



## 1.1 STANDARD and RIXc multilayer pipe

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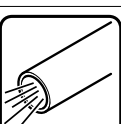


## 1.2 SYNTHETIC PIPES

HENCO 5L PE-Xc	36
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## 1.1 HENCO STANDARD and RIXc multilayer pipe

The HENCO STANDARD and RIXc multilayer pipe is a multi-purpose pipe

	<b>Drinking water</b>	As drinking water pipes for both hot and cold water and for all possible types of drinking water quality (In accordance with European standard 98/83/EC).
	<b>Heating</b>	As a heating pipe within the specified KOMO load values.
	<b>Underfloor heating</b>	For heating and cooling floors, walls and ceilings.
	<b>Cooled water</b>	Suitable for cooling applications and ice water applications.
	<b>Rainwater</b>	As a rainwater pipe for reusing water inside buildings within the specified load values.
	<b>Gas</b>	As a gas pipe in countries where the the system has been tested and where a certificate is available.
	<b>Compressed air</b>	As compressed air piping in oil-free installations (with activated oil filter).
	<b>Heating oil</b>	As heating oil piping within the specified load values.
	<b>Other applications</b>	On request and subject to written consent from HENCO.





# 1 PIPES

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## Composition of the HENCO STANDARD and RIXc multilayer pipe (PE-Xc/AL/PE-Xc)

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The HENCO multilayer pipe consists of a continuous butt-welded aluminium pipe with an inner and outer 4 layer made from polyethylene that has been cross-linked using electron beams. The different layers are bonded to each other by a high quality connecting layer.

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This results in the HENCO multilayer pipe: a pipe that combines all of the advantages of synthetic materials and metal pipes.

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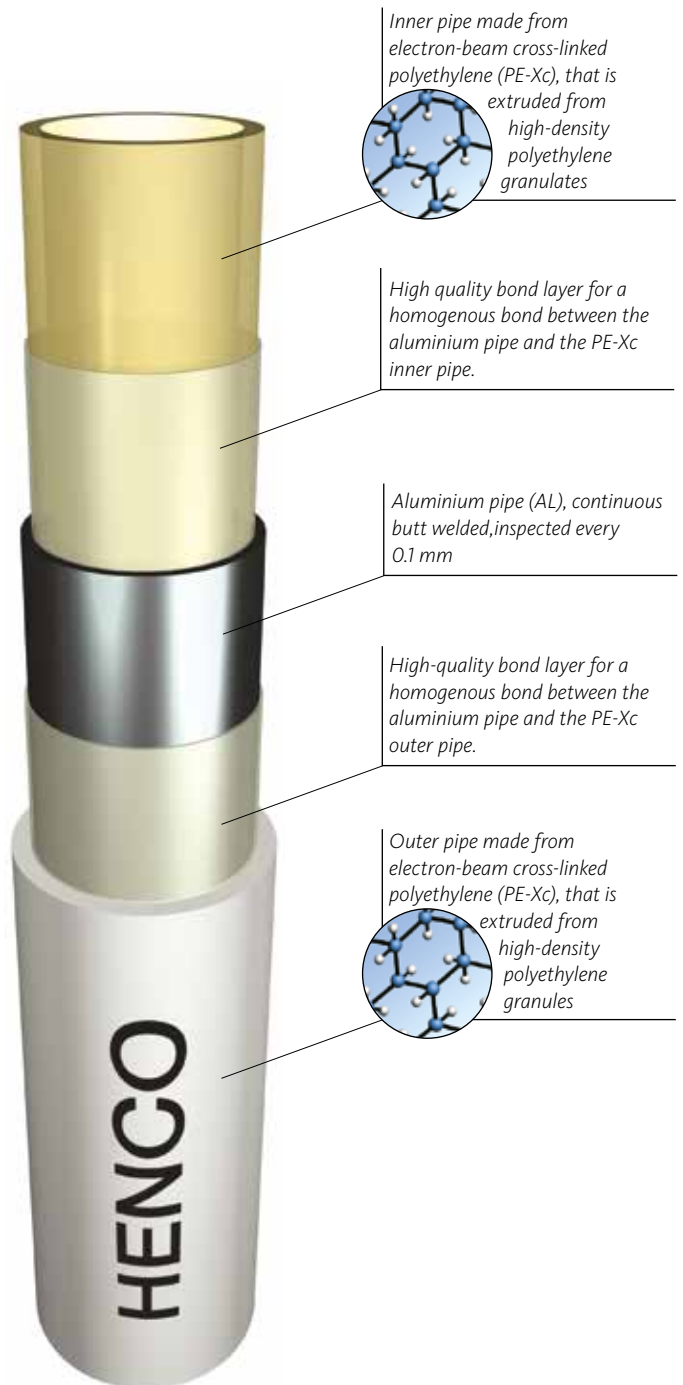
The inner and outer pipe are made from polyethylene (HDPE) granulates which have been cross-linked using electron beams. Cross-linking multiplies the natural qualities of the polyethylene many times over. This improves the pressure and temperature resistance of the pipe. The pipe meets the most stringent requirements for drinking water installations, and is even resistant to aggressive substances.

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The aluminium pipe guarantees that the pipe stays oxygen-tight and retains its shape. The butt welds along the length of the aluminium pipe ensure that the aluminium retains a consistent thickness. Consequently, the cross-linked outer layer that is applied with the connecting layer to the aluminium pipe by means of the bond layer will also have the same thickness. This also offers advantages when pressing, as it means that the press loads are perfectly distributed. Depending on the diameter of the pipe, the thickness of the aluminium layer is calculated in such a way that the pipe always retains the greatest flexibility and resistance to pressure.

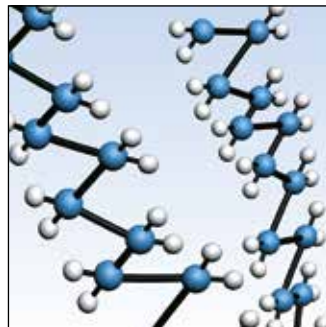




## Inner and outer pipes made from PE-Xc with guaranteed quality

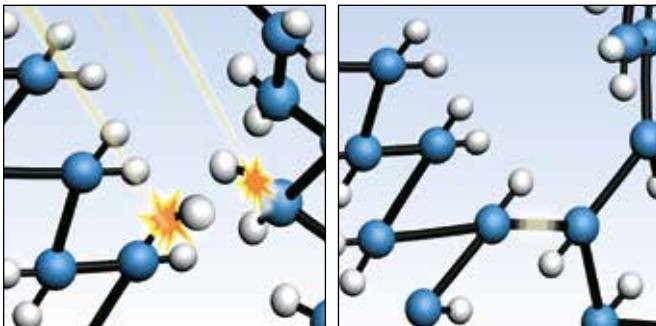
HENCO produces multilayer pipes which have both an inner and outer pipe consisting of PE-Xc, electron-beam cross-linked polyethylene.

- PE** stands for **polyethylene**
- X** stands for **cross-linking**
- c** stands for **cross-linking by means of electron beams**, in other words the process in which the polyethylene is cross-linked



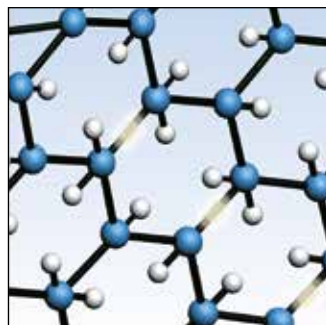
Structure of high-density polyethylene

Polyethylene is a plastic that consists of various chains of molecules. These chains are not directly connected to each other. The basic structure is kept together by weak mutual forces between the molecules. When heated, the chains move further away from each other. This makes the material become softer, more elastic and less pressure-resistant. In other words, polyethylene is less suited to sanitary applications or heating.



Cross-linking process by means of electron beams

Exposing the multilayer pipe to intense electron beams creates cross **connections** between the different molecular chains in the plastic. The electrons cause the oxygen atoms to split from the various polyethylene chains. This enables carbon atoms to bond to each other and form a strong cross-linked structure.



Structure of PE-Xc

The cross connections mean the movement of the chains with respect to each other is kept to a minimum. Applying heat or another form of energy will not distort the strong structure of the pipe. Cross-linked polyethylene displays optimal behaviour under continuous loads due to pressure or temperature loads. Cross-linking gives **enormous durability**.



# 1 PIPES

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The best and most accurate way of cross-linking polyethylene is through the use of electron beams.

