phenol	5 %	S	S	-
Phenol	90 %	S	-	-
Phosphine, gas		S	S	-
Phosphoric acid	Up to 85 %	S	S	S
Phosphorus oxychloride	100 %	L	-	-
Picric acid	Sat.sol	S	-	-
Potassium bicarbonate	Sat.sol	S	S	S
Potassium borate	Sat.sol	S	S	-
Potassium bromate	Up to 10 %	S	S	-
Potassium bromide	Sat.sol	S	S	-
Potassium carbonate	Sat.sol	S	S	-
Potassium chlorate	Sat.sol	S	S	-
Potassium chlorite	Sat.sol	S	S	-
Potassium chromate	Sat.sol	S	S	-
Potassium cyanide	Sol	S	-	-
Potassium dichromate	Sat.sol	S	S	S
Potassium ferricyanide	Sat.sol	S	S	-
Potassium fluoride	Sat.sol	S	S	-
Potassium hydroxide	Up to 50 %	S	S	S
Potassium iodide	Sat.sol	S	-	-
Potassium nitrate	Sat.sol	S	S	-
Potassium perchlorate	10 %	S	S	-
Potassium permanganate	(2 N) 30 %	S	-	-
Potassium persulphate	Sat.sol	S	S	-
Potassium sulphate	Sat.sol	S	S	-
Propane, gas	100 %	S	-	-
Propionic acid	>50 %	S	-	-

CHEMICAL RESISTANCE

■ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Pyridine	100 %	L	-	-
Seawater		S	S	S
Silicon oil		S	S	S
Silver nitrate	Sat.sol	S	S	L
Sodium acetate	Sat.sol	S	S	S
Sodium benzoate	35 %	S	L	-
Sodium bicarbonate	Sat.sol	S	S	S
Sodium carbonate	Up to 50 %	S	S	L
Sodium chlorate	Sat.sol	S	S	-
Sodium chloride	Sat.sol	S	S	-
Sodium chlorite	2 %	S	L	NS
Sodium chlorite	20 %	S	L	NS
Sodium dichromate	Sat.sol	S	S	S
Sodium hydrogen carbonate	Sat.sol	S	S	S
Sodium hydrogen sulphate	Sat.sol	S	S	-
Sodium hydrogen sulphite	Sat.sol	S	-	-
Sodium hydroxide	1 %	S	S	S
Sodium hydroxide	From 10 to 60 %	S	S	S
Sodium hypochlorite	5 %	S	S	-
Sodium hypochlorite	10 % - 15 %	S	-	-
Sodium hypochlorite	20 %	S	L	-
Sodium metaphosphate	Sol	S	-	-
Sodium nitrate	Sat.sol	S	S	-
Sodium perborate	Sat.sol	S	S	-
Sodium phosphate (neutral)		S	S	S
Sodium silicate	Sol	S	S	-
Sodium sulphate	Sat.sol	S	S	-
Sodium sulphide	Sat.sol	S	-	-
Sodium sulphite	40 %	S	S	S
Sodium thiosulphate (hypo)	Sat.sol	S	-	-
Soybean oil		S	L	-
Succinic acid	Sat.sol	S	S	-
Sulphuric acid	Up to 10 %	S	S	S
Sulphuric dioxide, dry or wet	100 %	S	S	-

CHEMICAL RESISTANCE

▪ CHEMICAL RESISTANCE TABLE POLYPROPYLENE

Chemical or Product	Concentration	Temperature °C		
		20	60	100
Sulphur acid	From 10 to 30 %	S	S	-
Sulphuric acid	50 %	S	L	L
Sulphuric acid	96 %	S	L	NS
Sulphuric acid	98 %	L	NS	NS
Sulphurous acid	Up to 30 %	S	-	-
Tartaric acid	Sat.sol	S	S	-
Tetrahydrofuran	100 %	L	NS	NS
Tetraolin	100 %	NS	NS	NS
Thiophene	100 %	S	L	-
Tin (IV) chloride	Sol	S	S	-
Tin (II) chloride	Sat.sol	S	S	-
Toluene	100 %	L	NS	NS
Trichloroacetic acid	Up to 50 %	S	S	-
Trichloroethylene	100 %	NS	NS	NS
Triethanolamine	Sol	S	-	-
Turpentine		NS	NS	NS
Urea	Sat.sol	S	S	-
Vinegar		S	S	-
Water brackish, mineral, potable		S	S	S
Whiskey		S	S	-
Wines		S	S	-
Xylene	100 %	NS	NS	NS
Yeast	Sol	S	S	S
Zinc chloride	Sat.sol	S	S	-
Zinc sulphate	Sat.sol	S	S	-

This data is based on multiple sources. You are required to carry out the appropriate tests to ensure the suitability and safety of the products for the envisaged use in accordance with all applicable regulations.

MARKING

Pipes and fittings are marked with the following:

- Manufacturer's Logo
- Manufacturer's Trade Name
- Manufacturer's Trademark
- Nominal diameter (DN)
- Angle specification (with elbows and branches)
- Material
- Standard numbers
- Mark of quality
- Machine Number
- Date of manufacture
- EAN Code



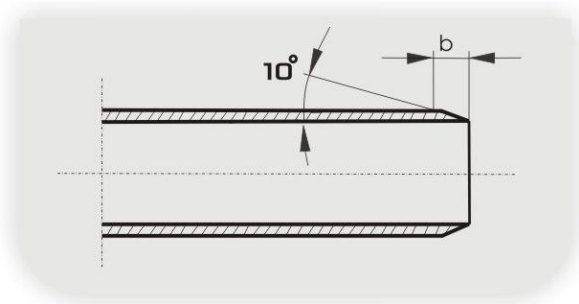
[Figure 6]

ASSEMBLY

▪ SHORTENING AND CHAMFERING THE PIPES

1. Cut the pipe at a 90° angle from the axis with a pipe cutter, a fine-toothed saw or any other parting-off tool. [see figure 8-9]
2. For connections to push-fit socket pipe systems, chamfer the pipe ends with a chamfering tool or a coarse file at an angle under approx. 10° according to the following table: [see also figure 7]

DN / OD	50	75	90	110	125	160	200
b ca mm.	4	4	5	6	6	7	8



[Figure 7]

3. De-burr the outside edges with a knife or a scraper. [see figure 10]



[Figure 8]



[Figure 9]



[Figure 10]

ASSEMBLY

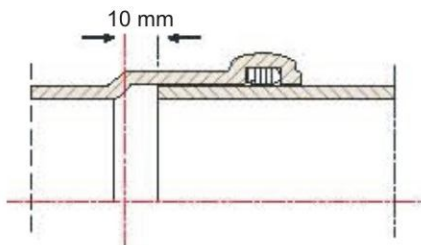
■ CONNECTING THE PIPES WITH THE FITTINGS

1. Clean the ends of both the pipe and the fitting to be connected.
2. Apply a thin layer of lubricant to the ends of the pipe and the fitting. Do not use grease or soft soap.
3. Insert the pipe completely into the fitting until it stops.
4. Mark inserted pipe end in this position at the sleeve edge with a pencil, felt pen etc.
5. Vertically laid pipework: for each additional storey, retract the push-fit connection in the socket by 10 mm. (see figure 11)
6. Horizontally laid pipework: after every 4 m of laid pipe length, retract the push-fit connections between the fittings, they can remain fully inserted.
7. It is not necessary to make changes in length to push-fit connections between fittings, they can remain fully inserted.

Where pipes are vertically arranged, the individual lengths must be fastened with brackets under the socket immediately after installation to avoid sinking. (see figure 15).

