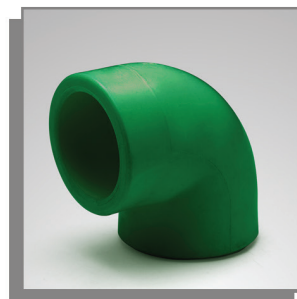
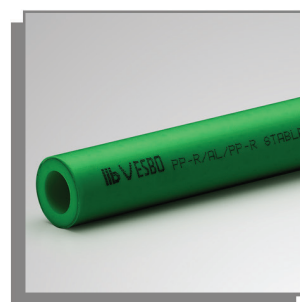


# PP-R HOT AND COLD WATER SYSTEMS





### **ARCON HANDELS GmbH**

Arcon Handels GmbH was established in 1982 in Munich and joined Kar Group of Companies in 1987. Being the engineering arm of VESBO PP-R pipes and fittings, Arcon is responsible for the research and product development of VESBO products as well as the supply of machineries and raw materials from Germany.

### **NOVAPLAST Plastik Sanayi ve Ticaret A.Ş.**

Established in Istanbul in 1992, Novaplast joined Kar Group of Companies in the year of 1994, in which, it merges its operation with Çamlıca Yapı Ltd. Şti. to streamline its operations and take advantage of the economies of scale to manufacture VESBO Polypropylene Random Co-polymer (PP-R) pipes and fittings. Among various things, Novaplast also manufactures other types of thermoplastic products in extrusion and injection moulding.

VESBO export department is responsible for European, Mediterranean and Middle East markets.

### **VESBO ASIA Pte. Ltd.**

VESBO was introduced to the Far East Markets in 1994. At present, VESBO Asia Pte. Ltd. a subsidiary of Kar Group of Companies, is the Asian marketing arm of VESBO, with its head office in Singapore. It is established to further introduce, market and assing distributors to spread its networks in the Asia Pacific region.

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## 1. CHARACTERISTICS

### 1.1 General

#### Raw Material

VESBO PP-R pipes and fittings are manufactured from high quality, Polypropylene Random Co-polymer resins (PP-R Type 3). Its physical and chemical properties make VESBO a versatile piping system in a wide range of applications in different industries. Its advantages over PP types 1 or 2 and other thermoplastic pipes in the potable water industries are its high impact strength and resistance to high temperatures.

### 1.2 Mechanical & Thermal Properties

Property	Test Method	Unit	Value
Resin Type		Polypropylene, Random Copolymer	
Density at 23° C	ISO 1183	g/cm <sup>3</sup>	0.9
Viscosity number	ISO 1628 T3	cm <sup>3</sup> /g	420 ml/g
Melt Flow Rate			
MFR 190° C / 5 kg	ISO 1133	g /10 min	0.5 - 0.7
MFR 230° C / 2.16 kg	ISO 1133	g /10 min	0.3 - 0.5
MFR 230° C / 5 kg	ISO 1133	g /10 min	1.3 - 1.5
Melting temperature	ASTM 3418	°C	141
Softening point (vicat)	ASTM D1525	°C	133
Crystalline melting temp.	ASTM E794	°C	150 - 154
Tensile Properties			
Tensile Stress at Yield	ISO 527	MPa	25
Tensile Strength at Break	ISO 527	MPa	40
Elongation at Break	ISO 527	%	>600
Tensile Modulus (23 °C)	ISO 527		850 MPa
Tensile Creep Modulus 1h	ISO 527	MPa	650
Tensile Creep Modulus 1000h	ISO 527	MPa	350
Flexural modulus (23 °C)	ISO 178	MPa	850
Flexural stress at 3,5% deflection	ISO 178	MPa	20
Ball indentation hardness	ISO 2039 T1 (132N)	MPa	45
Shear Modulus			
-10 °C	ISO 537 Method A	N/mm <sup>2</sup>	1100
0 °C	ISO 537 Method A	N/mm <sup>2</sup>	770
10 °C	ISO 537 Method A	N/mm <sup>2</sup>	500
20 °C	ISO 537 Method A	N/mm <sup>2</sup>	370
30 °C	ISO 537 Method A	N/mm <sup>2</sup>	300
40 °C	ISO 537 Method A	N/mm <sup>2</sup>	240
50 °C	ISO 537 Method A	N/mm <sup>2</sup>	180
60 °C	ISO 537 Method A	N/mm <sup>2</sup>	140

Mechanical Strength Properties			
Determined by Impact Strength at 0°C	DIN 8078		no failure
Impact Strength (Charpy)	ISO 179/1eU		
23°C		kJ/m <sup>2</sup>	no failure
0°C		kJ/m <sup>2</sup>	no failure
-10°C		kJ/m <sup>2</sup>	no failure
Notched Impact Strength (Charpy)	ISO 179/1eA		
23°C		kJ/m <sup>2</sup>	20
0°C		kJ/m <sup>2</sup>	4
-10 B44		kJ/m <sup>2</sup>	3
Coefficient of Linear Thermal Expansion	DIN 53752	K <sup>-1</sup>	1.5x10 <sup>-4</sup>
Thermal Conductivity at 20°C	DIN 52612	W/mK	0.24
Specific Heat at 20°C	Adiabatic Calorimeter	kJ/kg K	2.0
Specific Surface Resistivity	ASTM D257	Ohm	> 10 <sup>14</sup> Ohm

### 1.3 Application Areas

- Potable water, hot & cold water, chemical, irrigation
- Residential apartments, condominiums, public housing
- Industrial plants dealing with chemicals, food processing, semi conductors
- Hospitals
- Schools, laboratories and chemical sewerage
- Hotels & Resorts

### 1.4 Behavior of VESBO According to DIN 8078 Under Long Term Hoop Stress

The service life of VESBO depends on the internal hoop stress over time subject to the temperature

Hoop stress is given as follows:

$$\delta = \frac{P \times (d-s)}{20 \times s}$$

where

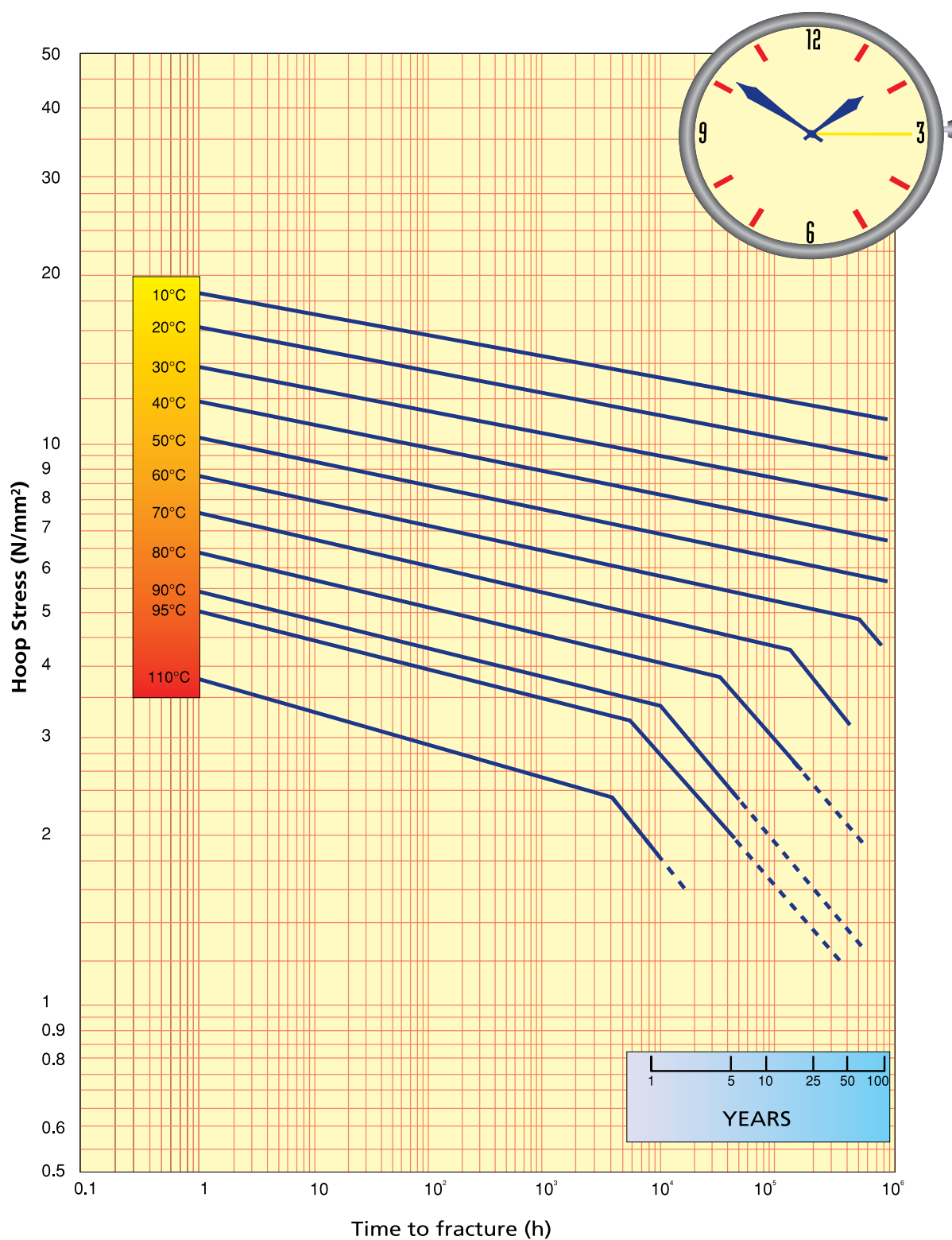
$\delta$  = Hoop stress (N/mm<sup>2</sup> or MPa)