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Polyethylene can be cross-linked in the following ways:

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The German standard DIN 16892 determines the minimum degree of cross-linking for each of the methods.

b. **PE-Xb:** cross-linking is achieved by adding silane to the polyethylene, followed by a water treatment. This is a chemical method.

c. **PE-Xc:** in contrast to the two previous methods, cross-linking takes place during a second process when the pipe is exposed to intense electron beams. The beams excite the polyethylene molecules so much that they cross-link. This is a physical method.

Cross-linking methods		Procedure	
Description	Minimum cross-linking levels according to DIN 16892 standard	Physical	Chemical
PE-Xa	70 %		Peroxide
PE-Xb	65 %		Silane
PE-Xc	60 %	Electron beams	

So you can see that in order to meet the standard, a PE-Xa pipe needs 70% cross-linking, a PE-Xb pipe needs 65% cross-linking and a PE-Xc pipe needs only 60% cross-linking. Furthermore, the PE-Xc is a physical method which means that no chemical additives are used, so by definition the pipe does not have to be rinsed for sanitary use.

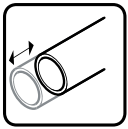


## A summary of all the advantages



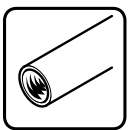
### Resistant to temperature and pressure

The working temperature can be up to 95°C, and the maximum working pressure 10 bar.



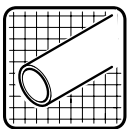
### Minimum linear expansion

The aluminium layer in the HENCO pipe means that it has a coefficient of expansion comparable to that of copper and 8 times less than an ordinary plastic pipe. Its coefficient of expansion is 0.025 mm/mK.



### Resistant to corrosion

The smooth inner and outer surfaces of the pipe prevents the build-up of scale or other debris. This avoids sedimentation and corrosion are avoided. The smoothness of the inner pipe also ensures for minimum pressure loss.



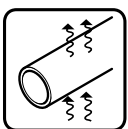
### Retains its shape

The pipe retains the required shape after bending. Unlike other synthetic pipes it does not have a thermal memory. This simplifies and speeds up the installation of the pipe and the assembly of any fittings.



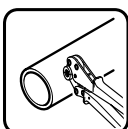
### Resistant to wear

The outer and inner pipe are made from polyethylene that has been cross-linked using electron beams. This means that the pipe does not suffer wear, even at high temperatures and flow rates.



### Fully sealed against oxygen and water vapour (diffusion)

The integrated aluminium layer prevents the penetration of oxygen into the pipe. This avoids corrosion problems with any metal components in the installation.



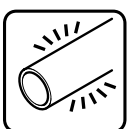
### Lightweight (which means fast and simple assembly)

Fast and simple installation saves you time and money. The HENCO pipe is flexible and extremely light. A coil of 200 m HENCO STANDARD 16X2 weighs a mere 25 kg.



### Long life

If the pipe is used according to the specified working pressure and temperature, it will have a guaranteed working life of at least 50 years.



### No noise problems

In contrast to metal pipes, water shock or flow noises do not cause noise problems in these pipes if the correct diameter is chosen. You can avoid contact noises through correct assembly.



### From drinking water (in accordance with 98/83/EC) to chemical liquids

The pipe meets the most stringent toxicological and hygienic requirements. It is totally suitable for transporting drinking water. The pipe is also resistant to various liquid chemicals..

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# 1 PIPES

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## Technical properties of the HENCO STANDARD and RIXc multilayer pipe

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### Technical profile of the HENCO STANDARD and RIXc multilayer pipe

Outer diameter (mm)	12	14	16	16	18	18	20	20	26	26	32	40	50	63	75	90
				RIXC		RIXC		RIXC		RIXC						
Inner diameter (mm)	8.8	10	12	12	14	14	16	16	20	20	26	33	42	54	63	76
Wall thickness (mm)	1.6	2	2	2	2	2	2	2	3	3	3	3.5	4	4.5	6	7
Max. working temperature (°C) **	60	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Max. working pressure (bar)	6	10	16	10	10	10	16	10	16	10	16	10	10	10	10	10
Application class (EN ISO21003-1)	4	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5	2-4-5
Coefficient of thermal conductivity (W/mK)	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Coefficient of linear expansion (mm/mK)	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Minimum tensile strength of adhesive layer (N/10 mm)	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Surface roughness of inner pipe (μ)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Oxygen diffusion (mg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Min. bending radius, manual/external spiral spring (mm)	5XDU	5XDU	5XDU	5XDU	5XDU	5XDU	5XDU	5XDU	5XDU	5XDU	5XDU	*	*	*	*	*
Min. bending radius, manual/internal spiral spring (mm)	3XDU	3XDU	3XDU*	3XDU*	3XDU	3XDU	3XDU	3XDU	3XDU	3XDU	3XDU	*	*	*	*	*
Degree of cross-linking (%)	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Weight (kg/m)	0,084	0,108	0,125	0,101	0,132	0,125	0,147	0,129	0,285	0,261	0,390	0,528	0,766	1,155	1,516	2,155
Flow (l/h)	0,061	0,079	0,113	0,113	0,154	0,154	0,201	0,201	0,314	0,314	0,531	0,855	1,385	2,29	3,117	4,536

\* Elbow fittings should be used here

\*\* Application class table (EN ISO 21003-1)

+ 2XDU when using a BM-16 bending tool

### Application class table (EN ISO 21003-1)

Application class table (EN ISO 21003-1)							
Application class	$T_D$		$T_{max}$		$T_{mal}$		Typical application
	°C	Time <sup>a</sup> years	°C	Time years	°C	Time h	
1 <sup>a</sup>	60	49	80	1	95	100	Hot water supply (60°C)
2 <sup>a</sup>	70	49	80	1	95	100	Hot water supply (70°C)
4 <sup>b</sup>	20 + cumulative 40 + cumulative 60	2.5 20 25	70	2.5	100	100	Underfloor heating and low-temperature radiators
5 <sup>b</sup>	20 + cumulative 60 + cumulative 80	14 25 10	90	1	100	100	High-temperature radiators

**NOTE** This international standard does not apply for  $T_D$ ,  $T_{max}$  and  $T_{mal}$  greater than those shown in the table above.

a Countries can choose either class 1 or class 2 according to with their national legislation.

b Where there is more than 1 design temperature for a class, the times should be added together. "Plus cumulative" in the table implies a temperature profile for the aforementioned temperature over a certain period. (e.g. for class 5, the design temperature profile over 50 years is 20°C. This becomes 60 °C over 14 years, 80 °C over 10 years, 90 °C over 1 year and 100 °C over 100 hours respectively.