Length expansion coefficient:

- **SILENTA PREMIUM** 0,04 mm/m°K



[Figure 11]

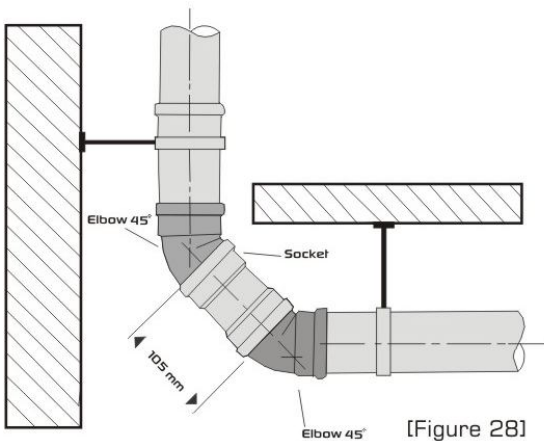
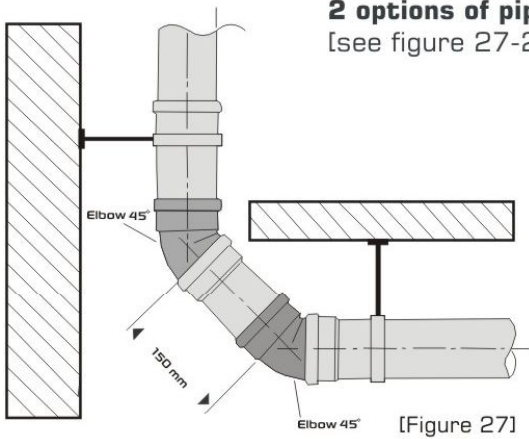
ASSEMBLY

PIPE LAYING

Pipe arrangement has a significant impact on noise reduction as well as the development of sound. Appropriate measures must be taken to reduce flow and impact sounds in areas of directional change.

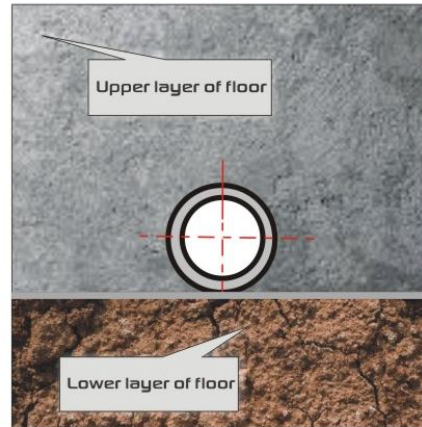
Example: In the case of bending of vertical down-pipes in the intermediate ceiling area. For any 90-degree change of direction where the down pipe enters the horizontal main a steadying section consisting of two 45° bends and a 250 mm long pipe must be used for hydraulic and acoustic reasons. 87.5° bends must not be fitted in the transition area leading from a vertical to a horizontal arrangement.

2 options of pipelaying: [see figure 27-28]



INSTALLING PIPES IN CONCRETE AND BRICKWORK

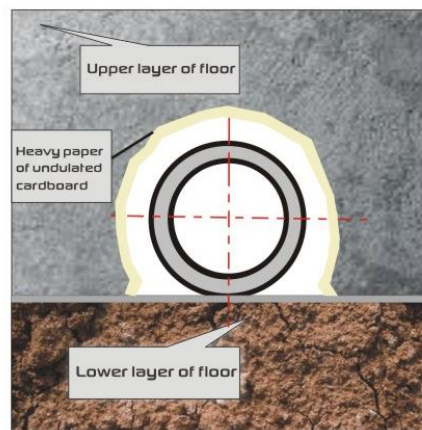
SILENTA pipes and fittings can be set directly into concrete. [See figure 29]



[Figure 29]

The change in pipe length must be taken into account.

In case of high temperature liquid transfers, it is advised to cover the pipes with undulated cardboard in a way to allow expansion. [see figure 30]



[Figure 30]

In order to prevent the concrete mixture from seeping into the socket gap, it should be sealed with adhesive tape. Open piping components must be closed. The piping must be installed in such a manner that it is prevented from moving during the cementing process.

No acoustic bridge for structure-borne sound should be allowed to develop between the piping and the plaster support. In order to prevent this, the pipe can be covered with sound insulation material.

ASSEMBLY

FLOOR TRAP

- This highly functional product completes the existing Hakan Plastik low-noise soil and waste system. With Hakan Plastik, noise inside buildings can be reduced to an absolute minimum.

- GF Hakan Plastik Floor Trap has unique features such as an air tight baffle construction.

- GF Hakan Plastik Floor Trap can be directly applied in a soil and waste system design.

- Important aspects in the designing process were knockout prevention, absorbs/correct installation mistakes, durability and resistance to 'cruel' installation circumstances.

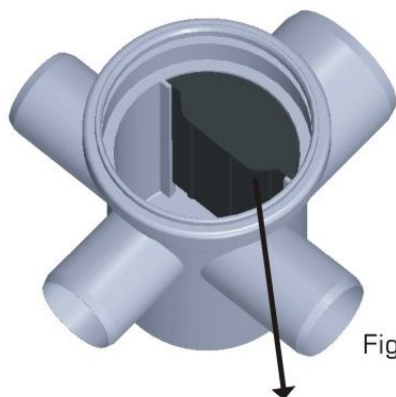


Figure 30-1

Inner separator specification

- Provides a proper water flow and avoids reflux.

- Prevents expansion of bad odors from the installation to the building.

- Avoids wastes to drop into the installation and so prevents clogging.



Figure 30-2

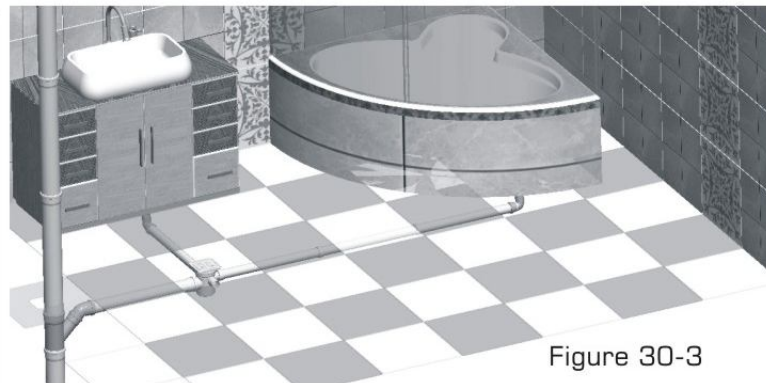


Figure 30-3

Connections and relation between DN

	Number	DN (mm)
Inlets	3	58
Outlet	1	78
Top Inlet	1	110

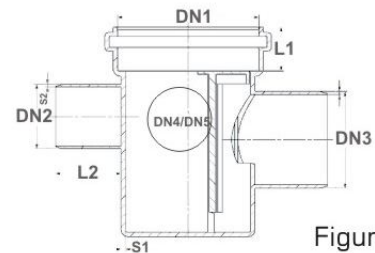


Figure 30-4

Installation

- Before installation all the input and output channels of the floor trap should be checked.

- The channels of the floor trap should be opened by using a metal tool.

- Make sure that the surface where the floor trap will be installed is flat.

- In order to prevent the entrance of solid waste into the installation, a filter must be assembled onto the 110mm output of the floor trap.

- In case not all the inlets are to be used, assembly PP blind cap. These blind caps are easy to mount to the inlets of the floor trap and secure a leakage-free sealing of unused inlet connections.



Figure 30-5

Some Application Areas

- Commercial kitchens, bathroom & toilets, car parks, healthcare facilities, shopping centres, high rise apartments.

ASSEMBLY

■ INSTALLATION OF VENTILATION ELBOW

For the ventilation and the elimination of odors, reduction of moisture and humidity, ventilation fans are used. A correct assembly of ventilation systems is important for successful results.