$P$  = Internal pressure (bar)

$d$  = Outer diameter of pipe (mm)

$s$  = Wall thickness of pipe (mm)

Time-Hoop Stress Graph



## 1.5 Permissible Operation Pressure

Allowable operating pressures for PP-R pipes conveying water, safety factor (SF) = 1,5

The following table provides more detailed information with regards to the permissible pressure of various pipe pressure rating at various temperatures. These values are derived from the hoop stress chart and formula.

Under normal working pressures and conditions the average service life of VESBO pipes is projected to be 50 years or more.

### Examples:

A PN 10 cold water pipe, transporting water at a temperature of 30°C can last for more than 50 years under normal conditions with an operating pressure of 10.9 bars or 158 psi.

A PN 20 hot water pipe, transporting water at temperature of 70°C can last for more than 50 years under normal conditions with an operating pressure of 8.5 bars or 123 psi.

SDR= Standart Dimension Ratio  
(Diameter/Wall Thickness Ratio)  
SDR= d/s  
(s= Pipes series index from ISO 4065)

Temperature	Service Life, Years	For Water Installations, According to DIN 8077:2208 Safety-Factor of 1.5				
		VESBO Pipe SDR 11	VESBO Pipe SDR 7.4	VESBO Pipe SDR 6	VESBO Composite Faser Pipe SDR 6	VESBO Stable Pipe
		Nominal Pressure in Bars				
		PN 10 Cold Water	PN 16, Hot & Cold Water	PN 20, Hot & Cold Water	PN 20, Hot & Cold Water	PN 25, Hot & Cold Water
		Permissible Working Pressure at Various Temperatures (bars)				
20°C	1	15,0	23,7	29,9	29,9	37,7
	5	14,1	22,3	28,1	28,1	35,4
	10	13,7	21,7	27,4	27,4	34,5
	25	13,2	21,0	26,4	26,4	33,3
	50	12,9	20,4	25,7	25,7	32,4
	100	12,5	19,9	25,0	25,0	31,5
30°C	1	12,7	20,2	25,4	25,4	32,0
	5	11,9	18,9	23,8	23,8	30,0
	10	11,6	18,4	23,2	23,2	29,2
	25	11,2	17,7	22,3	22,3	28,1
	50	10,9	17,2	21,7	21,7	27,4
	100	10,6	16,8	21,1	21,1	26,6
40°C	1	10,8	17,1	21,6	21,6	27,2
	5	10,1	16,0	20,2	20,2	25,4
	10	9,8	15,5	19,6	19,6	24,7
	25	9,4	15,0	18,8	18,8	23,7
	50	9,2	14,5	18,3	18,3	23,1
	100	8,9	14,1	17,8	17,8	22,4
50°C	1	9,1	14,5	18,2	18,2	23,1
	5	8,5	13,5	17,0	17,0	21,4
	10	8,2	13,1	16,5	16,5	20,8
	25	7,9	12,6	15,9	15,9	20,0
	50	7,7	12,2	15,4	15,4	19,4
	100	7,5	11,8	14,9	14,9	18,8
60°C	1	7,7	12,2	15,4	15,4	19,4
	5	7,1	11,3	14,3	14,3	18,0
	10	6,9	11,0	13,9	13,9	17,5
	25	6,6	10,5	13,3	13,3	16,7
	50	6,4	10,2	12,9	12,9	16,2
70°C	1	6,5	10,3	12,9	12,9	16,3
	5	6,0	9,5	12,0	12,0	15,1
	10	5,8	9,2	11,6	11,6	14,6
	25	5,0	8,0	10,0	10,0	12,7
	50	4,2	6,7	8,5	8,5	10,7
80°C	1	5,4	8,6	10,8	10,8	13,7
	5	4,8	7,6	9,6	9,6	12,1
	10	4,0	6,4	8,1	8,1	10,2
	25	3,2	5,1	6,5	6,5	8,1
95°C	1	3,8	6,1	7,6	7,6	9,6
	5	2,6	4,1	5,2	5,2	6,5
	(10) <sup>a</sup>	(2,2)	(3,4)	(4,3)	(4,3)	(5,5)

## 1.6 Hygiene & Health Concerns

Health is taken as a major concern during production of VESBO pipes and fittings. Connection of pipes does not require additives such as cement solvent, fluxes or solder. To ensure the safety of VESBO pipes and fittings for usage relating to human contact and consumption with potable water the following are strictly adhered to:

- **DIN 1988 Part 2**

- Drinking Water Supply Systems, Materials, Components, Appliances, Design and Installation

- **SKZ - Hygiene Enstitute**

- Test Certificate Based on Hygiene Enstitute recommendations for Materials in Contact with Drinking Water

- **WRc**

- Test Certificate

- Water Bylaws Scheme/WRc, Tests of Effect on Water Quality based on BS 6920

## 1.7 UV Resistance

VESBO Products are produced with UV stabilisers. However, like all other piping systems including metals pipe works should not be left exposed under direct sunlight without insulating or protection from direct sunlight or UV radiation.

## 1.8 Fire Classification

VESBO pipes and fittings comply and are classified under the requirements of the fire classification, B2 (Normally inflammable) according to DIN 4102. In case of a fire outbreak of temperature  $>800^{\circ}\text{C}$ , under ideal conditions, with sufficient oxygen, only carbon dioxide and water vapour are produced as the raw material of Polypropylene Random Co-polymer is a hydrocarbon chain. Toxic fumes or dioxin will not be emitted.

## 1.9 Sound Insulation

Compared to metallic pipes, VESBO does not need further insulation to decrease the decibel level when water flows at relatively high speeds. The reason is simply that metals transmit noises quicker and louder, whereas, plastics dampen the noises. Hence "whistling" and noises resulting from water hammer effect are largely reduced to non-existence.

## 1.10 Advantages of Using VESBO

From the above properties of VESBO systems and application areas, compared to other conventional metal or plastic piping systems VESBO has the following advantages.