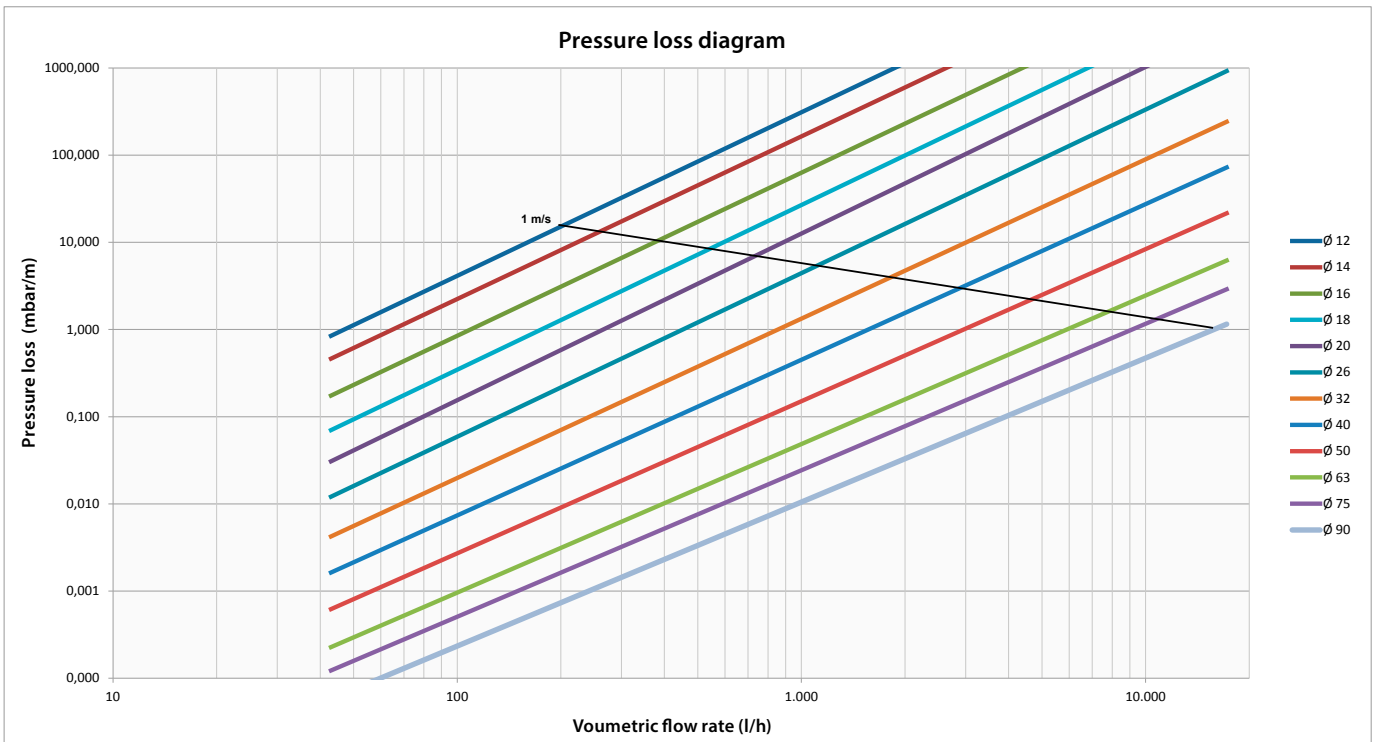


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### Pressure loss tables for the HENCO multilayer pipe

Liquids lose energy when they flow through a pipe as a result of friction between the liquid and the walls of the pipe. The diagram and tables below show the pressure loss for

a given volumetric flow rate in relation to the pipe diameter and the flow speed.















# 1 PIPES

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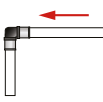
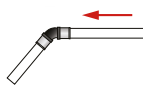


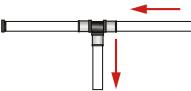
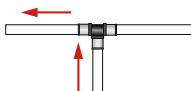
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## Overview of flow loss coefficients (Zeta values)

Liquids do not only lose energy when they flow through a pipe. They also lose energy when they change direction. This is because liquids have to overcome extra resistance.

The table below provides an overview of the flow loss coefficients for the various fittings and the corresponding number of meters of piping.

Zeta values ( Medium: water at 15°C Flow speed: 2 m/s)										
		Ø14	Ø16	Ø18	Ø20	Ø26	Ø32	Ø40	Ø50	Ø63
<b>Curved bend</b>	 zeta	1.50	1.25	1.10	1.85	0.70	-	-	-	-
	m	0.74	0.65	0.61	0.50	0.49	-	-	-	-
<b>90° bend</b>	 zeta	3.071	2.021	2.839	1.87	1.974	1.981	1.865	1.753	1.666
	m	1.16	0.96	1.63	1.27	1.76	2.44	3.08	3.88	5.01
<b>45° bend</b>	 zeta	-	-	-	-	-	-	0.761	0.69	0.614
	m	-	-	-	-	-	-	1.26	1.53	1.84
<b>Straight coupling</b>	 zeta	0.918	0.689	0.61	0.559	0.504	0.472	0.388	0.342	0.327
	m	0.35	0.33	0.35	0.38	0.45	0.58	0.64	0.76	0.98
<b>T-piece</b>	 zeta	1.026	0.829	0.739	0.639	0.629	0.562	0.472	0.407	0.347
	m	0.39	0.39	0.42	0.43	0.56	0.69	0.78	0.90	1.04
	 zeta	2.772	2.329	2.126	1.89	1.974	1.844	1.716	2.001	1.884
	m	1.05	1.10	1.22	1.28	1.76	2.27	2.83	4.43	5.66
	 zeta	2.851	2.372	2.268	2.010	2.104	1.898	1.716	1.902	1.785
	m	1.08	1.12	1.30	1.36	1.88	2.34	2.83	4.21	5.36



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**Zeta values ( Medium: water at 15°C Flow speed: 2 m/s)**

			Ø16- Ø14-Ø16	Ø18- Ø14-Ø18	Ø18- Ø16-Ø18	Ø20- Ø14-Ø20	Ø20- Ø16-Ø20	Ø20- Ø18-Ø20	Ø26- Ø16-Ø26	Ø26- Ø18-Ø26	Ø26- Ø20-Ø26	Ø32- Ø16-Ø32	Ø32- Ø18-Ø32	Ø32- Ø20-Ø32	Ø32- Ø26-Ø32
<b>T-piece reduction</b>		zeta	0.79	0.702	0.734	0.606	0.588	0.648	0.578	0.563	0.592	0.544	0.539	0.544	0.549
	m	0.37	0.40	0.42	0.41	0.40	0.44	0.52	0.50	0.53	0.67	0.66	0.67	0.68	
		zeta	1.864	1.726	1.711	1.486	1.516	1.575	1.256	1.359	1.358	1.32	1.289	1.257	1.296
	m	0.88	0.99	0.98	1.01	1.03	1.07	1.12	1.21	1.21	1.63	1.59	1.55	1.60	
		zeta	1.697	1.578	1.654	1.408	1.408	1.497	1.181	1.033	1.119	1.464	1.245	1.074	1.129
	m	0.80	0.91	0.95	0.95	0.95	1.01	1.05	0.92	1.00	1.80	1.53	1.32	1.39	
			Ø40- Ø16-Ø40	Ø40- Ø20-Ø40	Ø40- Ø26-Ø40	Ø40- Ø32-Ø40	Ø50- Ø20-Ø50	Ø50- Ø26-Ø50	Ø50- Ø32-Ø50	Ø50- Ø40-Ø50	Ø63- Ø26-Ø63	Ø63- Ø32-Ø63	Ø63- Ø40-Ø63	Ø63- Ø50-Ø63	
		zeta	0.427	0.378	0.477	0.447	0.362	0.357	0.377	0.397	0.312	0.317	0.327	0.337	
	m	0.70	0.62	0.74	0.74	0.80	0.79	0.83	0.88	0.94	0.95	0.98	1.01		
		zeta	1.315	1.155	1.123	1.599	1.056	1.022	1.183	1.243	1.014	1.262	1.119	1.326	
	m	2.17	1.91	1.85	2.64	2.34	2.26	2.62	2.75	3.05	3.79	3.36	3.98		
		zeta	1.412	1.101	0.999	1.49	1.101	1.027	0.861	0.855	0.92	1.04	0.696	0.988	
	m	2.33	1.82	1.65	2.46	2.44	2.27	1.91	1.89	5.77	3.12	2.09	2.97		



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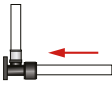
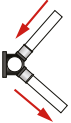

		Zeta values ( Medium: water at 15°C Flow speed: 2 m/s)											
		Ø16- Ø14-Ø14	Ø18- Ø16-Ø16	Ø20- Ø16-Ø16	Ø20- Ø18-Ø18	Ø20- Ø20-Ø16	Ø26- Ø20-Ø20	Ø26- Ø26-Ø16	Ø26- Ø26-Ø20	Ø32- Ø26-Ø26	Ø40- Ø32-Ø32	Ø40- Ø40-Ø26	
T-piece 2X reduction		zeta	0.907	0.732	0.699	0.759	0.80	0.694	0.859	0.674	0.671	0.673	0.704
	m	0.43	0.42	0.47	0.51	0.54	0.62	0.77	0.60	0.83	1.11	1.16	
		zeta	1.902	1.667	1.759	1.657	1.90	1.413	1.983	2.441	1.254	1.441	1.721
	m	0.90	0.96	1.19	1.12	1.29	1.26	1.77	2.18	1.54	2.38	2.84	
		zeta	1.879	1.885	1.34	1.924	1.11	1.731	0.978	1.104	1.398	1.609	0.748
	m	0.89	1.08	0.91	1.30	0.75	1.54	0.87	0.98	1.72	2.65	1.23	
		Ø40- Ø40-Ø32	Ø50- Ø40-Ø40	Ø26- Ø16-Ø20	Ø26- Ø20-Ø16	Ø32- Ø20-Ø26	Ø40- Ø20-Ø32	Ø40- Ø26-Ø32	Ø50- Ø20-Ø40	Ø50- Ø26-Ø40	Ø50- Ø32-Ø40		
		zeta	0.633	0.597	0.694	0.832	0.619	0.633	0.673	0.616	0.587	0.621	
	m	1.04	1.32	0.62	0.74	0.76	1.04	1.11	1.36	1.30	1.37		
		zeta	1.701	1.308	1.445	2.526	1.236	1.142	1.123	1.061	1.088	1.307	
	m	2.81	2.89	1.29	2.25	1.52	1.88	1.85	2.35	2.41	2.89		
		zeta	1.02	1.328	1.393	1.337	1.231	1.102	1.143	1.056	1.054	1.223	
	m	1.68	2.94	1.24	1.19	1.52	1.82	1.89	2.34	2.33	2.71		