Allow a 2-3 foot straight run out of the fan before the first elbow. This allows airflow momentum to build before passing through the first elbow. An installation that has a 90° elbow immediately after the fan exhaust port will cause air to flow back into the fan. This will reduce fan performance and increase noise. [see figure 31-32]

ELBOWS



[Figure 31]



[Figure 32]

Use a long radius angle to ensure optimum airflow and minimum airflow noise. The shortest smooth, inner surface duct with the least number of elbows will provide optimum fan performance. [see figure 33-34]

LONG RADIUS ANGLE



[Figure 33]



[Figure 34]

ASSEMBLY

FASTENING WITH CLAMPS

TYPES OF CLAMPS FOR SILENTA PREMIUM

- By using EPDM insulated pipe clamps, it is possible to reduce noise and prevent the abrasions on surface which are caused by the vibrations generated by the fluids flow.[see page 41]

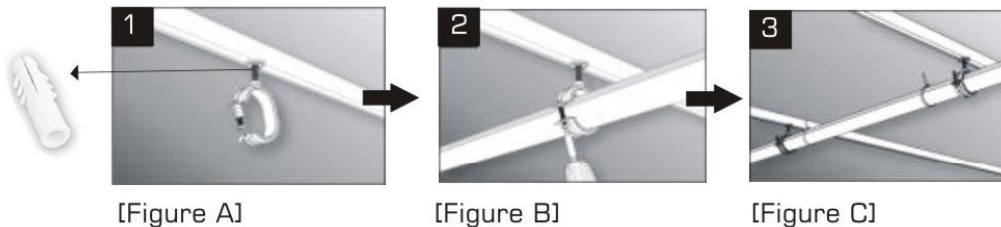
APPLICATION AREAS & FEATURES

- CLAMP WITH SCREW

- It is used as pipe fixing element on horizontal and vertical surfaces.
- It is fixed with nylon plug [see figure A]
- Its screw with cruciform slot provides more easy and practical mounting.[see figure B]
- Drop of screws is prevented by washer on it.
- It is coated with 8- 12 zinc against corrosion.
- With its EPDM insulating rubber it absorbs vibration and accommodates to thermal movements.



Assembly Sequence



[Figure A]

[Figure B]

[Figure C]

- CLAMP WITH NUT

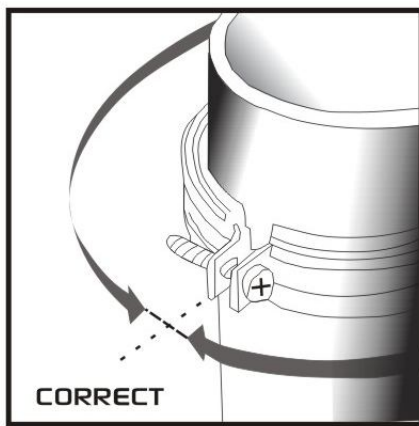
- It is used as pipe fixing element on horizontal and vertical surfaces.
- It is fixed with steel anchor
- Its screw with cruciform slot provides more easy and practical mounting.
- Drop of screws is prevented by washer on it.
- It is coated with 8- 12 zinc against corrosion.
- With its EPDM insulating rubber it absorbs vibration and accommodates to thermal movements.



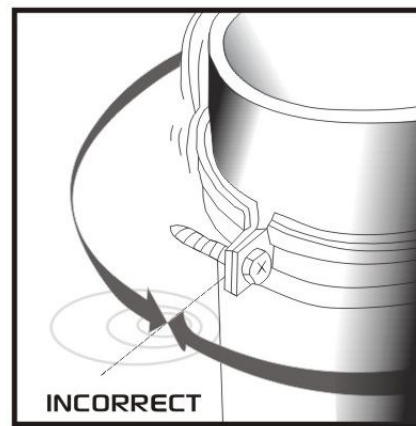
ASSEMBLY

FASTENING WITH CLAMPS

- When mounting a pipe system with a sound insulating steel bracket with rubber insert on the wall, make sure to observe the correct distances when tightening the screws.
- The fixed bracket must not be fully tightened in order to observe the span tolerances and to avoid increased structure-borne noise (see figure 12-13).

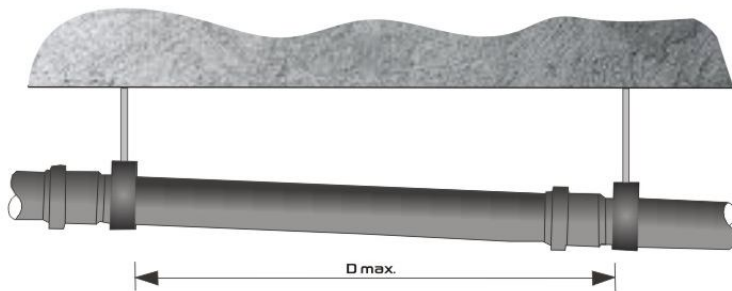


[Figure 12]

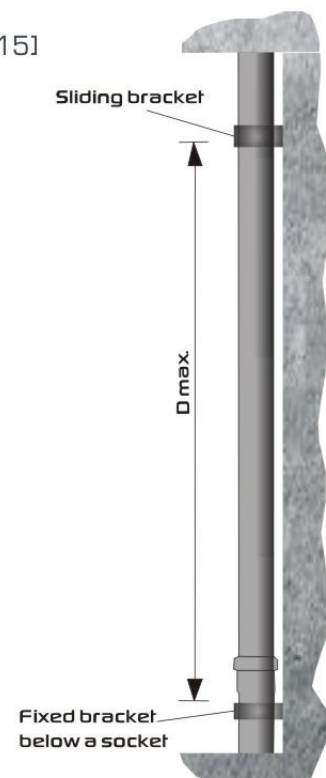


[Figure 13]

- The clamps should be mounted near the points where noise can be generated. For example in proximity of reductions and bends. It is recommended to use vibration-damping rubber-clad steel clips. [see figure 16]
- On principle, 2 brackets are fitted for each storey. [see figure 14-15]
- One fixed and one sliding bracket must be fitted on each storey. [see figure 14-15]



[Figure 14]



[Figure 15]

ASSEMBLY

- The fixed bracket must be positioned below a socket in the lower third of the storey. The bracket has to be tightened to the required extent.
- The sliding bracket must be fitted on the plain pipe in the upper third of the storey as it is intended to allow linear expansion of the pipe due to the changes in the temperature, but prevent lateral yielding.
- Make sure that the sliding bracket only slightly touches the pipe to avoid unnecessary transmission of structure-borne sound into the room that needs to be protected many steel brackets for plastic pipe dimensions DN/OD 110 have a span range from 108 to 114 mm. A fully tightened bracket would press the rubber insert too heavily. consequentially, this strong pressing would give rise to avoidable structure-borne noise transmissions and eventually, the plumbing noise level L_{in} would increase.
- The insertion of spacers between the locking clips can also ensure the expert quality laying of the pipe.

Maximum distance between the brackets:

Nominal outer diameter DN/OD mm	Bracket distance	
	Horizontal pie routing* Dmax. m (max. 15 x da)	Vertical pipe routing* D max. m
40	0,6	1,50
50	0,75	1,50
75	1,10	2,00
90	1,35	2,00
110	1,65	2,00
125	1,85	2,00
160	2,40	2,00
200	3,00	2,00
250	3,00	2,00

In horizontal pipelines the distance between the clamps should be approximately $10 \times D_n$
(ex: $D_n = 110\text{mm}$ Clamp distance: $10 \times 110\text{mm} = 1.100\text{mm}$)

In vertical pipelines the distance between the clamps should not exceed 1-1,5 meters.

ASSEMBLY

■ FIRE PROTECTION

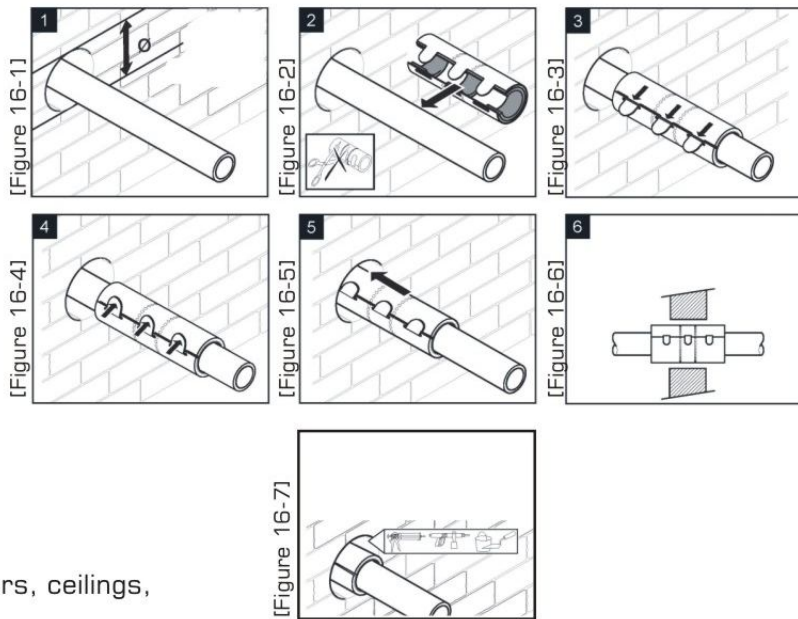
During the assembly of SILENTA pipes it is recommended to use one of the below fire retarding products in wall and floor transitions in order to ensure a good fire protection. In case of fire, these items prevent the propagation of flames between the floors and the adjacent doors. Their assembly is fast and easy and does not require the use of any extra equipment.