- Not detrimental to human health
- Rust and corrosion free
- Rupture free
- No scalling
- High resistance to acids and chlorides
- Noise free at high flow rates
- High pressure tolerances and rating
- Insulation is not necessary for interior applications
- Light weight
- Speed and ease of fusion technology
- Extensive savings in time and labour

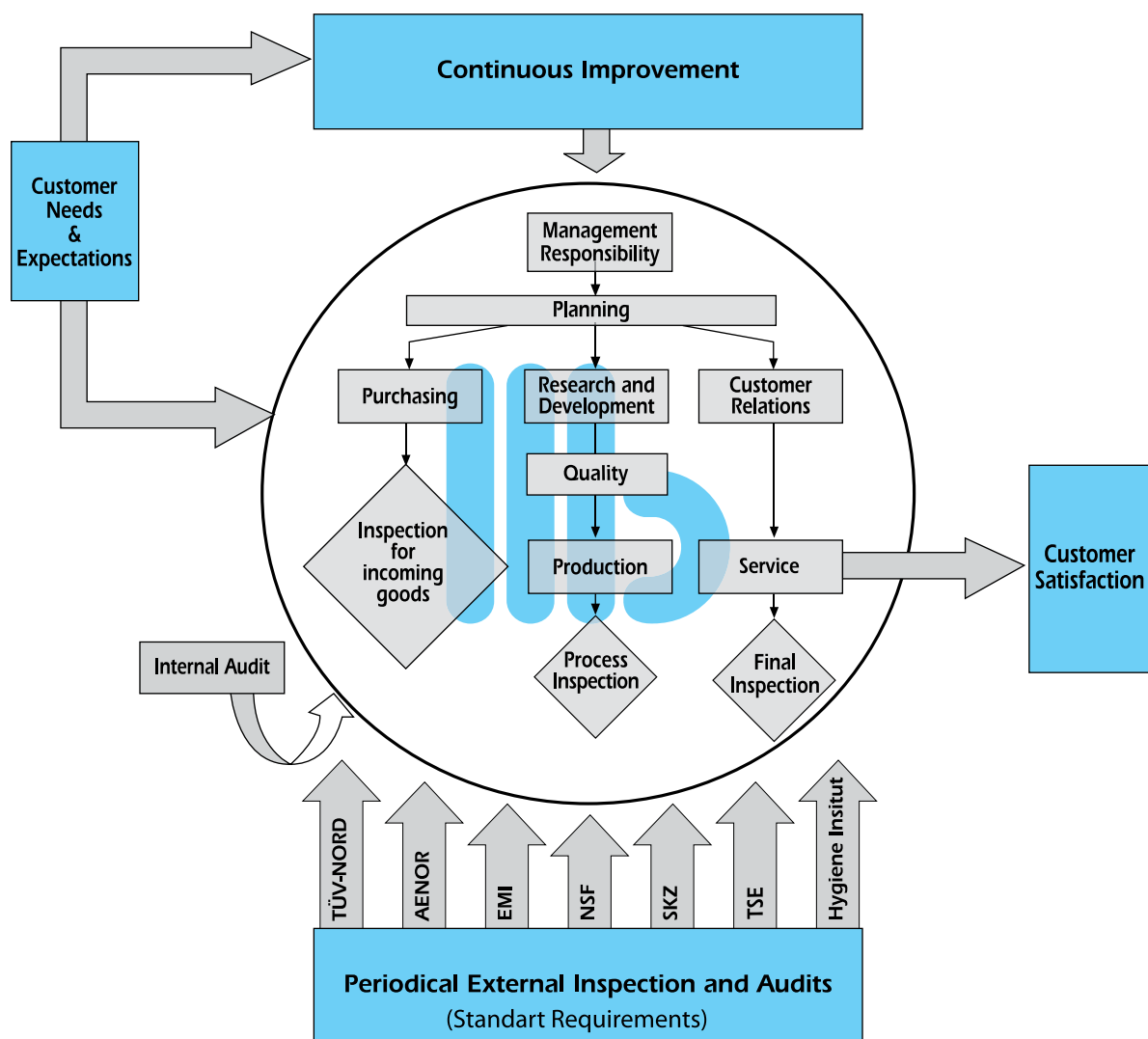


## 2. QUALITY ASSURANCE

### 2.1 Quality as the Strategic Focus

Quality process is an integral part of everything VESBO does. Quality action teams of VESBO throughout the world are continually working to improve products, processes and procedures to better meet customer requirements.

We have learned and adapted many of the best practices of successful better quality management systems to create our own VESBO Quality System. There is no end for quality. VESBO Quality System is designed to be a cycle:



Quality is engineered into VESBO products during the entire manufacturing process. The three phases of quality control involve the incoming raw material, the pipe production and the finished product. The combination of all three areas ensures that the final product will fulfill the requirements and meet the desired specifications.

## 2.2 Internal Control

VESBO pipes and fittings are periodically subjected to the following extensive test program according to the standards.

### Material Characterization Tests

Testing the incoming resin is the first step in the quality control program. It is usually checked for contamination, melt index, density, DSC and OIT. Any resin that does not meet the raw material specifications is not used for the production.



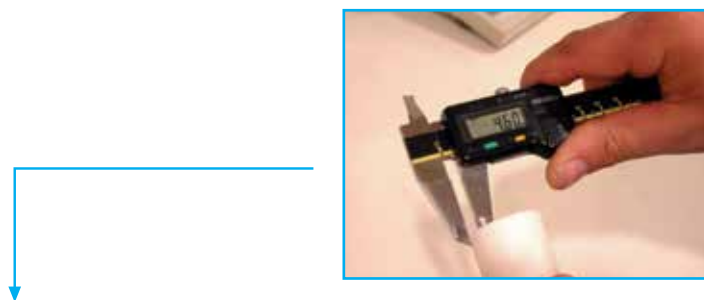
### Thermal Reversion Properties

Thermal properties of plastic materials are equally important as mechanical properties. Unlike metals, plastics are extremely sensitive to changes in temperature. This difference in the coefficient of thermal expansion develops internal stresses and stress concentrations in the polymer. Pipes are subjected to thermal stresses inside a thermostatic chamber with a continuous air circulation to observe shrinkage in accordance with DIN 8078, EN ISO 15874.



### Color Measurement Test with Spectrophotometry

Numeric color measurement means everyone involved in the supply chain speaks a universal color language. This new language lets you compare a measured color to a pre-established specification. And that enables you to control the color - maintain it within acceptable tolerances - at every step in your production process or supply chain.



### Dimensional Tests

Pipe diameter, wall thickness, ovality and length of pipe are measured on a regular basis to insure compliance with standard requirements. The outside diameter wall thickness shall comply with the DIN 8077 and EN ISO 15874 specifications.

## Mechanical Tests

The mechanical properties, among all the properties of plastic materials, are often the most important properties because virtually all service conditions and majority of end-use applications involve some degree of mechanical loading.

### Thermocycling Test

Thermocycling Testing determines the ability of parts to resist extremely low and extremely high temperatures, as well as their ability to withstand cyclical exposures to these temperature extremes.



### Impact Strength

Impact resistance is the ability of a material to resist breaking under a shock loading. Standard test specimens prepared from VESBO pipes are subjected to a pendulum type impact type load in accordance with DIN 8078 and EN ISO 15874.



### Creep Strength Test (Short Term)

VESBO Pipes are subjected to creep tests according to DIN 8078 that determines their service life and that provides the required information about the mechanical characteristics of the pipe. The long-term burst strength of pipes is determined by subjecting the pipes to constant internal pressure and observing time-to-failure.

### Thermal Stability Test ( 110 °C @ 8760 h )

A method for developing long-term hydrostatic design stresses, defined as the estimated tensile stress in the wall of the pipe in the circumferential orientation due to internal hydrostatic pressure that can be applied continuously with a high degree of certainty that failure of the pipe will not occur, for thermoplastic pipe materials is described.

The long-term performance of thermoplastic pipe materials is evaluated by stresses calculated for period 50 years.



### Peeling Strength Test

Peeling strength is generally used to measure adhesive band strength of a material for VESBO Stable Pipes, Alpex, Alpert Multilayer Pipes.

## 2.3 External Control

Beside the internal controls which are planned and maintained by qualified VESBO technical departments, there are also periodic external controls carried out by independent international organizations like TÜV-NORD, SKZ, TSE, AENOR, NSF, EMI and Hygiene Institut. These controls include both product testing according to relevant standards and whole quality system controls. Therefore external controls are the main tools for us to ensure the highest quality products hence satisfying our customers expectations.

## 2.4 Locate & Trace Tools

Locate and Trace Tools make easier handling (H), loading (L), storing (S) and tracing (T) processes with visual locating and comprehensive feedback data.