		Zeta values ( Medium: water at 15°C Flow speed: 2 m/s)						
		Ø16- Ø18-Ø16	Ø16- Ø20-Ø16	Ø20- Ø26-Ø20	Ø26- Ø32-Ø26	Ø32- Ø40-Ø32	Ø40- Ø50-Ø40	
T-piece enlarged		zeta	0.841	0.896	0.671	0.629	0.678	0.452
	m	0.48	0.61	0.60	0.77	1.12	1.00	
		zeta	1.483	1.255	1.14	1.029	1.233	2.209
	m	0.85	0.85	1.02	1.27	2.03	4.80	
		zeta	1.749	1.598	1.507	1.395	1.629	2.298
	m	1.00	1.08	1.34	1.72	2.69	5.08	





**Zeta values ( Medium: water at 15°C Flow speed: 2 m/s)**

		Ø14-1/2"	Ø16-3/8"	Ø16-1/2"	Ø18-1/2"	Ø20-1/2"	Ø20-3/4"	Ø26-3/4"			
<b>Backplate</b>		zeta	1.697	1.417	1.441	1.513	1.587	1.264	1.385		
		m	0.64	0.67	0.68	0.87	1.07	0.86	1.24		
		Ø16-1/2"-Ø16    Ø20-1/2"-Ø20									
<b>Double backplate</b>		zeta	4.157	4.315							
		m	1.97	2.92							
		Ø16-Ø14    Ø18-Ø14    Ø18-Ø16    Ø20-Ø14    Ø20-Ø16    Ø20-Ø18    Ø26-Ø16    Ø26-Ø18    Ø26-Ø20									
<b>Reduction</b>		zeta	0.953	0.913	0.722	0.838	0.765	0.669	0.746	0.813	0.684
		m	0.45	0.52	0.41	0.57	0.52	0.45	0.67	0.73	0.61
		Ø32-Ø16    Ø32-Ø20    Ø32-Ø26    Ø40-Ø26    Ø40-Ø32    Ø50-Ø32    Ø50-Ø40    Ø63-Ø40    Ø63-Ø50									
		zeta	0.807	0.689	0.598	0.622	0.599	0.671	0.592	0.661	0.531
		m	0.99	0.85	0.74	1.03	0.99	1.46	1.31	1.99	1.60

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# 1 PIPES

1

## Expansion table

All materials used in manufacturing the pipe expand when they are warmed and shrink when they cool down. That is why you always have to take length differences into account as a result of variations in temperature. The temperature difference and the length of the pipe are the

two parameters that will determine the change in length. You can use the expansion table below to see the change in length that can be expected with a certain pipe length and a certain temperature difference. The coefficient of expansion is the same for all diameters.

Expansion (mm/m)	Temperature difference ( $\Delta T$ )							
Pipe length (m)	10°C	20°C	30°C	40°C	50°C	60°C	70°C	80°C
1	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
2	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00
3	0.75	1.50	2.25	3.00	3.75	4.50	5.25	6.00
4	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
5	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00
6	1.50	3.00	4.50	6.00	7.50	9.00	10.50	12.00
7	1.75	3.50	5.25	7.00	8.75	10.50	12.25	14.00
8	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
9	2.25	4.50	6.75	9.00	11.25	13.50	15.75	18.00
10	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00

The expansion table (expressed in mm) was created using the following formula:

$$\Delta L = L \times \alpha \times \Delta T$$

Where:

- $\Delta L$  = change in length
- $L$  = length of pipe
- $\alpha$  = coefficient of expansion
- $\Delta T$  = temperature difference

and where the coefficient of expansion is 0.025 mm/mK irrespective of the diameter of the pipe.

### Example:

Given that:

- $L = 8 \text{ m}$
- $\alpha = 0.025 \text{ mm/mK}$
- $\Delta T = 50^\circ\text{C}$  (where  $T_{\text{min}}=20^\circ\text{C}$  and  $T_{\text{max}}=70^\circ\text{C}$ )

Required:  $\Delta L$

Solution: Consult the expansion table or apply the formula.

From the table:  $\Delta L = 10.0 \text{ mm}$

Using the formula:  $\Delta L = L \times \alpha \times \Delta T$   
 $\Delta L = 8 \times 0.025 \times 50$   
 $\Delta L = 10.0 \text{ mm}$

This change in length should be considered when a professional installs the piping system.



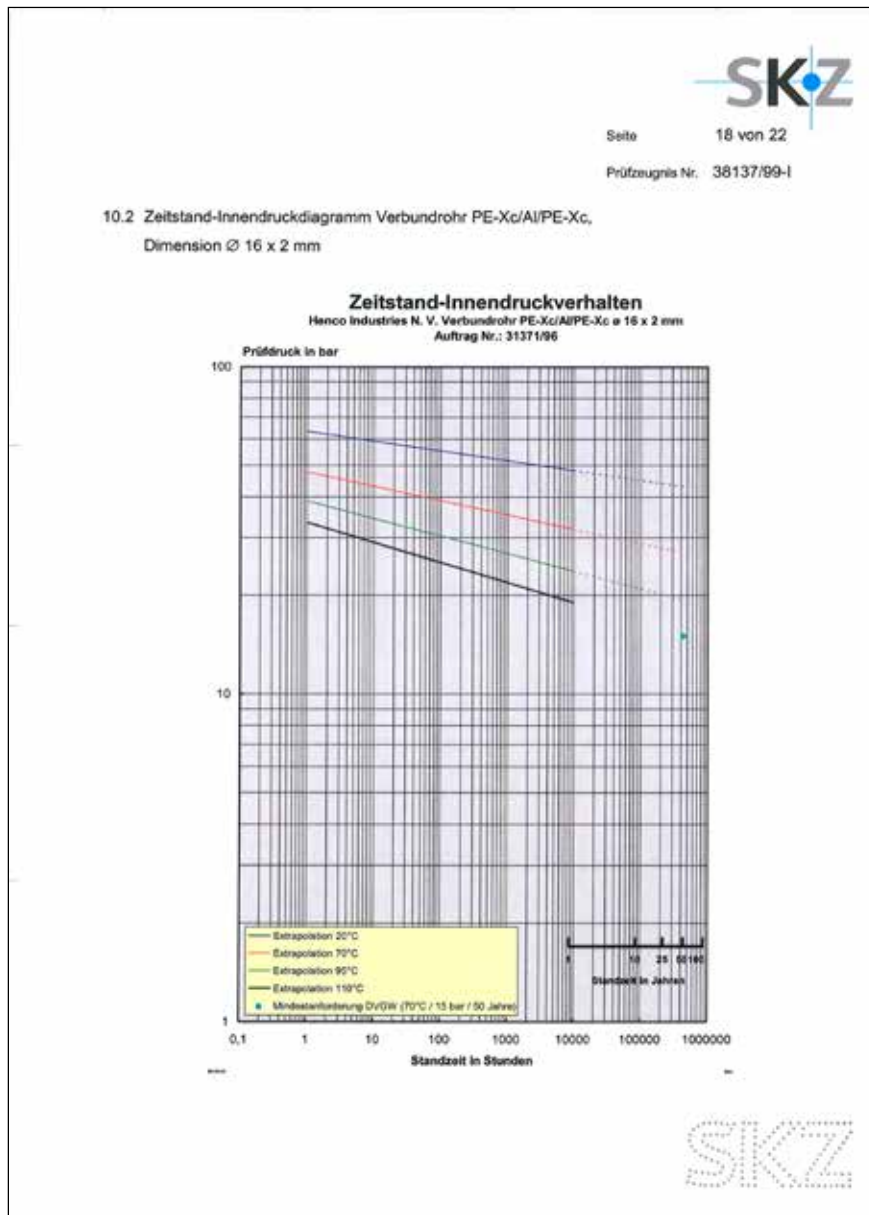
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### Regression curve (working life) of the HENCO STANDARD and RIXc multilayer pipes

The working life of the multilayer pipe depends on the temperature and pressure in the pipe. The straight lines in the diagram below show the pressure that the pipe is capable of withstanding at a certain age and a constant water temperature. Clearly the pipe can withstand less pressure as it becomes older. To obtain German DVGW certification, a pipe must be able to withstand a pressure of 1.5 its working pressure after 50 years and at a constant water temperature of 70°C.