Fire, Smoke and Noise Barrier



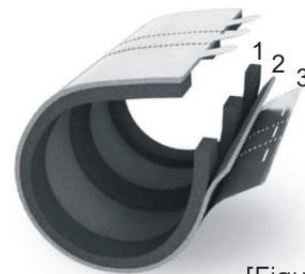
[Figure 16]

Installation



[Figure 16-7]

The composition



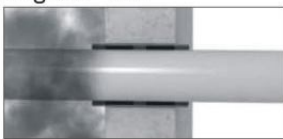
[Figure 17]

- 1-Foam Tape**
- 2-Fire-Resistant Layer**
- 3-Stainless Steel Sleeve**

Features & Benefits

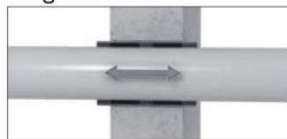
- Is easily and simply installed.
- Is suitable for apertures through floors, ceilings, solid walls and stud walls.
- Is maintenance-free and unaffected by moisture or any other building chemicals in common use.
- Does not affect the duct or any other construction components guaranteed to remain operational for decades.
- Permits shrinkage and expansion or sideways movement of the ducting
- Does not contain any asbestos or other dangerous substances
- Does not emit any toxic fumes or develop any smoke worth mentioning in the event of fire
- Limits operational noise transmission between pipe and wall or ceiling

[Figure 18]



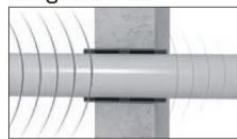
Smoke protection

[Figure 19]



Free expansion-contraction

[Figure 20]



The transmission of noise reduction

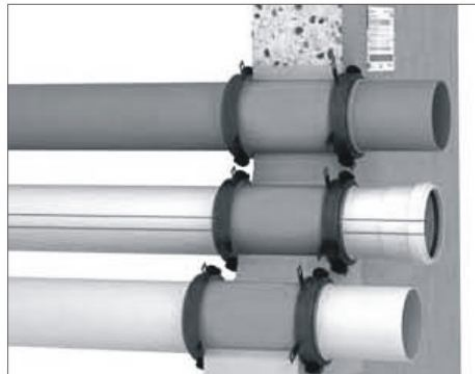
ASSEMBLY

▪ FIRE PROTECTION

Fire Retarding Cuff



[Figure 21]



[Figure 22]

Features & Benefits

- If installed properly, stuck on both side of the wall, the cuffs will not allow smoke or flames to pass from a room to another.
- The cuffs can be used with any plastic pipeline applications that require fire protection on walls and ceilings according to DIN 4102-11 and EN1363-3.
- Thanks to their small size they can be installed directly under the ceiling.
- For fire protection the installation must be done on both sides of the wall.
- Suitable to use in wet rooms.
- It can be used with waste water pipes for up to 200mm diameter.

Fire Protection Stripe



[Figure 23]

Features & Benefits

- The nature of its work is based on the coverage of the surface of the pipes then the protective shield will protect it from heat and flame.
- It can be used with Plastic pipes and pipe applications that require fire protection on the walls and ceilings according to DIN 4102-11 and EN1363-3.
- It can be applied on any material without the need of any extra tools or can be installed with glued tape.
- One roll is sufficient for many applications.



[Figure 24]



[Figure 25]



[Figure 26]

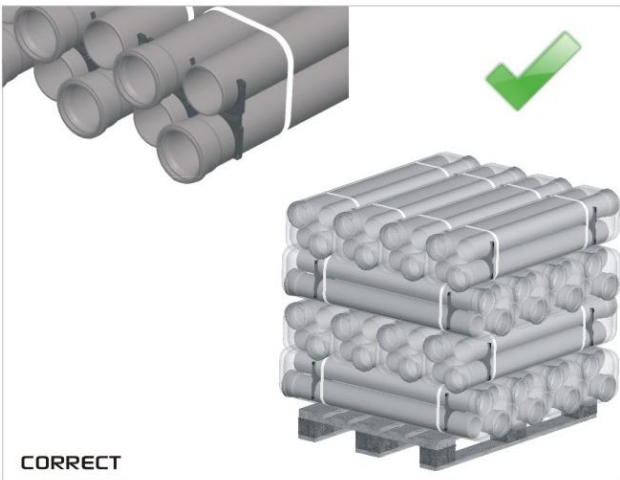


PACKAGING - STORAGE - TRANSPORT

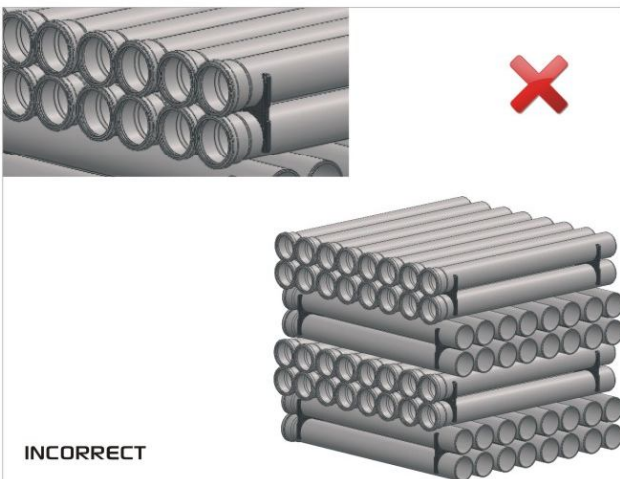
PACKAGING

SILENTA pipes and fittings are packed ready for transport in a customer friendly way. The packing guarantees optimal security, efficient storage and easy handling.

Pipes with sockets are placed in a way that the socketed parts will not overlap and rest on top of each other.



[Figure 35]



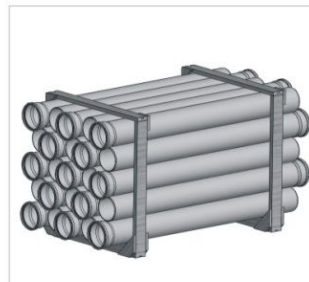
[Figure 36]

Pipes are packed with plastic clamps to hold the pipes together and are covered with plastic film to keep the products away from dust and dirt.



[Figure 37]

SILENTA pipes are provided with wooden frames or pallets depending on the customers' needs.



[Figure 38]



[Figure 39]

Short lengths of 150, 250 and 500 mm as well as fittings are packed in cartons.



[Figure 40]

All Silenta products are identified by a barcode stickers. The barcode system prevents confusions or errors while manipulating, stocking and loading the products.



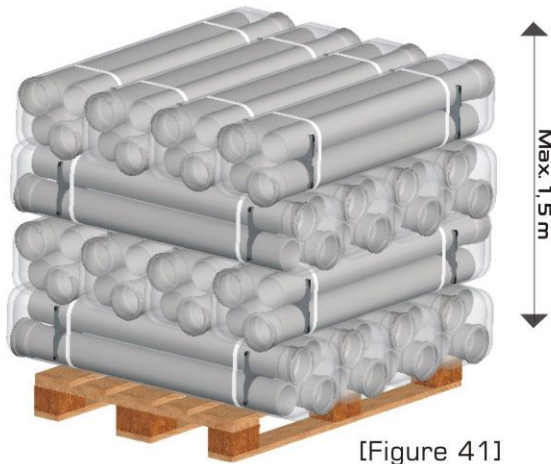
[Figure 40-11]

During storage and transport of products, the barcode informations should be checked.

PACKAGING - STORAGE - TRANSPORT

STORAGE

The manner of storage must not cause permanent sagging or damage to the pipes. If well stored, no lasting deformations or damage to pipes and fittings will occur. The stack should never be higher than 1.5 m. Pipe stacks must be secured against rolling apart.