### Packaging



	 SN : 000009545555 KBT: 109740	Unequal T Raccordo a "T" Ridotto Té à 90° Réduit Te Reducida Trójnik redukcyjny Inegal T
SIZE / QTY	40x25x40 mm - 36 pcs / Box 6 pcs / Bag Class 2/8	 T-Stück 90° Reduziert 异径三通 Тройник уменьшитель تبه متقلص Teu redus
CODE	 112.1B.A05.HFH	

### Barcode Packaging Box Label For Fittings (H, L, S, T)

On each Vesbo fittings box you will find a labelling tag on which the article's dimensions, code, quantity and KBT (to trace if contents are genuinely produced by VESBO®) are mentioned.

*The article's name in different languages are also printed.*



### Barcode Packaging Box Label For Pipes (H,L,S,T)

Package or bundle of pipes is strapped with a barcode tag containing the article dimension, code, size, KBT and SN (serial numbers). Possible quality problems, shortage of goods during the packaging or dispatching process can be eliminated.

## 2.5 Standards

### Pipes & Fittings

<b>EN ISO 15874</b>	: Plastic Piping Systems for Hot and Cold Water Installations-Polypropylene(PP)
<b>EN ISO 15874-2:2013</b>	: Plastic Piping Systems for Hot and Cold Water Installations - Polypropylene pp - part 2: Pipes
<b>EN ISO 15874-3:2013</b>	: Plastic Piping Systems for Hot and Cold Water Installations - Polypropylene pp - part 3: Fittings
<b>DIN 8077:2008</b>	: Polypropylene (PP) Pipes – PP-H, PP-B, PP-R, PP-RCT – Dimensions
<b>DIN 8078:2008</b>	: Polypropylene (PP) Pipes – PP-H, PP-B, PP-R, PP-RCT – General Quality Requirements and Testing
<b>DIN 16962</b>	: Pipe Joints and Elements for Polypropylene Pressure Pipes
<b>DIN 16928</b>	: Pipe Joints, Elements for Pipes, Laying-General Conditions
<b>DIN 1988</b>	: Drinking Water Supply Systems, Materials, Components, Appliances, Design and Installation
<b>DIN 2999</b>	: Threads for Pipes and Fittings
<b>KWT Requirements</b>	: Plastics Used for Drinking Water
<b>DVS 2207</b>	: Welding of Thermoplastic Materials
<b>DVS 2208</b>	: Machines and Instruments for Welding of thermoplastic Materials
<b>ASTM F2389</b>	: Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems
<b>CSA B 137:11</b>	: Polypropylene (PP-R) Pipe and Fittings for Pressure Applications

## 2.6 Quality & Health Certificates

### Production Quality Certificates

- DIN EN ISO 9001: 2008 Design, Production, Marketing and Sales of Vesbo Plastic Pipes and Fittings and Miscellaneous Parts
- BS OHSAS 18001: 2007 Occupational Health and Safety Management Systems
- EN ISO 14001: 2005 Environmental Management Systems

### Product Quality & Health Certificates



#### GERMANY

- SKZ German Plastic Institute
- KTW Federal Health Office



#### USA

- NSF The Public Health and Safety Organization



#### SPAIN

- AENOR The Spanish Association for Standardization and Certification



#### RUSSIAN FEDERATION

- GOST-R State Committee of the Russian Federation for Standardization and Metrology
- Russian federation Ministry of Health-Sewerage Department , Recommendations for materials in contact with drinking water



#### ROMANIA

- ICECON Test Approval Certificate



#### POLAND

- TIN Institute of Building Technique
- PZH National Institute of Hygiene



#### CANADA

- NSF The Public Health and Safety Organization

**TURKEY**

- TSE Turkish Standards Institute

**PHILIPPINES**

- Industrial Technology Development Institute Standards and Testing Division

**SINGAPORE**

- TUV SUD PSB
- PSB Productivity & Standards Board, Public Utilities Board, Singapore Ministry of Environment Sewerage Department (Project Basis), Test Effect on Water quality based on BS 6920

**MALAYSIA**

- SIRIM, SPAN

**CHINA**

- MA/Ministry of Health
- Building Material Quality Inspection Testing Bureau

**VIETNAM**

- Directorate for Standards and Quality Vietnam Metrology Institute

**PORTUGAL**

- CERTIF

**CHILE**

- CESMEC

**KUWAIT**

- Ministry of Public Works

**KAZAKHSTAN**

- TEKS

**UKRAINE**

- SEPROKIEVBUDPROEKT Certification Center of Construction, Materials, Wares and Structures

- The image displays ten sample certificates and reports from various international organizations, arranged in a 3x4 grid with the last row containing only two samples. Each sample is numbered in the top left corner with a grey ribbon icon.

  - Sample 1:** TÜV CERT Certificate. Issued by TÜV SÜD. The certificate is for the TÜV CERT Certification Body of TÜV NORD CERT GmbH. It certifies the management system of the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 2:** SKZ Certificate. Issued by SKZ. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 3:** NSF International Certificate. Issued by NSF International. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 4:** Hy Certificate. Issued by Hy. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 5:** AENOR Certificate. Issued by AENOR. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 6:** kiwa Certificate. Issued by kiwa. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 7:** PSB Capixim Certificate. Issued by PSB Capixim. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 8:** Certif Certificate. Issued by Certif. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 9:** TÜV SÜD Certificate. Issued by TÜV SÜD. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.
  - Sample 10:** PSB Capixim Certificate. Issued by PSB Capixim. The certificate is for the company "Novaplast Plastik Sanyaj ve Ticaret A.Ş." and certifies the management system according to the standard ISO 9001:2008 / EN ISO 9001:2008.

### 3. PRODUCT RANGE

#### 3.1 VESBO® Composite Faser Pipe

**VESBO® Faser Pipe is the latest addition to the PP-R pipe range.**

It is a composite pipe consisting of 3 Layers, with 20% glass fiber/PP-R, sandwiched between PPR material in the inner layer and on the surface layer i.e. PP-R/GF/PP-R.

Faser pipes are used for chilled and hot water reticulation systems.

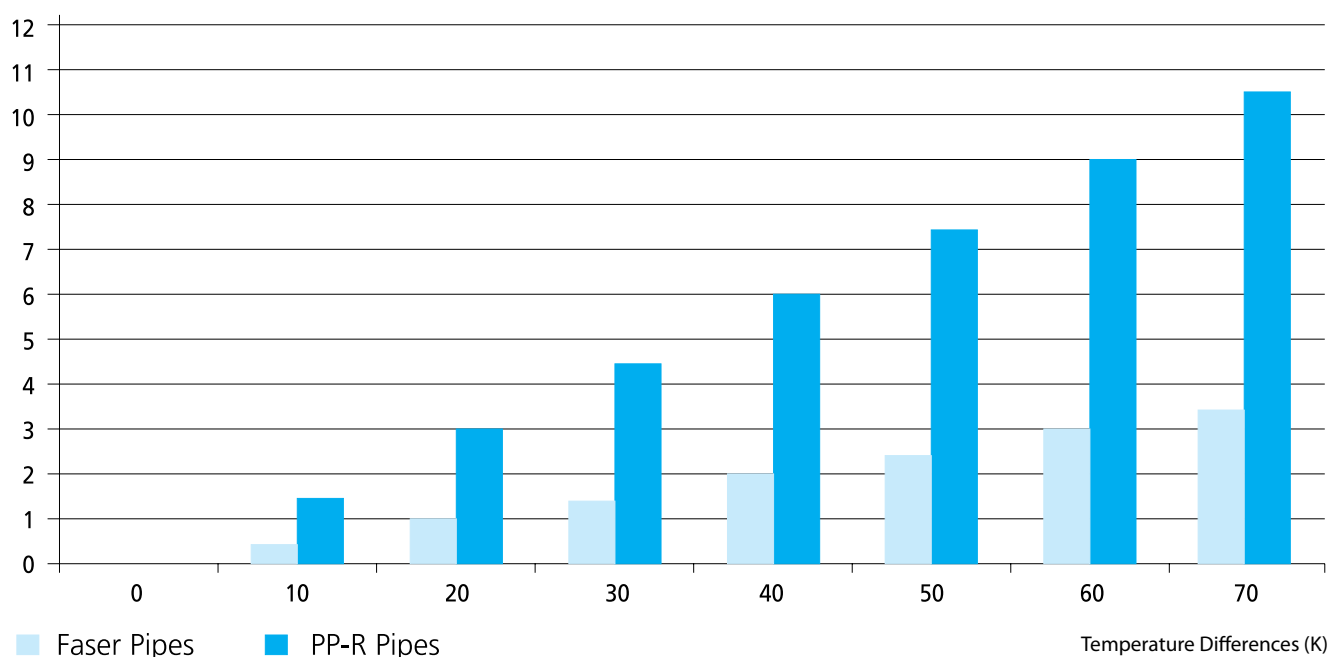
#### Linear Expansion

Compared to normal PP-R pipes, Faser pipes have a much lower extension when transporting hot water. As such, Faser pipes remain relatively straight at high temperatures. Pipe supports can be minimized.