The regression curves for the different diameters of the HENCO multilayer pipe show that for all pipe diameters, after 50 years with a water temperature of 70°C, the pipes are able to resist a much greater pressure than that required for DVGW certification. The HENCO pipe has a working life of at least 50 years.

Please see the example below of the regression curve for diameter 16, as drawn up by the test laboratory of the SKZ in Germany.





# 1 PIPES

1

## HENCO PRE-INSULATED

2

Versions: STANDARD and RIXc

3

### General

4

The PE-Xc/Al/PE-Xc pipes come with a round or eccentric thermal insulating material. This material is made from extruded PE foam with a closed cell structure and protects the pipe against:

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- ▶ Heat loss/heat transmission
- ▶ Condensation
- ▶ Expansion
- ▶ Noise transmission

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The PE foam has a sturdy outer layer made from PE with a red or blue meshed vapour tight structure. This protects the foam against damage, so that the insulating properties of the product are not lost even during rough building work. The technical characteristics of the thermal insulation are as follows:

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Insulation value (DIN 52613 / ISO 8497)	0.040 W/mK at +40°C 0.036 W/mK AT +10°C
Fire classification	B1 (DIN 4102)
Temperature resistance	-40°C to + 100°C
Usage temperature	+5°C to +100°C (EN 14707)
Sound damping	Up to 23 dB(A) (DIN 52218)
Thickness (round)	6 , 10 or 13 mm
Thickness (eccentric)	6 mm above and 13 or 26 mm below





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Transmission table															
AT	Ø14		Ø16			Ø18		Ø20			Ø26			Ø32	
	6 mm	10 mm	6 mm	10 mm	13 mm	6 mm	10 mm	6 mm	10 mm	13 mm	6 mm	10 mm	13 mm	6 mm	10 mm
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	-0.4	-0.4	-0.4	-0.4	-0.3	-0.4	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
-2.0	-0.9	-0.8	-0.8	-0.7	-0.7	-0.7	-0.7	-0.7	-0.6	-0.6	-0.5	-0.5	-0.5	-0.4	-0.4
-3.0	-1.3	-1.2	-1.2	-1.1	-1.0	-1.1	-1.0	-1.0	-0.9	-0.9	-0.8	-0.7	-0.7	-0.6	-0.6
-4.0	-1.8	-1.6	-1.6	-1.4	-1.3	-1.4	-1.3	-1.3	-1.2	-1.1	-0.1	-0.1	-0.9	-0.9	-0.8
-5.0	-2.2	-2.0	-2.0	-1.8	-1.7	-1.8	-1.6	-1.6	-1.5	-1.4	-1.3	-1.2	-1.2	-1.1	-1.0
-6.0	-2.7	-2.4	-2.4	-2.2	-2.0	-2.1	-2.0	-2.0	-1.8	-1.7	-1.6	-1.5	-1.4	-1.3	-1.2
-7.0	-3.1	-2.8	-2.8	-2.5	-2.4	-2.5	-2.3	-2.3	-2.1	-2.0	-1.8	-1.7	-1.6	-1.5	-1.4
-8.0	-3.5	-3.2	-3.2	-2.9	-2.7	-2.9	-2.6	-2.6	-2.4	-2.3	-2.1	-1.9	-1.9	-1.7	-1.6
-9.0	-4.0	-3.6	-3.6	-3.2	-3.0	-3.2	-2.9	-2.9	-2.7	-2.6	-2.3	-2.2	-2.1	-1.9	-1.8
-10.0	-4.4	-4.0	-4.0	-3.6	-3.4	-3.6	-3.3	-3.3	-3.0	-2.8	-2.6	-2.4	-2.3	-2.2	-2.0
-11.0	-4.9	-4.4	-4.4	-3.9	-3.7	-3.9	-3.6	-3.6	-3.3	-3.1	-2.9	-2.7	-2.5	-2.4	-2.2
-12.0	-5.3	-4.8	-4.8	-4.3	-4.0	-4.3	-3.9	-3.9	-3.6	-3.4	-3.1	-2.9	-2.8	-2.6	-2.4
-13.0	-5.8	-5.2	-5.1	-4.7	-4.4	-4.7	-4.3	-4.3	-3.9	-3.7	-3.4	-3.2	-3.0	-2.8	-2.6
-14.0	-6.2	-5.6	-5.5	-5.0	-4.7	-5.0	-4.6	-4.6	-4.2	-4.0	-3.6	-3.4	-3.2	-3.0	-2.8
-15.0	-6.6	-6.0	-5.9	-5.4	-5.0	-5.4	-4.9	-4.9	-4.5	-4.3	-3.9	-3.6	-3.5	-3.2	-3.1
-16.0	-7.1	-6.4	-6.3	-5.7	-5.4	-5.7	-5.2	-5.2	-4.8	-4.6	-4.2	-3.9	-3.7	-3.4	-3.3
-17.0	-7.5	-6.8	-6.7	-6.1	-5.7	-6.1	-5.6	-5.6	-5.1	-4.8	-4.4	-4.1	-3.9	-3.7	-3.5
-18.0	-8.0	-7.1	-7.1	-6.5	-6.0	-6.4	-5.9	-5.9	-5.4	-5.1	-4.7	-4.4	-4.2	-3.9	-3.7
-19.0	-8.4	-7.5	-7.5	-6.8	-6.4	-6.8	-6.2	-6.2	-5.7	-5.4	-4.9	-4.6	-4.4	-4.1	-3.9
-20.0	-8.8	-7.9	-7.9	-7.2	-6.7	-7.2	-6.5	-6.5	-6.0	-5.7	-5.2	-4.9	-4.6	-4.3	-4.1
-21.0	-9.3	-8.3	-8.3	-7.5	-7.1	-7.5	-6.9	-6.9	-6.3	-6.0	-5.5	-5.1	-4.9	-4.5	-4.3
-22.0	-9.7	-8.7	-8.7	-7.9	-7.4	-7.9	-7.2	-7.2	-6.6	-6.3	-5.7	-5.3	-5.1	-4.7	-4.5

The table shows the surface temperature of the insulation at a certain temperature difference.

**Example:** - ambient temperature: 24°C  
 - cold water temperature: 6°C  
 - temperature difference: 6°C - 24°C = -18°C

This means that the surface temperature is then 17.5°C (24°C - 6.5°C).

For a 16 mm pipe provided with 10 mm insulation that has a temperature difference of -18°C the correction value is of -6.5°C.

To avoid condensation, the surface temperature of the insulation must always be higher than the dew point temperature.



# 1 PIPES

1

## HENCO PROTECTION HOSE

2

Version: STANDARD, RIXc and 5L PE-Xc

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### General

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The HENCO STANDARD and RIXc multilayer pipes and the 5L PE-Xc synthetic pipes are also supplied with a ribbed protection hose.

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### Material and characteristics

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#### Extra protection

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The protective sleeves are made from Polyethylene. This offers extra protection to pipes carrying water and gas during building works.

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#### Low insulating capacity

This prevents laid pipes from transmitting too much heat to the floor above when the pipes are used with central heating systems.

The layer of air in the protective sleeve provides an insulating effect.

HENCO recommends that you always use a protective sleeve for additional mechanical protection. An added benefit of using a protective sleeve is that supply and return pipes can be colour coded which prevents mistakes with incorrectly connected pipes.

#### Gas installations

In gas installations, you are only allowed to combine the yellow protective sleeves with the HENCO STANDARD multilayer pipe for gas. See page 27 for the gas specifications concerning protective sleeves.

### Range

Pipe sleeves can be supplied in red, blue, yellow or black in diameters ranging from 14 to 32 mm.





## HENCO COMBI®

Versions: STANDARD and RIXc

### General

The HENCO COMBI® consists of two PE-Xc/AL/PE-Xc pipes which are provided with a double polyethylene protective sleeves. The double protective sleeve is made from two individual sleeves which are connected to each other at various points. This means that you can fit floor fastenings between the two sleeves. As the pipes are only connected at various points, it requires little effort to separate the pipes.