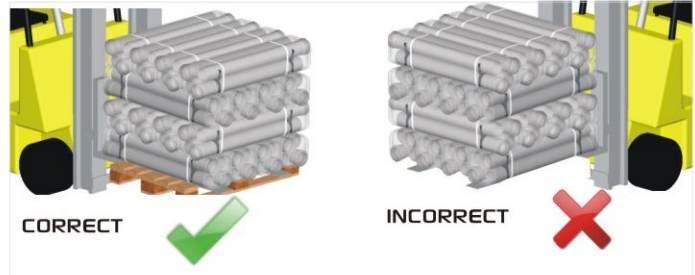
[Figure 41]

Carton-packed pipes and fitting must be protected from moisture.

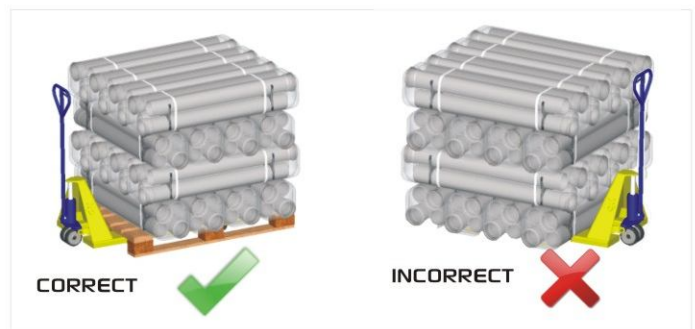


[Figure 42]

Factory bundled pipes can be stacked with wooden frames. To avoid any damage on socket parts of the pipes that are placed at the bottom of the stack for long time, suitable material such as pallets, etc. must be placed on the ground. This ensures that the pipes and the socket parts do not come into contact with the ground. It also provides ease and excellence while moving the pipes from the floor through forklifts, etc.



[Figure 43]



[Figure 44]

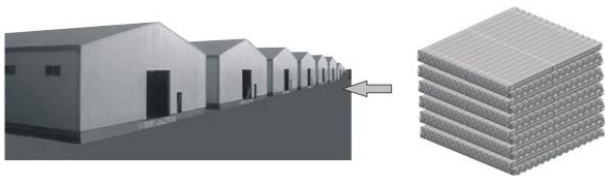


PACKAGING - STORAGE - TRANSPORT

OUTDOOR EXPOSURE

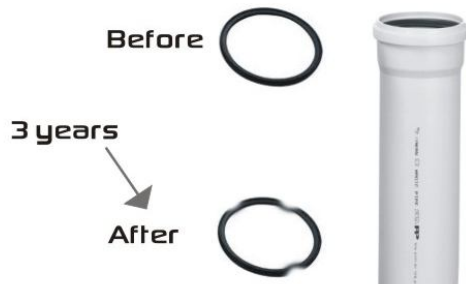
SILENTA PREMIUM pipe systems are designed to withstand outdoor storage for max. 2 years.

Longer outdoor storage periods and intense insolation might lead to discoloration which, however, is only an optical defect and in no way influences the quality of the pipe system. When laying pipes outside buildings (e. g., rain water downpipes) they must be protected from mechanical impact.



[Figure 45]

The sealing material is designed to withstand outdoor storage for three years, after this time the seals must be replaced. This only applied to seals which are directly exposed to weathering when inserted (spigot end sleeves), their service life equals that of seals installed inside a building.



[Figure 46]

LOADING, UNLOADING AND TRANSPORTING

Products are to be carried out with appropriate care. Pay attention not to damage the pipes. Avoid sudden and abrupt stresses on pipes and fittings, especially with temperatures in the frost range.

Do not drop pipes or slide them over the ground. The loading and downloading of the pipes, packed as a block, should be done using forklifts equipped with flat prongs or extensions.



[Figure 47]

It is recommended to avoid contact between metal straps, hooks or chains. Furthermore, make sure that the pipes are not pulled over sharp edges (e.g. Tailgate).



[Figure 48]





TECHNICAL DRAWINGS & DIMENSIONS



■ SILENTA PREMIUM WITH SINGLE SOCKET PIPE

CODES	DIAMETER (mm)	LB (mm)	DN1 (mm)	DN2 (mm)	S (Thick/mm)	L (mm)	PACKING (PCS)
4401005800121	58	150	58	59	4	51,5	70
4401005800221	58	250	58	59	4	51,5	50
4401007801321	58	500	58	59	4	51,5	30
4401005800421	58	1000	58	59	4	51,5	8
4401005800521	58	2000	58	59	4	51,5	8
4401005800621	58	3000	58	59	4	51,5	8
4401007801021	78	150	78	79	4,5	53,5	40
4401007801121	78	250	78	79	4,5	53,5	30
4401007801221	78	500	78	79	4,5	53,5	30
4401007801321	78	1000	78	79	4,5	53,5	6
4401007801421	78	2000	78	79	4,5	53,5	6
4401007801521	78	3000	78	79	4,5	53,5	6
4401009002221	90	500	90	91	5	60	16
4401009002321	90	1000	90	91	5	60	5
4401009002421	90	3000	90	91	5	60	5
4401011003021	110	150	110	111	5,3	57,5	22
4401011003121	110	250	110	111	5,3	57,5	15
4401011003221	110	500	110	111	5,3	57,5	9
4401011003321	110	1000	110	111	5,3	57,5	4
4401011003421	110	2000	110	111	5,3	57,5	4
4401011003521	110	3000	110	111	5,3	57,5	4
4401013504021	135	150	135	136	5,3	60,5	15
4401013504121	135	250	135	136	5,3	60,5	10
4401013504221	135	500	135	136	5,3	60,5	6
4401013504321	135	1000	135	136	5,3	60,5	4
4401013504421	135	2000	135	136	5,3	60,5	4
4401013504521	135	3000	135	136	5,3	60,5	4
4401016005021	160	150	160	161	5,3	70	8
4401016005121	160	250	160	161	5,3	70	6
4401016005221	160	500	160	161	5,3	70	4
4401016005321	160	1000	160	161	5,3	70	4
4401016005421	160	2000	160	161	5,3	70	4
4401016005521	160	3000	160	161	5,3	70	4
4401020006021	200	500	200	201	6,2	87	4
4401020006121	200	1000	200	201	6,2	87	4
4401020006221	200	2000	200	201	6,2	87	4
4401020006321	200	3000	200	201	6,2	87	4

GENERAL INFORMATION & ADVANTAGES

WORLDWIDE QUALITY ASSURANCE APPROVALS

FIELDS OF APPLICATION

TECHNICAL PROPERTIES

SOUND INSULATION PERFORMANCE

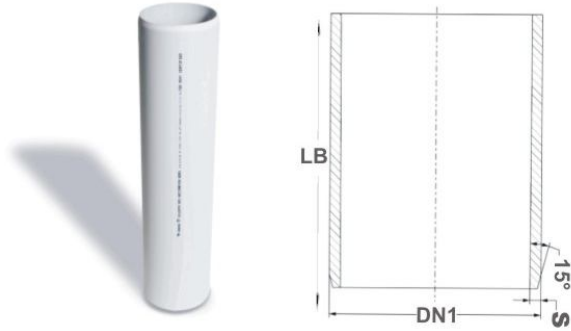
CHEMICAL RESISTANCE

ASSEMBLY

PACKAGING - STORAGE TRANSPORT

TECHNICAL DRAWINGS & DIMENSIONS

TECHNICAL DRAWINGS & DIMENSIONS



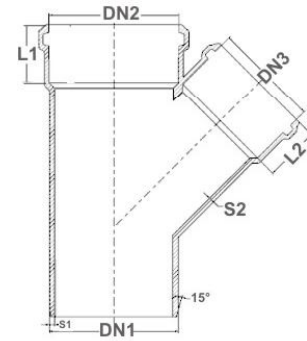
- SILENTA PREMIUM WITHOUT SOCKET PIPE

CODES	DIAMETER (mm)	LB (mm)	DN1 (mm)	S (Thick/mm)	PACKING (PCS)
4401005810621	58	3000	58	4	8
4401005810821	58	5000	58	4	8
4401007811521	78	3000	78	4,5	6
4401007811721	78	5000	78	4,5	6
4401009003021	90	500	90	5	1
4401009003121	90	1000	90	5	10
4401009002521	90	3000	90	5	1
4401011013521	110	3000	110	5,3	4
4401011013721	110	5000	110	5,3	4
4401013514521	135	3000	135	4,5	4
4401013514721	135	5000	135	4,5	4
4401016015521	160	3000	160	5,3	4
4401016015721	160	5000	160	5,3	4
4401020016021	200	500	200	6,2	4
4401020016121	200	1000	200	6,2	1
4401020016221	200	2000	200	6,2	1
4401020016421	200	2500	200	6,2	1
4401020016321	200	3000	200	6,2	1