#### Linear Expansion Comparison

#### Linear Expansion of PP-R and Faser Pipes

Linear Expansion Comparison (m/mm)



Coefficient of linear thermal expansion of VESBO faser pipes is 0.04 mm/mK.

Coefficient of linear thermal expansion of VESBO mono PP-R is 0.15 mm/mK.



### Permissible Operating Pressure

Compared to normal PP-R pipes, Faser pipes has better and longer projected life span at higher temperatures and pressure.

Maximum operational pressures for pipes consisting of PP-R 80 for water with Safety Factor (SF) = 1.25 (acc. to DIN 8077: 2007-05)					
Heating Period	Temperature (°C)	Years of Operating	PN 16 SDR 7.4 (bar)	PN 20 SDR 6 (bar)	PN 25 SDR 5 (bar)
Continuously	70	50	8.1	10.2	12.8
Continuous working at 70 °C including 60 days per year with	75	45	8.1	10.2	12.8
	80	40	7.8	9.8	11.6
	85	35	7.1	8.9	11.2
	90	30	6.3	7.6	8.4
Continuous working at 70 °C including 90 days per year with	75	45	7.3	9.9	12.2
	80	37.5	7.0	9.1	11.5
	85	32.5	6.2	8.0	10.4
	90	25	5.7	7.3	8.2

VESBO® PP-R + Glass Fiber=



Polypropylene Random Copolymer Pipe (PP-R) \_\_\_\_\_

Glass Fiber (GF) \_\_\_\_\_

Polypropylene Random Copolymer Pipe (PP-R) \_\_\_\_\_



## 3.2 Pipes



VESBO PN 10 (SDR 11) Pipes are suitable for cold water installations and low pressure systems.

### PN 10 (SDR 11) COLD WATER PIPE

CODE	OD x THICKNESS (mm)	m / PACK
111.1Y.E15.EC4T	20 x 2.3	100
111.1Y.E15.FC4T	25 x 2.3	100
111.1Y.E15.GC4T	32 x 2.9	100
111.1Y.E15.HC4T	40 x 3.7	60
111.1Y.E15.IC4T	50 x 4.6	40
111.1Y.E15.JC4T	63 x 5.8	28
111.1Y.E15.KC4T	75 x 6.8	20
111.1Y.E15.LC4T	90 x 8.2	12
111.1Y.E15.MC4T	110 x 10.0	8
111.1Y.E15.NC4T	125 x 11.4	4
111.1Y.E15.PC4T	160 x 14.6	4



VESBO PN 16 (SDR 7.4) Pipes are used for both hot & cold water installations and higher pressure systems

### PN 16 (SDR 7.4) HOT & COLD WATER PIPE

CODE	OD x THICKNESS (mm)	m / PACK
111.1Y.E13.EC4T	20 x 2.8	100
111.1Y.E13.FC4T	25 x 3.5	100
111.1Y.E13.GC4T	32 x 4.4	100
111.1Y.E13.HC4T	40 x 5.5	60
111.1Y.E13.IC4T	50 x 6.9	40
111.1Y.E13.JC4T	63 x 8.6	28
111.1Y.E13.KC4T	75 x 10.3	20
111.1Y.E13.LC4T	90 x 12.3	12
111.1Y.E13.MC4T	110 x 15.1	8
111.1Y.E13.NC4T	125 x 17.1	4
111.1Y.E13.PC4T	160 x 21.9	4



VESBO PN 20 (SDR 6) Pipes are used for both hot & cold water installations and higher pressure systems

### PN 20 (SDR 6) HOT & COLD WATER PIPE

CODE	OD x THICKNESS (mm)	m / PACK
111.1Y.E12.EC4T	20 x 3.4	100
111.1Y.E12.FC4T	25 x 4.2	100
111.1Y.E12.GC4T	32 x 5.4	100
111.1Y.E12.HC4T	40 x 6.7	60
111.1Y.E12.IC4T	50 x 8.3	40
111.1Y.E12.JC4T	63 x 12.5	28
111.1Y.E12.KC4T	75 x 12.5	20
111.1Y.E12.LC4T	90 x 15.0	12
111.1Y.E12.MC4T	110 x 18.3	8
111.1Y.E12.NC4T	125 x 20.8	4
111.1Y.E12.PC4T	160 x 26.6	8

## 3.2 Pipes



VESBO Composite Faser Pipes are preferred mainly for exposed pipe installations thanks to the low linear expansion rate and reinforced structure.

### SDR 6 COMPOSITE FASER PIPE FOR HOT & COLD WATER

CODE	OD x THICKNESS (mm)	m / PACK
111.1Y.E62.EC4T	20 x 3.4	100
111.1Y.E62.FC4T	25 x 4.2	100
111.1Y.E62.GC4T	32 x 5.4	60
111.1Y.E62.HC4T	40 x 6.7	40
111.1Y.E62.IC4T	50 x 8.3	20
111.1Y.E62.JC4T	63 x 10.5	20
111.1Y.E62.KC4T	75 x 12.5	12
111.1Y.E62.LC4T	90 x 15.0	12
111.1Y.E62.MC4T	110 x 18.3	8



VESBO Composite Faser Pipes are preferred mainly for exposed pipe installations thanks to the low linear expansion rate and reinforced structure.

### SDR 7.4 COMPOSITE FASER PIPE FOR HOT & COLD WATER

CODE	OD x THICKNESS (mm)	m / PACK
111.1Y.E63.EC4T	20 x 2.8	100
111.1Y.E63.FC4T	25 x 3.5	100
111.1Y.E63.GC4T	32 x 4.4	60
111.1Y.E63.HC4T	40 x 5.5	40
111.1Y.E63.IC4T	50 x 6.9	20
111.1Y.E63.JC4T	63 x 8.6	20
111.1Y.E63.KC4T	75 x 10.3	12
111.1Y.E63.LC4T	90 x 12.3	12
111.1Y.E63.MC4T	110 x 15.1	8



VESBO Stable Pipes are preferred mainly for exposed pipe installations thanks to the low linear expansion rate and reinforced structure.

### PN 25 (SDR 5) STABLE PIPE WITH ALUMINIUM FOR HOT & COLD WATER

CODE	OD x THICKNESS + OUTER LAYER (mm)	m / PACK
111.1Y.E21.E04T	20 x 3.4 + 0.5	100
111.1Y.E21.F04T	25 x 4.2 + 0.6	100
111.1Y.E21.G04T	32 x 5.4 + 0.7	60
111.1Y.E21.H04T	40 x 6.7 + 0.8	60
111.1Y.E21.I04T	50 x 8.3 + 1.0	40
111.1Y.E21.J04T	63 x 10.5 + 1.1	28
111.1Y.E21.K04T	75 x 12.5 + 1.4	20
111.1Y.E21.L04T	90 x 15.0 + 1.6	12
111.1Y.E21.M04T	110 x 18.3 + 2.0	8

### 3.3 Fittings



VESBO Sockets are used to join two pipes.

#### SOCKET

CODE	SIZE (mm)	PCS / PACK
112.1Y.A01.E00	20	280
112.1Y.A01.F00	25	180
112.1Y.A01.G00	32	119
112.1Y.A01.H00	40	75
112.1Y.A01.I00	50	36
112.1Y.A01.J00	63	16
112.1Y.A01.K00	75	16
112.1Y.A01.L00	90	7
112.1Y.A01.M00	110	4
212.9Y.A01.N00V *	125	1
212.9Y.A01.P00V *	160	1



VESBO Elbows are used where the pipeline makes a curve of 90°.