### Advantages

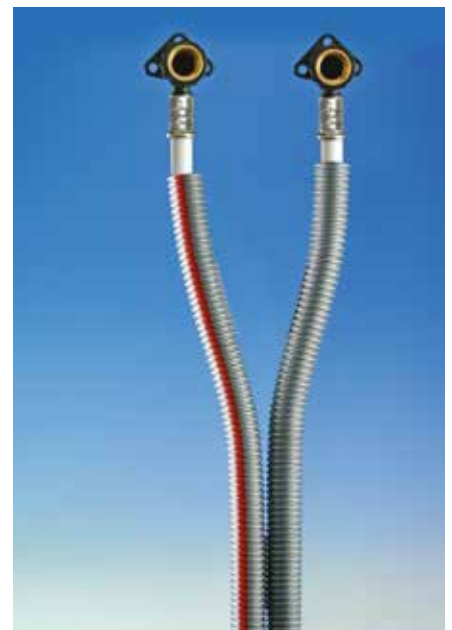
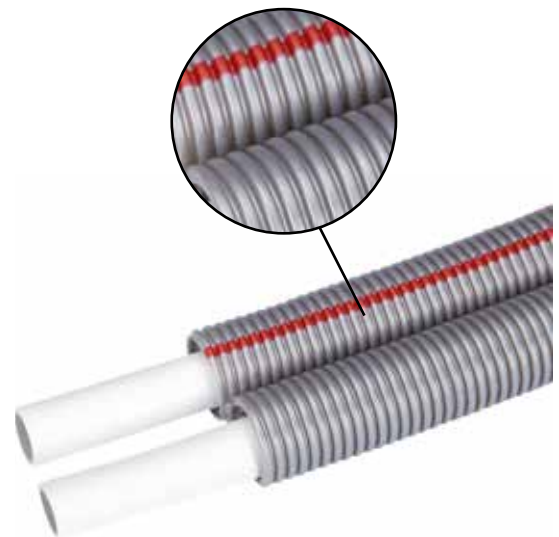
The HENCO COMBI pipe combines the benefits of having a single protective sleeve with the following advantages

- ▶ Fast installation (supply and return pipes can be fitted in one job)
- ▶ Less fastenings required on the floor below
- ▶ Neat (parallel) installation

### Red marking

It is important that the fitter is able to tell which is the supply and which is the return pipe. That is why one of the protective sleeves carries a red marking.

HENCO recommends that you always use a protective sleeve for additional mechanical protection.



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# 1 PIPES

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## HENCO GAS

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Version: STANDARD and with protective sleeve

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### General

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The HENCO STANDARD multilayer pipe PE-Xc/Al/PE-Xc and the PE protective sleeve can also be used with gas, provided that you use yellow pipes and sleeves.

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The HENCO system for gas is only permitted in countries where a gas quality mark has been granted. Always consult the applicable regulations for gas piping systems which apply in the country.

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The HENCO synthetic gas system carries the KIWA-GASTEC gas quality mark 39581/01 AND is intended for domestic gas installations and for transporting gas according to NPR-3378-5 and NPR-3378-6 of December 2012 and the amendments 3378-5/A1 and 3378-6/A1.

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In addition, the HENCO gas system with brass press fittings possesses the UNI/TS 11344 quality mark.

▶ KIWA-GASTEC

▶ UNI/TS 11344



Synthetic gas pipes do need to be protected against corrosion in humid areas. This is in contrast to metal gas piping which must be protected against corrosion. Using synthetic piping gives significant savings during purchase and installation.

### System

The HENCO gas system comprises the HENCO PE-Xc/Al/PE-Xc multilayer pipes for gas which can be provided with or without protective sleeves and the HENCO PVDF and brass press fittings for gas.





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### Colour indication

The pipes and sleeves protective yellow colour and are printed with the HENCO brand name and the KIWA-GASTEC name.

The sleeves of the fitting are required to have a yellow band

### Solely for use with gas installations

The yellow pipe (protection hose) and the specially marked gas fittings can only be used in gas installations. The gas fittings are provided with special O-ring seals (HNBR) that have been specially designed for gas and do not work in water installations. Therefore regular water fittings cannot be used in gas installations and conversely, gas fittings cannot be used with water!

### Protection hoses

Protection hoses have been adopted and are obligatory in certain circumstances. Protective sleeves give extra protection to pipes carrying gas when building works are being carried out.

HENCO recommends that you always use a protective sleeve as it provides additional mechanical protection.

The pipe sleeves are made from polyethylene and can also be supplied separately.

## Instructions for the installation of gas piping

- ▶ You should choose the piping route so that that likelihood of damage to pipes from drilling or inserting nails for example is as low as possible.
- ▶ When pipes are bent, the minimum bending radius specified by HENCO should be respected. You should remove any cracked pipes.
- ▶ When carrying out building work you should block off the end of the gas pipe to prevent debris from entering the pipe. If dirt does enter the pipe, you should remove this using inert gas or compressed air.
- ▶ Pipes and fittings which show signs of surface damage should not be used.

## Installation specifications for gas piping and gas fittings

### Basic criteria

- ▶ NPR-3378-5 of December 2012 and the amendment 3378-5/A1
- ▶ NPR-3378-6 of December 2012 and the amendment 3378-6/A1



# 1 PIPES

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## Positioning pipes

Pipes can be positioning in the following ways:

- ▶ **A** In view
- ▶ **B** Concealed
- ▶ **C** In the ground

## The HENCO gas system can be used subject to the following requirements:

- ▶ Pipes use press connections (cannot be detached)
- ▶ Positioning pipes A-B-C

## Explanations (the sub-numbers refer to NEN 3378-6):

### A Pipes in view (NPR 3378-6, 4.2)

#### (4.2.1) Examples/definitions of pipes in view:

- ▶ a pipe in a well-accessible crawl space. Well-accessible implies a door or access hatch measuring 1 m x 0.60 m and a clearance height of at least 0.80 m
- ▶ a gas meter installed in a meter box, closed off with a door
- ▶ a burner, closed off with a door

#### (4.2.2) A crawl space is accessible if it can be accessed for inspection, maintenance and replacement:

- ▶ via a crawl hatch measuring at least 1 m x 0.60 m
- ▶ a clearance height of at least 0.80 m
- ▶ without obstacles impeding free passage

Two types of accessible crawl spaces can be distinguished:

**(4.2.2.2) A crawl space with watertight damp-proofing on the bottom** (e.g. concrete with contiguous watertight rising walls): It is allowed to install the pipe with a pipe sleeve in this situation, provided that the area is permanently dry and ventilated by means of opposing ventilation openings. The pipe sleeve can be interrupted at the fittings. The Henco gas fittings and multilayer pipes do not require additional protection against corrosion.

**(4.2.2.3) A crawl space without watertight damp-proofing on the bottom** (e.g. sand): In crawl spaces without watertight damp-proofing, gas pipes should be installed with an uninterrupted pipe sleeve. This pipe sleeve must be:

- ▶ made of a synthetic
- ▶ uninterrupted, i.e. no fittings under the floor
- ▶ able to dispose of any leak gas above the floor. Henco gas pipes and pipe sleeves do not require protection against corrosion.

#### (4.2.3.2) Space where a gas meter is installed (meter area)

If a Henco multilayer pipe is installed in the area where a gas meter is installed, it needs to be protected against mechanical and heat loads by means of a flexible pipe sleeve made of PE. The fittings do not require protection by means of a pipe sleeve.

#### (4.2.3.3) Space where a burner is installed

If a multilayer pipe is installed in the area where a burner is installed, it needs to be protected against mechanical and heat loads by means of a flexible pipe sleeve made of PE. The fittings do not require protection by means of a pipe sleeve.

#### (4.2.3.4) Pipe shafts

If a multilayer pipe is installed in an accessible pipe shaft, it needs to be protected against mechanical and heat loads by means of a flexible pipe sleeve made of PE. The fittings do not require protection by means of a pipe sleeve.

#### (4.2.4) Pipes above a lowered removable ceiling

If a multilayer pipe is installed in the space above a lowered removable ceiling (system ceiling), it should be protected against mechanical and heat loads by means of a flexible pipe sleeve made of PE. The fittings do not require protection by means of a pipe sleeve.



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## B Concealed pipes (NPR 3378-6, 4.3)

With regard to pipes in inaccessible or out-of-reach spaces, a distinction is made between the following three circumstances:

- ▶ pipes in potentially humid and corrosive spaces
- ▶ pipes in dry, non-corrosive spaces
- ▶ embedded pipes in floors and walls

**(4.3.2.2)** E.g. in humid crawl spaces without watertight damp-proofing on the bottom, multilayer pipes are allowed, provided that they are installed in an uninterrupted pipe sleeve. In this case, the use of fittings for additional connections is not allowed. Both ends of the pipe sleeve must protrude at least 20 mm above the finished floor. If any additional connection is required, a connection by means of a T-piece above the floor could be a solution. A second pipe with a pipe sleeve can then be connected similarly (as a bypass) to the T-piece. It is important that the brackets around the pipe sleeve are sufficiently wide, to allow any leaked gas to flow freely between the inner pipe and the pipe sleeve.