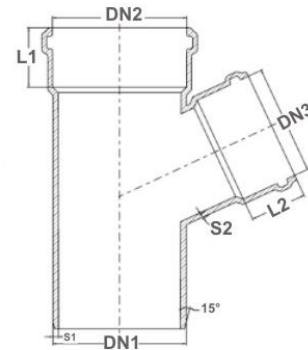
TECHNICAL DRAWINGS & DIMENSIONS

■ SILENTA PREMIUM SINGLE BRANCH (45°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501205800121	58x58	58	59	59	4	4	51,5	51,5	50
4501207800221	78x58	78	79	59	4,5	4	53,5	51,5	30
4501207800321	78x78	78	79	79	4,5	4,5	53,5	53,5	25
4501209000121	90x58	90	91	59	5	4	55	51,5	*
4501209000321	90x90	90	91	91	5	5	55	55	*
4501211000421	110x58	110	111	59	5,3	4	57,5	51,5	20
4501211000521	110x78	110	111	79	5,3	4,5	57,5	53,5	15
4501211000621	110x110	110	111	111	5,3	5,3	57,5	57,5	10
4501213500721	135x78	135	136	79	5,3	4,5	60,5	53,5	10
4501213500821	135x110	135	136	111	5,3	5,3	60,5	57,5	8
4501213500921	135x135	135	136	136	5,3	5,3	60,5	60,5	6
4501216000921	160x58	160	161	59	5,3	5,3	70	51,5	*
4501216001021	160x110	160	161	111	5,3	5,3	70	57,5	5
4501216001121	160x135	160	161	136	5,3	5,3	70	60,5	4
4501216001221	160x160	160	161	161	5,3	5,3	70	70	4
4501220001321	200x58	200	201	59	6,2	4	87	51,5	2
4501220001421	200x110	200	201	111	6,2	5,3	87	57,5	2
4501220001521	200x135	200	201	136	6,2	5,3	87	60,5	2
4501220001621	200x160	200	201	161	6,2	5,3	87	70	2
4501220001721	200x200	200	201	201	6,2	6,2	87	87	3

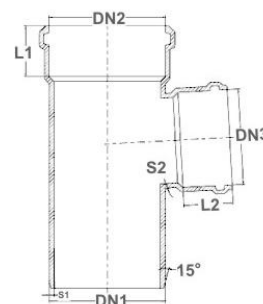
■ SILENTA PREMIUM SINGLE BRANCH (67°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501205806021	58x58	58	59	59	4	4	51,5	51,5	*
4501207805021	78x58	78	79	59	4,5	4	53,5	51,5	*
4501207805521	78x78	78	79	79	4,5	4,5	53,5	53,5	*
4501211001021	110x58	110	111	59	5,3	4	57,5	51,5	*
4501211001121	110x78	110	111	79	5,3	4,5	57,5	53,5	*
4501211000721	110x110	110	111	111	5,3	5,3	57,5	57,5	12

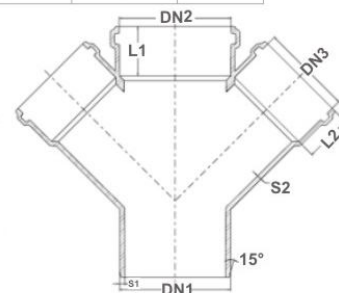
TECHNICAL DRAWINGS & DIMENSIONS

▪ SILENTA PREMIUM SINGLE BRANCH (87°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501205806021	58x58	58	59	59	4	4	51,5	51,5	60
4501207806121	78x58	78	79	59	4,5	4	53,5	51,5	40
4501207806221	78x78	78	79	79	4,5	4,5	53,5	53,5	30
4501209006121	90x58	90	91	59	5	4	55	51,5	*
4501209006221	90x78	90	91	79	5	4,5	55	53,5	*
4501209006321	90x90	90	91	91	5	5	55	55	*
4501211006321	110x58	110	111	59	5,3	4	57,5	51,5	25
4501211006421	110x78	110	111	79	5,3	4,5	57,5	53,5	20
4501211006521	110x110	110	111	111	5,3	5,3	57,5	57,5	15
4501213506621	135x110	135	136	111	5,3	5,3	60,5	57,5	10
4501213506721	135x135	135	136	136	5,3	5,3	60,5	60,5	8
4501216006821	160x110	160	161	111	5,3	5,3	70	57,5	3
4501216007021	160x135	160	161	136	5,3	5,3	70	60,5	3
4501216006922	160x160	160	161	161	5,3	5,3	70	70	2
4501220002021	200x110	200	201	111	6,2	5,3	87	57,5	3
4501220002321	200x135	200	201	136	6,2	5,3	87	60,5	3
4501220002421	200x160	200	201	161	6,2	5,3	87	70	1
4501220002521	200x200	200	201	201	6,2	6,2	87	87	1

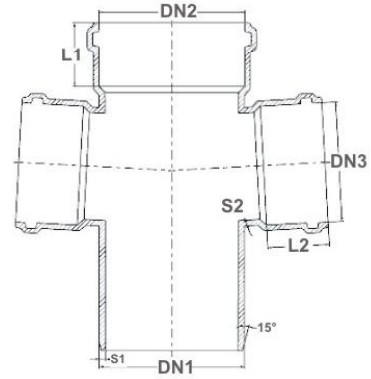
▪ SILENTA PREMIUM DOUBLE BRANCH (45°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501907830621	78x78	78	79	79	4,5	4,5	53,5	53,5	15
4501211004021	110x78	110	111	79	5,3	4,5	57,5	53,5	6
4501211004121	110x110	110	111	111	5,3	5,3	57,5	57,5	8
4501213504121	135x78	135	136	79	5,3	4,5	60,5	53,5	8
4501213504221	135x110	135	136	111	5,3	5,3	60,5	57,5	6
4501216004321	160x110	160	161	111	5,3	5,3	70	57,5	3
4501216004421	160x160	160	161	161	5,3	5,3	70	70	2
4501220001821	200x110	200	201	111	6,2	5,3	87	57,5	1
4501220004221	200x135	200	201	136	6,2	5,3	87	60,5	1
4501220004321	200x160	200	201	161	6,2	5,3	87	70	1
4501220004421	200x200	200	201	201	6,2	6,2	87	87	1

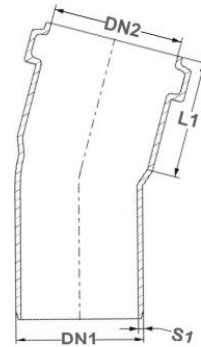
TECHNICAL DRAWINGS & DIMENSIONS

■ SILENTA PREMIUM DOUBLE BRANCH (87°)



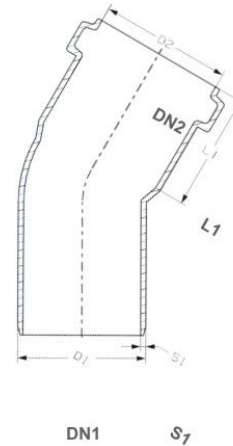
CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501205806121	58x58x58	58	59	59	4	4	51,5	51,5	10
4501209007021	90x90x90	90	91	91	5	4,5	55	55	*
4501207806321	78x78x78	78	79	79	4,5	4,5	53,5	53,5	10
4501211007021	110x110x110	110	111	111	5,3	5,3	57,5	57,5	10