#### 90° ELBOW

CODE	SIZE (mm)	PCS / PACK
112.1Y.A02.E00	20	200
112.1Y.A02.F00	25	125
112.1Y.A02.G00	32	75
112.1Y.A02.H00	40	40
112.1Y.A02.I00	50	24
112.1Y.A02.J00	63	10
112.1Y.A02.K00	75	5
112.1Y.A02.L00	90	2
112.1Y.A02.M00	110	2
212.9Y.A02.N00V *	125	1
212.9Y.A02.P00V *	160	1



VESBO Elbows are used where the pipeline makes a curve of 45°.

#### 45° ELBOW

CODE	SIZE (mm)	PCS / PACK
112.1Y.A03.E00	20	200
112.1Y.A03.F00	25	120
112.1Y.A03.G00	32	75
112.1Y.A03.H00	40	48
112.1Y.A03.I00	50	25
112.1Y.A03.J00	63	12
112.1Y.A03.K00	75	5
112.1Y.A03.L00	90	3
112.1Y.A03.M00	110	2
212.9Y.A03.N00V *	125	1
212.9Y.A03.P00V *	160	1

\* These products may be supplied by an outsource

### 3.3 Fittings



VESBO T Parts are used to join branches on the main pipeline.

#### T-PART

CODE	SIZE (mm)	PCS / PACK
112.1Y.A04.E00	20	150
112.1Y.A04.F00	25	75
112.1Y.A04.G00	32	48
112.1Y.A04.H00	40	36
112.1Y.A04.I00	50	12
112.1Y.A04.J00	63	8
112.1Y.A04.K00	75	4
112.1Y.A04.L00	90	2
112.1Y.A04.M00	110	1
212.9Y.A04.N00V *	125	1
212.9Y.A04.P00V *	160	1



VESBO Reducers are used for joining bigger size pipelines to smaller size pipelines.

#### REDUCER

CODE	SIZE (mm)	PCS / PACK	SOCKET SIZE TO BE USED (mm)
112.1Y.A06.FE0	25 / 20	250	25
112.1Y.A06.GE0	32 / 20	180	32
112.1Y.A06.GF0	32 / 25	120	32
112.1Y.A06.HE0	40 / 20	100	40
112.1Y.A06.HF0	40 / 25	100	40
112.1Y.A06.HG0	40 / 32	105	40
112.1Y.A06.IE0	50 / 20	60	50
112.1Y.A06.IF0	50 / 25	60	50
112.1Y.A06.IG0	50 / 32	60	50
112.1Y.A06.IH0	50 / 40	60	63
112.1Y.A06.JE0	63 / 20	48	63
112.1Y.A06.JF0	63 / 25	40	63
112.1Y.A06.JG0	63 / 32	40	63
112.1Y.A06.JH0	63 / 40	30	63
112.1Y.A06.JI0	63 / 50	36	63
112.1Y.A06.KH0	75 / 40	16	75
112.1Y.A06.KI0	75 / 50	16	75
112.1Y.A06.KJ0	75 / 63	16	75
112.1Y.A06.LI0	90 / 50	12	90
112.1Y.A06.LJ0	90 / 63	12	90
112.1Y.A06.LK0	90 / 75	12	90
112.1Y.A06.MK0	110 / 75	6	110
112.1Y.A06.ML0	110 / 90	6	110
212.9Y.A06.NM0V *	125 / 110	1	125
212.9Y.A06.PM0V *	160 / 110	1	160

\* These products may be supplied by an outsource



VESBO Unequal T Parts used for both joining branches on pipelines and for transitions to different diameters like reducer parts.

**UNEQUAL T**

CODE	SIZE (mm)	PCS / PACK
112.1Y.A05.EFE	20 x 25 x 20	75
112.1Y.A05.FEE	25 x 20 x 20	75
112.1Y.A05.FEF	25 x 20 x 25	75
112.1Y.A05.FFE	25 x 25 x 20	75
112.1Y.A05.GEE	32 x 20 x 20	45
112.1Y.A05.GEF	32 x 20 x 25	45
112.1Y.A05.GEG	32 x 20 x 32	50
112.1Y.A05.GFE	32 x 25 x 20	60
112.1Y.A05.GFG	32 x 25 x 32	48
112.1Y.A05.HEH	40 x 20 x 40	36
112.1Y.A05.HFG	40 x 25 x 32	36
112.1Y.A05.HFH	40 x 25 x 40	36
112.1Y.A05.HGF	40 x 32 x 25	36
112.1Y.A05.HGH	40 x 32 x 40	30
112.1Y.A05.IEI	50 x 20 x 50	15
112.1Y.A05.IFI	50 x 25 x 50	15
112.1Y.A05.IGI	50 x 32 x 50	15
112.1Y.A05.IHI	50 x 40 x 50	12
112.1Y.A05.JEJ	63 x 20 x 63	8
112.1Y.A05.JFJ	63 x 25 x 63	8
112.1Y.A05.JGJ	63 x 32 x 63	8
112.1Y.A05.JHJ	63 x 40 x 63	8
112.1Y.A05.JIJ	63 x 50 x 63	8
112.1Y.A05.KEK	75 x 20 x 75	5
112.1Y.A05.KFK	75 x 25 x 75	5
112.1Y.A05.KGK	75 x 32 x 75	5
112.1Y.A05.KHK	75 x 40 x 75	5
112.1Y.A05.KIK	75 x 50 x 75	4
112.1Y.A05.KJK	75 x 63 x 75	4
112.1Y.A05.LHL	90 x 40 x 90	3
112.1Y.A05.LIL	90 x 50 x 90	3
112.1Y.A05.LJL	90 x 63 x 90	2
112.1Y.A05.LKL	90 x 75 x 90	2
112.1Y.A05.MIM	110 x 50 x 110	2
112.1Y.A05.MJM	110 x 63 x 110	2
112.1Y.A05.MKM	110 x 75 x 110	2
112.1Y.A05.MLM	110 x 90 x 110	2


**CROSS**

CODE	SIZE (mm)	PCS / PACK
112.1Y.A13.E00	20	105
112.1Y.A13.F00	25	60
112.1Y.A13.G00	32	32
112.1Y.A13.H00	40	20

### 3.3 Fittings



VESBO Caps are used as a stopper at the pipeline ends.

#### CAP

CODE	SIZE (mm)	PCS / PACK
112.1Y.A07.E00	20	350
112.1Y.A07.F00	25	270
112.1Y.A07.G00	32	150
112.1Y.A07.H00	40	90
112.1Y.A07.I00	50	50
112.1Y.A07.J00	63	24
112.1Y.A07.K00	75	16
112.1Y.A07.L00	90	9
112.1Y.A07.M00	110	4



VESBO Threaded Caps are for sealing the pipe ends during the pressure tests.

#### THREADED CAP

CODE	SIZE (mm)	PCS / PACK
112.1Y.A08.E00	20	300
112.1Y.A08.F00	25	300
112.1Y.A08.G00	32	200



#### LONG THREADED CAP\*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.A08.E00V	20	100
212.9Y.A08.F00V	25	100



VESBO Collectors provide a direct installation of pipes to the consumption points and minimize number of the fittings used.

#### COLLECTOR

CODE	SIZE (mm)	PCS / PACK
112.1Y.A09.GE0	20	30
112.1Y.A09.HE0	25	20



VESBO Flanges are used for joining big size pipes to each other and for transition of Vesbo pipelines to other Pipe systems (copper, steel, PVC, PB etc.) without any plastic or metal threaded parts. Moreover, the joint could be separated easily when required.

#### FLANGE

CODE	SIZE (mm)	PCS / PACK
112.1Y.A10.J00	63	24
112.1Y.A10.K00	75	20
112.1Y.A10.L00	90	10
112.1Y.A10.M00	110	8



VESBO Sleeves are used to fix the pipelines on ground or walls.