**(4.3.2.3)** Pipes in dry, non-corrosive spaces (e.g. fixed ceilings, back panelling, joisting, storey floors, ...): The use of pipe sleeves in these cases is not obligatory. The pipe trajectory must be chosen in such a manner that any risk of damage e.g. by drilling or nailing is avoided.

Press fittings are tensile proof and therefore allowed.

## (4.3.3) Embedded pipes

Multilayer pipes and press fittings can be embedded in floors and walls. If the situation permits, we recommend fitting the pipe with a flexible pipe sleeve, but this is not obligatory. Before or during the work, the pipe sleeve will provide more mechanical protection for the inner pipe.

The material of the architectural construction should not be allowed to damage the piping and the fitting. Where the pipe protrudes from the floors and walls, we recommend using a piece of pipe sleeve as protection. At the transition of the finished floor or wall it will protect the inner pipe against notch effects.

## (4.3.4) Pipes in a closed pipe trench, tunnel or masonry ducts

Henco multilayer pipes and press fittings can be used in this case. If the situation permits, we recommend fitting the pipe with a flexible pipe sleeve, but this is not obligatory. Before or during the work, the pipe sleeve will provide more mechanical protection for the inner pipe. If the duct has a watertight damp-proofing at the bottom, it must be ventilated upwards.

## C Pipes in the ground (NPR 3378-7)

The use of multilayer pipes and fittings for gas transport in the ground is allowed, from a diameter of 16 mm up to and including a diameter of 40 mm, in combination with the press fittings, within the plot lines.

- ▶ Gas inlet bends should be used for façade feed-throughs.
- ▶ The press fittings need to be protected with DENSO grease tape.
- ▶ The multilayer pipes need to be fitted with a pipe sleeve.
- ▶ An underground warning tape must be applied approximately 30 cm above the pipe.
- ▶ If the ground is covered with 0.80 m of clean sand, mechanical protection measures must be taken, when technical objections arise.

It is recommended to feed the gas pipe through with a pipe sleeve in a solid PVC/PE/PP pipe sleeve.

Gas pipes should not be installed under buildings, in polluted soil, in rubble soil and where root growth and significant subsidence may occur.



# 1 PIPES

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## Summary

### Places where gas pipes are NOT allowed (NPR 3378-6, 5.0):

- ▶ cavities, except in case of perpendicular feed-through with a pipe sleeve
- ▶ chimneys, drainage or ventilation ducts
- ▶ waste or fuel ducts or elevator shafts

### Application/installation WITHOUT a pipe sleeve (NPR 3378-6):

- ▶ (4.3.3) Embedded or plastered-over pipes in floors and walls: Henco PVDF press fittings are allowed without protective measures.
- ▶ (4.3.2.3) Pipes between joisting/storey floors/fixed ceilings/walls/ back panelling /behind kitchen units/ in closed pipe trenches/closed ducts: Henco PVDF press fittings are allowed without protective measures.

### Application/installation WITH a pipe sleeve (NPR 3378-6):

- ▶ (4.2.3.2) In meter boxes from the gas meter until the pipe disappears from view (not visible with the naked eye): Henco PVDF press fittings are allowed, pipe sleeve up to the fitting.
- ▶ (4.2.3.3) Connecting pipes to burners until the pipe disappears from view (not visible with the naked eye): Henco a PVDF press fittings are allowed, pipe sleeve up to the fitting.
- ▶ (4.2.4)(4.2.3.4.) Lowered ceilings (system ceilings) /accessible pipe shafts: Henco PVDF press fittings are allowed, pipe sleeve up to the fitting.
- ▶ (4.2.2.2) Crawl space with watertight damp-proofing on the bottom: Henco PVDF press fittings are allowed, pipe sleeve up to the fitting.
- ▶ (4.2.2.3) Crawl space (basement) without watertight damp-proofing on the bottom, uninterrupted pipe sleeve, approx. 20 mm protruding from the finished floor: Henco PVDF press fittings are not allowed.

### Application/installation WITH a pipe sleeve in the ground (NPR 3378-7, 5.0):

- ▶ Apply a pipe sleeve up to the Henco PVDF press fittings.
- ▶ Wrap Henco PVDF press fittings in DENSO grease tape (commercially available with QA gas quality label).
- ▶ Apply a yellow underground warning tape (GAS) approx. 30 cm above the gas pipe (also commercially available).
- ▶ It is recommended to install the gas pipe in a pipe sleeve made of PVC/PE/PP. However, this is not obligatory.



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## Protection hose

HENCO recommends that you always use a protective sleeve as it provides additional mechanical protection.

The HENCO pipe sleeve meets the following requirements:

- ▶ Synthetic
- ▶ Internal & external diameter
- ▶ Gas tight

## Mechanical damage

We recommend that you do not expose piping in gas installations to the risk of mechanical damage and/or external mechanical stresses.

## Earthing

Synthetic piping should not be earthed using a metal barrier coating.

## Disconnection from the gas supply

It merits attention that you should be able to disconnect installations from the gas supply as follows:

- ▶ After each point of entry in a home that does not have its own stopcock.
- ▶ After the point of entry to every physical building if the gas supply serves several separate buildings.
- ▶ Outside a heating room

- ▶ Immediately after the point of entry to a practical room or laboratory
- ▶ Immediately before a gas pressure regulator and metering equipment.
- ▶ Where gas appliances are located ( in the case of decorative devices this can also be inside the meter cupboard)

## Protection in event of a gas leak (Detailed info: NPR-3378-5 of December 2012)

When there is a drop in gas pressure or the gas supply is reconnected there should not be an unlimited discharge of unburned gas from the piping or gas appliance. This is not a problem for gas appliances fitted with a cutoff valve. The following apply to gas appliances that are not fitted with a cutoff valve:

- ▶ Premises: a gas cutoff valve should be fitted behind every stopcock in sections of piping between the gas meter and the appliance.
- ▶ In homes, a gas shutoff valve should be used in the section of pipe that is immediately behind the tap at the gas meter.





# 1 PIPES

1

## Type of gas

HENCO gas pipes and press fittings are suitable for:

- ▶ Natural gas
- ▶ Propane
- ▶ Butane

For more information, refer to NEN 1078.



## Pressure test

The piping is first thoroughly tested using a blast of air at a pressure of 1 bar (1000 mbar). The pressure should then be reduced to a test pressure that is 100 mb above the working pressure. The piping is considered to be gas-tight when there is no visible drop in pressure over a period of 5 minutes. A U-tube manometer or digital manometer is used to measure the pressure drop.

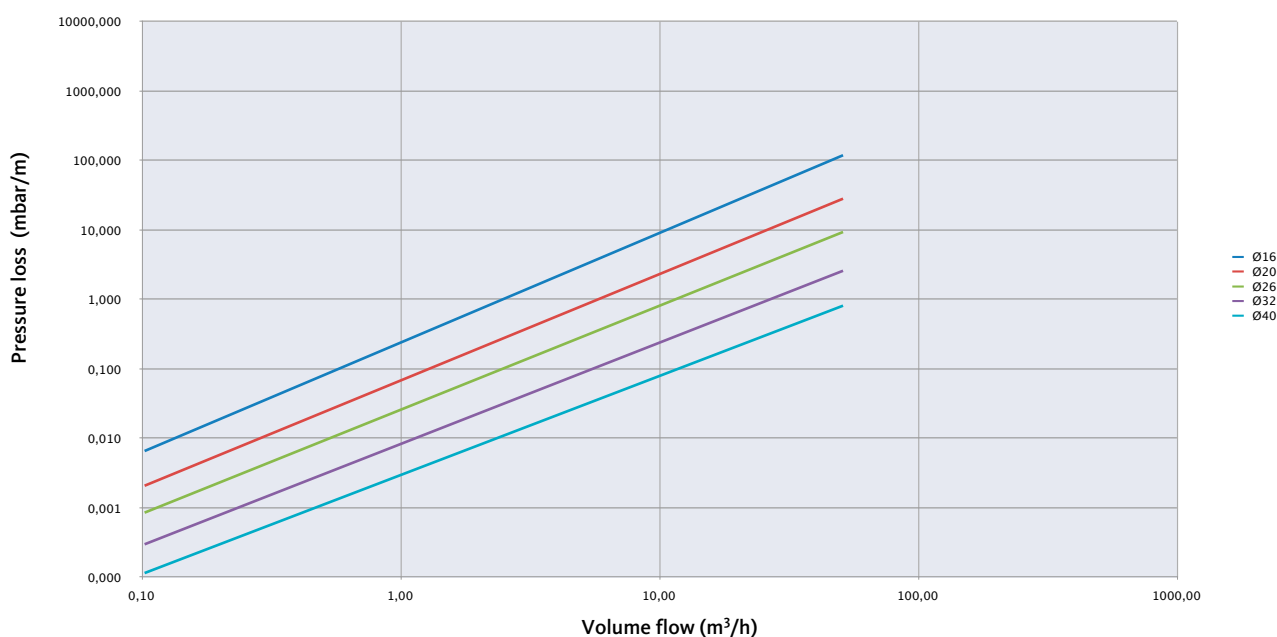
**Note:** these guidelines are only a small part of the actual standard. For further details about these guidelines, please consult NPR 3378-5 and NPR 3378-6.