■ SILENTA PREMIUM ELBOW (15°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501105800321	58	58	59	4	51,5	*
4501107800121	78	78	79	4,5	53,5	*
4501109000121	90	90	91	5	55	*
4501111000521	110	110	111	5,3	57,5	30
4501113500821	135	135	136	5,3	60,5	*
4501116001021	160	160	161	5,3	70	*

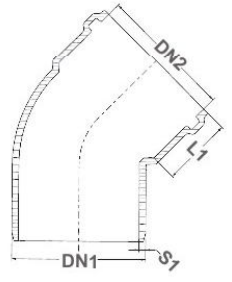
■ SILENTA PREMIUM ELBOW (30°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501105800421	58	58	59	4	51,5	*
4501107800221	78	78	79	4,5	53,5	*
4501109000221	90	90	91	5	55	*
4501111000621	110	110	111	5,3	57,5	30
4501113500921	135	135	136	5,3	60,5	*
4501116001121	160	160	161	5,3	70	*

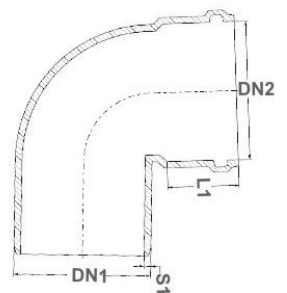
TECHNICAL DRAWINGS & DIMENSIONS

■ SILENTA PREMIUM ELBOW (45°)



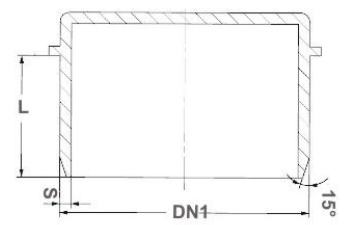
CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501105800121	58	58	59	4	51,5	100
4501107800321	78	78	79	4,5	53,5	60
4501109000321	90	90	91	5	55	*
4501111000721	110	110	111	5,3	57,5	25
4501113501021	135	135	136	5,3	60,5	15
4501116001221	160	160	161	5,3	70	10
4501120001421	200	200	201	6,2	87	4

■ SILENTA PREMIUM ELBOW (87°)



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501105800221	58	58	59	4	51,5	100
4501107800421	78	78	79	4,5	53,5	50
4501109000421	90	90	91	5	55	*
4501111000921	110	110	111	5,3	57,5	20
4501113501121	135	135	136	5,3	60,5	10
4501116001321	160	160	161	5,3	70	8
4501120001521	200	200	201	6,2	87	4

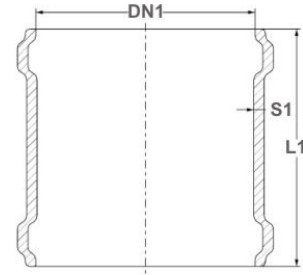
■ SILENTA PREMIUM BLIND CAP



CODES	DIAMETER (mm)	DN1 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501905800121	58	58	4	47,5	250
4501907800221	78	78	4,5	52	150
4501909000321	90	91	5	55	*
4501911000321	110	110	5,3	54	75
4501913500421	135	135	5,3	58	50
4501916000521	160	160	5,3	65	30

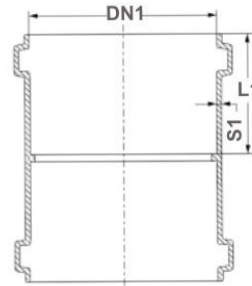
TECHNICAL DRAWINGS & DIMENSIONS

▪ SILENTA PREMIUM SOCKET



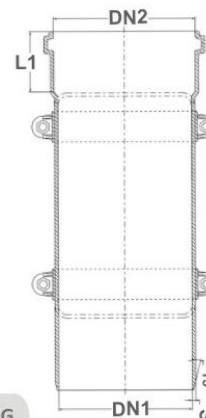
CODES	DIAMETER (mm)	DN1 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501505803021	58	59	4	105	125
4501507803121	78	79	4,5	110	75
4501509003121	90	91	5	115	*
4501511003221	110	111	5,3	120	40
4501513503321	135	136	5,3	130	20
4501516003421	160	161	5,3	145	15
4501520003521	200	201	6,2	205	6

▪ SILENTA PREMIUM SLEEVE SOCKET



CODES	DIAMETER (mm)	DN1 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501505804021	58	59	4	51,5	125
4501507804121	78	79	4,5	53,5	75
4501511004221	110	111	5,3	57,5	40
4501513504521	135	136	5,3	60,5	20
4501516004321	160	161	5,3	70	15
4501520004421	200	201	6,2	87	6

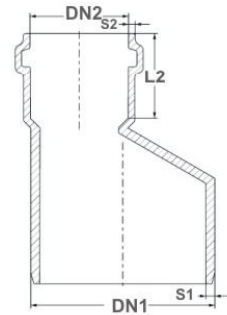
▪ SILENTA PREMIUM CLEAN OUT



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501305800422	58	58	59	4	51,5	50
4501307800522	78	78	79	4,5	53,5	25
4501309000121	90	90	79	4,5	53,5	25
4501311000121	110	110	111	5,3	57,5	10
4501313500221	135	135	136	5,3	60,5	7
4501316000321	160	160	161	5,3	70	5
4501320000621	200	200	201	5,3	72	1

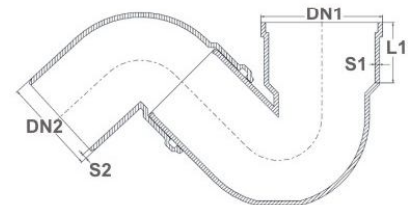
TECHNICAL DRAWINGS & DIMENSIONS

■ SILENTA PREMIUM REDUCER



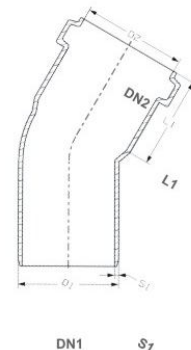
CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L2 (mm)	PACKING (PCS)
4501405802322	58x40	58	41,3	2	1,7	45,90	150
4501405800121	58x50	58	51	4	4	51,5	150
4501407802422	78x50	78	51	4,5	2	46	150
4501407800221	78x58	78	59	4	4,5	53,5	100
4501407800321	78x75	78	76,8	2,6	2,6	50,6	50
4501409000121	90x58	90	59	4	4,5	55	50
4501409000221	90x78	90	79	4,5	5	55	50
4501411000421	110x58	110	59	4	5,3	57,5	50
4501411000521	110x78	110	79	4,5	5,3	57,5	50
4501411000521	110x90	110	91	5	5,3	57,5	*
4501413500621	135x110	135	111	5,3	5,3	60,5	25
4501413500721	135x125	135	126	2,7	2,9	64,3	20
4501416000821	160x110	160	111	5,3	5,3	70	20
4501416000921	160x135	160	136	5,3	5,3	70	15
4501420001021	200x110	200	111	6,2	5,3	87	8
4501420001121	200x160	200	161	5,3	6,2	87	10

■ SILENTA PREMIUM "S" SIPHON 45°-87°



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501611000121	110x45°	140	110	5,3	5,3	70	10
4501611000221	110x87°	140	110	5,3	5,3	70	9

■ SILENTA PREMIUM ELBOW (67°)

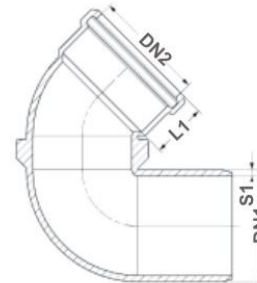


CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501105800521	58	58	59	4	51,5	*
4501107800521	78	78	79	4,5	53,5	*
4501111000821	110	110	111	5,3	57,5	25



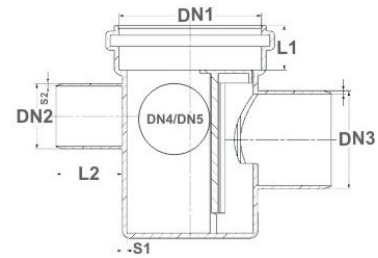
TECHNICAL DRAWINGS & DIMENSIONS

■ SILENTA PREMIUM VENTILATION ELBOW



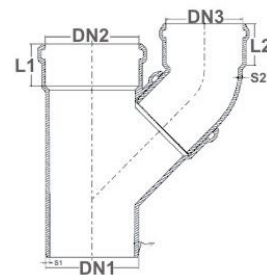
CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1 (Thick/mm)	L1 (mm)	PACKING (PCS)
4501111010022	110x135	110	111	5,3	57,3	20