#### SLEEVE

CODE	SIZE (mm)	PCS / PACK
112.1Y.A16.E00	20	400
112.1Y.A16.F00	25	300
112.1Y.A16.G00	32	200
212.9Y.A13.H00V *	40	100
212.9Y.A13.I00V *	50	50
212.9Y.A13.J00V *	63	25
212.9Y.A13.K00V *	75	20
212.9Y.A13.L00V *	90	10
212.9Y.A13.M00V *	110	10



#### DOUBLE SLEEVE

CODE	SIZE (mm)	PCS / PACK
112.1Y.A14.E00	20	50
112.1Y.A14.F00	25	40
112.9Y.A14.G00V *	32	25



VESBO Pipe Bridges are used where a pipeline has to pass over the other pipeline.

#### PIPE BRIDGE

CODE	SIZE (mm)	PCS / PACK
113.1Y.M12.E00	20	50
113.1Y.M12.F00	25	40
113.1Y.M12.G00	32	25

\* These products may be supplied by an outsource



### 3.3 Fittings



#### OMEGA

CODE	SIZE (mm)	PCS / PACK
113.1B.O12.E00	20	50
113.1B.O12.F00	25	40
113.1B.O12.G00	32	20



#### BRIDGE WITH SOCKET \*\*

CODE	SIZE (mm)	PCS / PACK
213.1Y.M12.E00	20	50
213.1Y.M12.F00	25	40
213.1Y.M12.G00	32	25



#### C BRIDGE \*\*

CODE	SIZE (mm)	PCS / PACK
213.9Y.C12.E00V	20	50
213.9Y.C12.F00V	25	40



#### ELBOW WITH TAILED \*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.A19.EQ0V	20 x 1/2	100
212.9Y.A19.PQ0V	25 x 1/2	75

\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.



VESBO Female Adaptors are used as transition parts between VESBO and metal pipelines. These fittings are preferred mostly for permanent joints.

**ADAPTOR FEMALE**

CODE	SIZE (mm)	PCS / PACK
112.1Y.B11.EQ0	20 x ½	180
112.1Y.B11.ER0	20 x ¾	120
112.1Y.B11.FQ0	25 x ½	120
112.1Y.B11.FR0	25 x ¾	105
112.1Y.X15.GS0	32 x 1	48



VESBO Male Adaptors are used in transition of VESBO pipeline to metal threaded parts and pipelines. These fittings are preferred mostly for permanent joints.

**ADAPTOR MALE**

CODE	SIZE (mm)	PCS / PACK
112.1Y.X21.EQ0	20 x ½	140
112.1Y.B21.ER0	20 x ¾	90
112.1Y.B21.FQ0	25 x ½	120
112.1Y.X21.FR0	25 x ¾	90
112.1Y.X25.GS0	32 x 1	54



VESBO Hexagonal Female Adaptors are used as transition parts between VESBO and metal pipelines. These fittings are preferred mostly for permanent joints.

**HEX. FEMALE ADAPTOR**

CODE	SIZE (mm)	PCS / PACK
112.1Y.X11.GS0	32 x 1	40
112.1Y.B11.HT0	40 x 1 ¼	25
112.1Y.B11.IU0	50 x 1 ½	16
112.1Y.B11.JV0	63 x 2	12
112.1Y.B11.KW0	75 x 2 ½	6
212.9Y.B11.LX0V *	90 x 3	1
212.9Y.B11.MY0V *	110 x 3 ½	1

\* These products may be supplied by an outsource

### 3.3 Fittings



VESBO Hexagonal Male Adaptors are used in transition of VESBO pipeline to metal threaded parts and pipelines. These fittings are preferred mostly for permanent joints.

#### HEX. MALE ADAPTOR

CODE	SIZE (mm)	PCS / PACK
112.1Y.X21.GS0	32 x 1	36
112.1Y.B21.HT0	40 x 1 ¼	24
112.1Y.B21.IU0	50 x 1 ½	16
112.1Y.B21.JV0	63 x 2	12
112.1Y.B21.KW0	75 x 2 ½	8
212.9Y.B21.LX0V *	90 x 3	1
212.9Y.B21.MY0V *	110 x 3 ½	1



VESBO Female Elbows are used in transition between VESBO pipeline and metal threaded parts (battery, tap, etc.)

#### ELBOW FEMALE

CODE	SIZE (mm)	PCS / PACK
112.1Y.B12.EQ0	20 x ½	120
112.1Y.B12.FQ0	25 x ½	90
112.1Y.B12.FR0	25 x ¾	60
112.1Y.B12.GS0	32 x 1	30
112.1B.B12.GR0	32 x ¾	40



VESBO Male Elbows are used in transition between VESBO pipeline and metal threaded parts (battery, tap, etc.)

#### ELBOW MALE

CODE	SIZE (mm)	PCS / PACK
112.1Y.B22.EQ0	20 x ½	105
112.1Y.B22.FQ0	25 x ½	80
112.1Y.B22.FR0	25 x ¾	60
112.1Y.B22.GS0	32 x 1	24

\* These products may be supplied by an outsource



VESBO Female T parts are used in joints between VESBO pipelines and metal threaded parts

**T-PART FEMALE**

CODE	SIZE (mm)	PCS / PACK
112.1Y.B13.EQ0	20 x ½ x 20	90
112.1Y.B13.ER0	20 x ¾ x 20	60
112.1Y.B13.FQ0	25 x ½ x 25	60
112.1Y.B13.FR0	25 x ¾ x 25	50
112.1Y.B13.GR0	32 x ¾ x 33	32



VESBO Male T parts are used in joints between VESBO pipelines and metal threaded parts

**T-PART MALE**

CODE	SIZE (mm)	PCS / PACK
112.1Y.B23.EQ0	20 x ½ x 20	75
112.1Y.B23.FQ0	25 x ½ x 25	60
112.1Y.B23.FR0	25 x ¾ x 25	48
112.1Y.B23.GS0	32 x 1 x 32	28

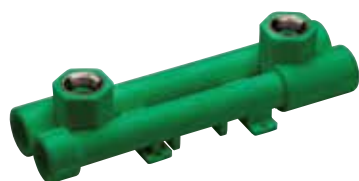


VESBO Wall Connection Elbows with their additional back parts are used to fasten the pipelines to the wall.

**WALL CONNECTION ELBOW**

CODE	SIZE (mm)	PCS / PACK
112.1Y.B14.EQ0	20 x ½	75
112.1Y.B14.FQ0	25 x ½	68

### 3.3 Fittings



#### ADJUSTABLE UNDER PLASTER ELBOW (NO NAME) \*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.B44.EQ0V	20 x ½	10
212.9Y.B44.FQ0V	25 x ½	10



#### DOUBLE STABLE UNDER PLASTER ELBOW \*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.B34.EQ0V	20 x ½	20
212.9Y.B34.FQ0V	25 x ½	20



#### UNION FEMALE

CODE	SIZE (mm)	PCS / PACK
112.1Y.G12.EQ0	20 x ½	160
112.1Y.G12.FR0	25 x ¾	90
112.1Y.G12.GS0	32 x 1	60
112.1Y.G12.HT0	40 x 1 ¼	30
112.9Y.G12.IU0V	50 x 1 ½	16
112.9Y.G12.JV0V	63 x 2	10

VESBO Female Unions are used in transition between fixed VESBO and metal pipelines. These fittings are preferred mainly for the installations in which temporarily renovation of the intermediate parts (valves, batteries, etc.) is required.

\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.



VESBO Male Unions are used in transition between fixed VESBO and metal pipelines. These fittings are preferred mainly for the installations in which temporarily renovation of the intermediate parts (valves, batteries, etc.) is required.

**UNION MALE**

CODE	SIZE (mm)	PCS / PACK
112.1Y.G22.EQ0	20 x ½	120
112.1Y.G22.FR0	25 x ¾	80
112.1Y.G22.GS0	32 x 1	48
112.1Y.G22.HT0	40 x 1 ¼	24
112.9Y.G22.IU0	50 x 1 ½	12
112.9Y.G22.JV0	63 x 2	10


**ADAPTOR WITH NUT (NO NAME) \*\***

CODE	SIZE (mm)	PCS / PACK
212.9Y.K00.EQ0V	20 x ½	120
212.9Y.K00.FR0V	25 x ¾	120


**ELBOW WITH NUT (NO NAME) \*\***

CODE	SIZE (mm)	PCS / PACK
212.9Y.K02.EQ0V	20 x ½	80
212.9Y.K02.FR0V	25 x ¾	60

\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.