## Pressure loss diagram and pressure loss table for gas pipes

Just like water, gas also loses energy due to frictional forces against the wall of the pipe. You can make correct pipe calculations by using the pressure loss diagrams for gas. Under the NEN 1078 standard, piping systems should be planned so that the pressure loss is not greater than the

difference between the working pressure and the minimum required supply pressure that is set by the manufacturer of the appliance. This means for a household gas installation that the total pressure loss from the outlet of the gas meter to the appliance may be 250 Pa 12 (2.5 mbar).

Pressure loss for natural gas 12°C













# 1 PIPES

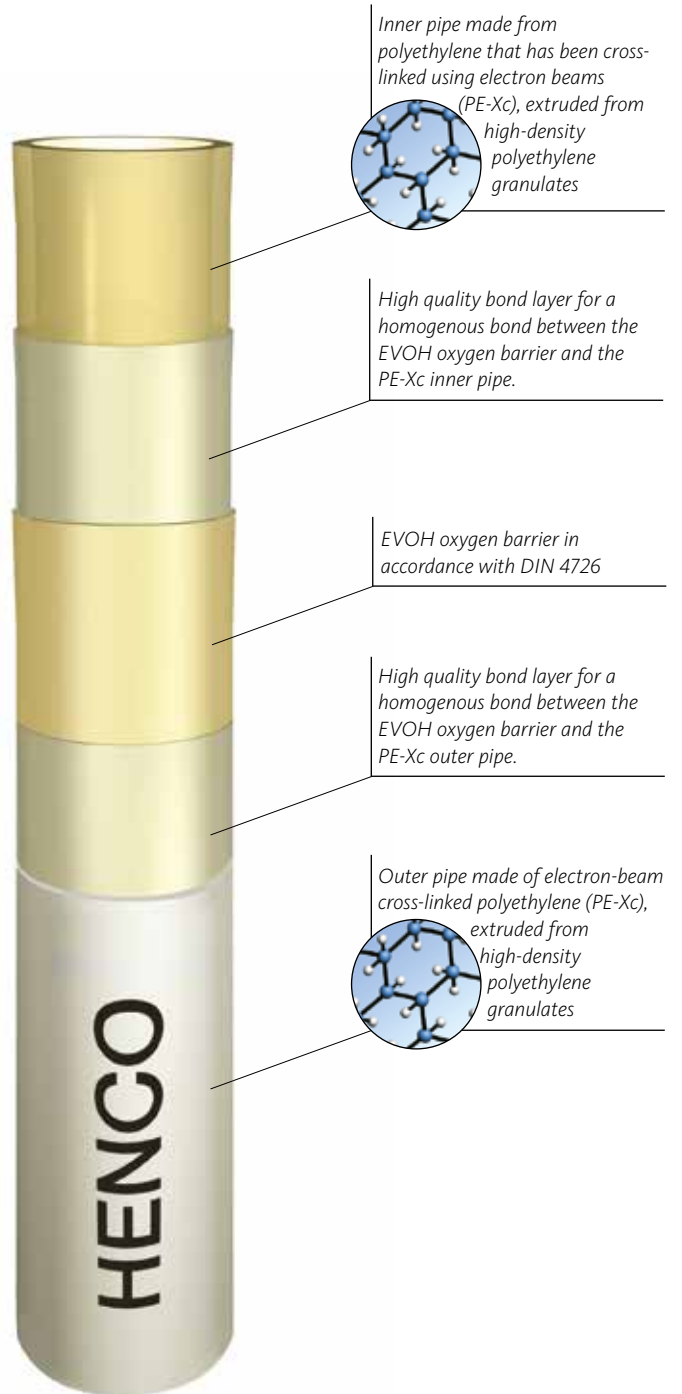
## 1 1.2 SYNTHETIC PIPES

### 2 HENCO 5L PE-Xc

#### 3 General

4 The HENCO 5L PE-Xc synthetic pipe is made up of five layers.  
 5 It has an inner and outer layer of electron-beam cross-linked  
 6 polyethylene that has been cross-linked using electron  
 7 beams EVOH oxygen barrier that conforms with with DIN  
 8 4726 which allows this synthetic pipe to be used in heating  
 9 applications. These three different layers are bonded to each  
 10 other by two high-quality, homogenous connecting layers.  
 11

See page 7 for more detailed information about cross-linking.



### HENCO 5L PE-Xc WITH PROTECTION HOSE

See page 24 for the specifications of the protection hose



## Technical characteristics of the HENCO 5L PE-Xc synthetic pipe

### Technical profile of the HENCO 5L PE-Xc synthetic pipe

Outer diameter (mm)	12	14	16	17	18	20	25	32
Inner diameter (mm)	8	10	12	13	14	16	20.4	26.2
Wall thickness (mm)	2	2	2	2	2	2	2.3	2.9
Max. working temperature (°C)	Depending on the application classes and dimensions (see DIN EN ISO 15875-2 table)							
Application class (ISO10508)	2 - 4 - 5	2 - 4 - 5	2 - 4 - 5	2 - 4 - 5	2 - 4 - 5	2 - 4 - 5	2 - 4 - 5	2 - 4 - 5
Max. working pressure (bar)	Depending on the application classes and dimensions (see DIN EN ISO 15875-2 table)							
Coefficient of thermal conductivity (W/mK)	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
Coefficient of linear expansion (mm/mK)	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Surface roughness of inner pipe (μ)	7	7	7	7	7	7	7	7
Oxygen diffusion DIN 4726 (g/m <sup>2</sup> /day)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Degree of cross-linking (%)	60	60	60	60	60	60	60	60
Weight (kg/m)	0.065	0.086	0.088	0.091	0.095	0.117	0.172	0.274
Flow (l/h)	0.050	0.079	0.113	0.133	0.154	0.201	0.327	0.539

### Application class table (DIN EN ISO 15875-1)

Application class table (DIN EN ISO 15875-1)							
Application class	$T_D$		$T_{max}$		$T_{mal}$		Typical application
	°C	Time <sup>a</sup> years	°C	Time years	°C	Time h	
1 <sup>a</sup>	60	49	80	1	95	100	Hot water supply (60°C)
2 <sup>a</sup>	70	49	80	1	95	100	Hot water supply (70°C)
4 <sup>b</sup>	20 + cumulative 40 + cumulative 60	2.5 20 25	70	2.5	100	100	Underfloor heating and low-temperature radiators
5 <sup>b</sup>	20 + cumulative 60 + cumulative 80	14 25 10	90	1	100	100	High-temperature radiators

**NOTE** This international standard does not apply for  $T_D$ ,  $T_{max}$  and  $T_{mal}$  greater than those shown in the table above.

a Countries can choose either class 1 or class 2 according to with their national legislation.

b Where there is more than 1 design temperature for a class, the times should be added together. "Plus cumulative" in the table implies a temperature profile for the aforementioned temperature over a certain period. (e.g. for class 5, the design temperature profile over 50 years is. This becomes 60 °C over 14 years, 80 °C over 10 years, 90 °C over 1 year and 100 °C over 100 hours respectively. .

### DIN EN ISO 15875-2 TABLE

Maximum working pressure table 5L PE-Xc (DIN EN ISO 15875-2)								
Application class	Ø12 x 2	Ø14 x 2	Ø16 x 2	Ø17 x 2	Ø18 x 2	Ø20X 2	Ø25 x 2.3	Ø32 x 2.9
1	10	10	10	10	8	8	6	6
2	10	10	10	8	8	6	6	6
4	10	10	10	10	10	8	8	8
5	10	10	8	8	8	6	6	6

Value expressed in bar