■ SILENTA PREMIUM FLOOR TRAP



CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	DN4 (mm)	DN5 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501911030322	110x78x58	110	58	78	58	58	5,3	4	57,3	51,5	12

■ SILENTA PREMIUM SINGLE PARALLEL BRANCH

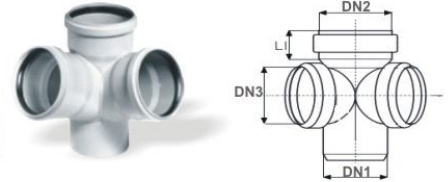


CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1 (Thick/mm)	S2 (Thick/mm)	L1 (mm)	L2 (mm)	PACKING (PCS)
4501211010122	110x110x110	110	111	111	5,3	5,3	57,5	57,5	12

TECHNICAL DRAWINGS & DIMENSIONS

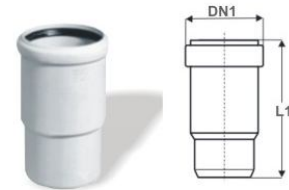
■ SILENTA PREMIUM DOUBLE CORNER BRANCH (87°)

CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	DN3 (mm)	S1(Thick) (mm)	L1 (mm)	PACKING (PCS)
4501211007121	110x110x110	110	111	111	5,3	57,5	*



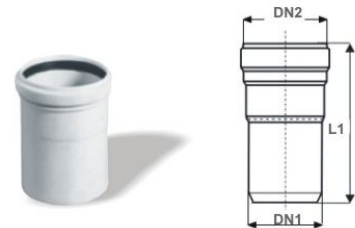
■ SILENTA PREMIUM LONG SOCKET

CODES	DIAMETER (mm)	DN1 (mm)	S1(Thick) (mm)	L1 (mm)	PACKING (PCS)
4501911001221	110	110	5,3	196	*



■ SILENTA PREMIUM ADAPTER

CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1(Thick) (mm)	L1 (mm)	PACKING (PCS)
4501905801021	58	58	51	4	50	*
4501907801021	78	78	76	4,5	59	*
4501913501021	135	135	126	5,3	95	*



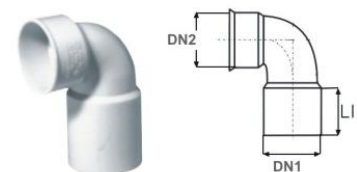
■ SILENTA PREMIUM LONG ELBOW (45°)

CODES	DIAMETER (mm)	DN1 (mm)	S1(Thick) (mm)	L1 (mm)	PACKING (PCS)
4501111001321	110	110	5,3	250	*



■ SILENTA PREMIUM SIPHON ELBOW (87°)

CODES	DIAMETER (mm)	DN1 (mm)	DN2 (mm)	S1(Thick) (mm)	L1 (mm)	PACKING (PCS)
4501105830621	58x40	58	50	2	56	150





TECHNICAL DRAWINGS & DIMENSIONS

■ FIRE, SMOKE AND NOISE BARRIER



CODES	DIAMETER (mm)	PACKING (PCS)
4501905820282	58	*
4501907826182	78	*
4501909026182	90	*
4501911026182	110	*
4501913526182	135	*
4501916026182	160	*

■ SAFETY CLAMP (LIPPER)



CODES	DIAMETER (mm)	PACKING (PCS)
4501905820382	58	*
4501907826282	78	*
4501909026282	90	*
4501911026282	110	*
4501913526282	135	*
4501916026282	160	*

■ FIRE RETARDING CUFF



CODES	DIAMETER (mm)	PACKING (PCS)
4501905820182	58	*
4501907826082	78	*
4501909026082	90	*
4501911026082	110	*
4501913526082	135	*
4501916026082	160	*

■ SAFETY CLAMP (FLAT)



CODES	DIAMETER (mm)	PACKING (PCS)
4501905820482	58	*
4501907826482	78	*
4501909026482	90	*
4501911026482	110	*
4501913526482	135	*
4501916026482	160	*

■ FIRE PROTECTION STRIPE



CODES	PACKING (PCS)
4501900000182	1

■ CONNECTION CLAMP



CODES	DIAMETER (mm)	PACKING (PCS)
4501905820582	58	*
4501907826582	78	*
4501909026582	90	*
4501911026582	110	*
4501913526582	135	*
4501916026582	160	*

GENERAL INFORMATION & ADVANTAGES

WORLDWIDE QUALITY ASSURANCE APPROVALS

FIELDS OF APPLICATION

TECHNICAL PROPERTIES

SOUND INSULATION PERFORMANCE

CHEMICAL RESISTANCE

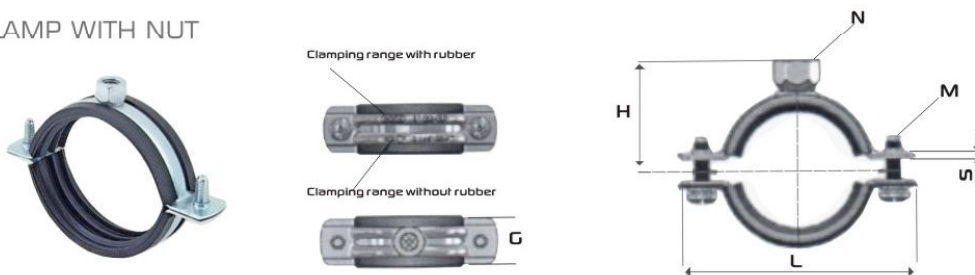
ASSEMBLY

PACKAGING - STORAGE TRANSPORT

TECHNICAL DRAWINGS & DIMENSIONS

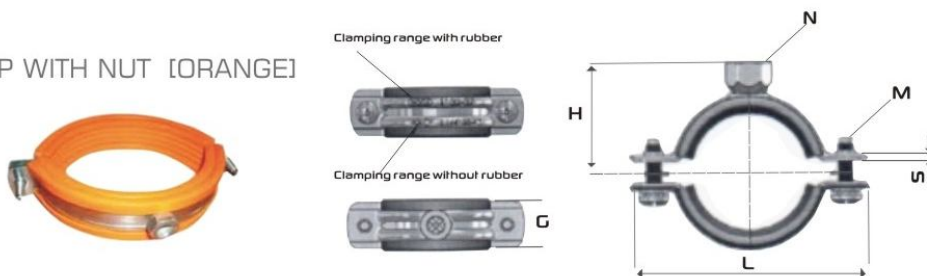
TECHNICAL DRAWINGS & DIMENSIONS

■ SILENTA PREMIUM CLAMP WITH NUT



CODES	SIZE (Inch)	CLAMMING RANGE (mm)	L (mm)	H (mm)	M	SxG Iron Seet	N
							Suspension Nut
4501905820082	2"	59-66	112	49	M5	1.2x20	M8
4501907820182	2 1/2"	74-81	134	60	M6	1.5x25	M10
4501911020282	4"	107-117	170	78	M6	1.5x25	M10
4501913520382	5"	133-143	197	91	M6	2x25	M10
4501916020482	6"	156-168	222	100,5	M6	2x25	M10
4501925020582	7"	191-203	257	121	M6	2x25	M12

■ SILENTA PREMIUM CLAMP WITH NUT [ORANGE]



CODES	SIZE (Inch)	CLAMMING RANGE (mm)	L (mm)	H (mm)	M	SxG Iron Seet	N
							Suspension Nut
4501905821082	2"	59-66	112	49	M5	1.2x20	M8
4501907821182	2 1/2"	74-81	134	60	M6	1.5x25	M10
4501911021282	4"	107-117	170	78	M6	1.5x25	M10
4501913521382	5"	133-143	197	91	M6	2x25	M10
4501916021482	6"	156-168	222	100,5	M6	2x25	M10
4501920021582	7"	191-203	257	121	M6	2x25	M12

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