### 3.3 Fittings



VESBO Valves are used as turn on/off and flow regulating units in pipelines.

#### VALVE

CODE	SIZE (mm)	PCS / PACK
112.1Y.C10.EQ0	20 x ½	24
112.1Y.C10.FR0	25 x ¾	25
112.1Y.C10.GS0	32 x 1	16



VESBO Chromium Valves are ball valves that are preferred mostly for the locations where aesthetics is important.

#### CHROMIUM VALVE

CODE	SIZE (mm)	PCS / PACK
112.1Y.C30.EQ0	20 x ½	30
112.1Y.C30.ER0	20 x ¾	20
112.1Y.C30.FR0	20 x ¾	30
112.1Y.C30.GS0	32 x 1	20



#### CHROMIUM VALVE-LONG

CODE	SIZE (mm)	PCS / PACK
112.1Y.C40.EQ0	20 x ½	20
112.1Y.C40.FR0	25 x ¾	20
112.1Y.C40.GS0	32 x 1	16


**VALVE T-PART**

CODE	SIZE (mm)	PCS / PACK
614.1Y.B01.EQ0	20 x ½	60
614.1Y.B01.FR0	25 x ¾	40
614.1Y.B01.GS0	32 x 1	32



VESBO Ball Valves are preferred for a more practical usage with their handles to regulate the water flow.

**PLASTIC BALL VALVE**

CODE	SIZE (mm)	PCS / PACK
112.1Y.C20.EQ0	20 x ½	40
112.1Y.C20.FR0	25 x ¾	32
112.1Y.C20.GS0	32 x 1	18
212.1Y.C20.HT0*	40 x 1 ¼	6
212.1Y.C20.IU0*	50 x 1 ½	4
212.1Y.C20.JV0*	63 x 2	2
212.1Y.C20.KW0*	75 x 2 ½	1


**PP-R BRASS UNION STOP VALVE \*\***

CODE	SIZE (mm)	PCS / PACK
212.9Y.Q60.EQ0V	20 x ½	20
212.9Y.Q60.FR0V	25 x ¾	18
212.9Y.Q60.GS0V	32 x 1	15
212.9Y.Q60.HT0V	40 x 1 ¼	9

\* These products may be supplied by an outsource

\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.



### 3.3 Fittings



#### PP-R BRASS UNION BALL VALVE \*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.Q70.EQ0V	20 x ½	45
212.9Y.Q70.FR0V	25 x ¾	24
212.9Y.Q70.GS0V	32 x 1	18

VESBO Composite Faser Pipes are preferred mainly for exposed pipe installations thanks to the low linear expansion rate and reinforced structure.



#### RADIATOR STRAIGHT VALVE \*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.H01.E00V	20 x ½ "	50



#### RADIATOR ELBOW VALVE \*\*

CODE	SIZE (mm)	PCS / PACK
212.9Y.H02.EQ0V	20 x ½ "	40

\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.


**THERMOSTATIC RADIATOR VALVE - ELBOW \*\***

CODE	SIZE (mm)	PCS / PACK
212.1B.H12.EQ0V	20 x ½ "	50


**THERMOSTATIC RADIATOR VALVE - STRAIGHT \*\***

CODE	SIZE (mm)	PCS / PACK
212.1B.H11.EQ0V	20 x ½ "	40


**FUSION WELDING MACHINES \*\***

CODE	TYPE	PCS / PACK
214.CO.101.B22V	WELDING SET 1500w/220v	1
114.CO.102.C22V	MAXI WELDING SET 2000w/220v	1

Fusion Welding Machines are used for joining the pipes and fittings with socket fusion method. Desktop Welding Kits are recommended for the pipe sizes over 50 mm.



\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.

### 3.3 Fittings



Welding Adaptors are used for heating the pipe ends and fittings to be welded.

#### WELDING ADAPTOR \*\*

CODE	SIZE (mm)	PCS / PACK
214.1O.1A0.E00	20	50
214.1O.1A0.F00	25	50
214.1O.1A0.G00	32	50
214.1O.1A0.H00	40	40
214.1O.1A0.I00	50	30
214.1O.1A0.J00	63	20
214.1O.1A0.K00	75	10
214.1O.1A0.L00	90	4
214.1O.1A0.M00	110	2
214.1O.1A0.N00	125	1
214.1O.1A0.P00	160	1



Aluminium Foil Shavers are used to remove the outer PP-R layer and aluminium foil of the VESBO Stable Pipes' tips to be welded.

#### ALUMINIUM FOIL SHAVER \*\*

CODE	SIZE (mm)	PCS / PACK
214.1O.3B0.EF0	20-25	1
214.1O.3B0.GH0	32-40	1
214.1O.3B0.HI0	40-50	1
214.1O.3B0.IJ0	50-63	1
214.1O.3B0.JK0	63-75	1
214.1O.3B0.KL0	75-90	1
214.1O.3B0.LM0	90-110	1

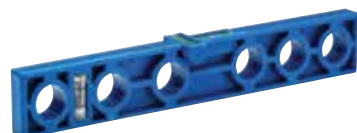
\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.



Cutters are used to shorten the pipes to the required length.

**CUTTERS & BLADES \*\***

CODE	SIZE (mm)	PCS / PACK
214.1O.2A0.E00	20-40	1
214.1O.2A0.H00	40-63	1
214.1O.2A4.000	CUTTER BLADE	1

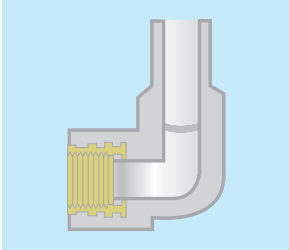

**WATER LEVELLER \*\***

CODE	TYPE	PCS / PACK
214.1M.4A0.000	WATER LEVELLER	1
214.1M.4B0.000	WATER LEVELLER STRAIGHT EDGE	1
214.1M.4C0.000	WATER LEVELLER SET BLUE	1

\*\* These accessories are not manufactured by VESBO; they are supplied from an outsource and can be subjected to modifications.

## 4. JOINTS, FUSSION & REPAIRS

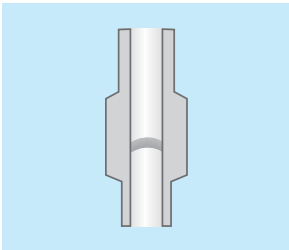
### 4.1 Homogeneous Joint



The result of a socket fusion or electrofusion joint is a homogeneous joint. This is one of the biggest advantages of using VESBO system:

- 100% leak-proof
- No maintenance
- Visual inspection possible
- Perfect for concealed installation that needs corrosion- free joining system.

### 4.2 Fusion Tools



- Socket Fusion Welding Tool
- Desktop Welding Machine
- Electrofusion Welding Kit

Please refer to the operating manuals of various welding tools.

### 4.3 Four-Step Fusion Process



#### Step 1

Cut pipe to the required length using a cutter, mark the welding depth on the pipe, ensure that the indicator light on the welding tool signals that the tool is hot enough (260 °C) for welding.



#### Step 2

The tip of the pipe to be welded is shaved by a special VESBO shaver to remove outside PP-R layer and aluminium foil. (This step is applicable only to Stable Pipes with aluminium foil.)



#### Step 3

Push the pipe and fitting into the welding adaptors, applying even strength at both ends. Do not twist or turn the pipe and fitting while pushing. Wait until heating time is reached. See the table on section 4.5 for necessary information).



#### Step 4

When the welding time is reached, remove both pipe and fittings together, again without twisting or turning while pulling out of the welding adaptors. Almost immediately, push both the pipe and fitting together until the depth is reached. It is possible to adjust the joints for more than 5 degrees during the time. Thus the fusion process is completed.

#### 4.4 VESBO Desktop Welding Machine Operating Manual

VESBO desktop welding machine is designed for a efficient and operative fusion for specifically large diameter (50 mm to 110 mm) pipes. Because of its simple appliance, it is not necessary to use complicated equipments.



##### Step 1

To prevent formation of gaps inside the joint, check the pipe and the fitting which are placed into clamping jaws whether they fit well into each other before the welding process. Use a pipe support if the pipe is longer than 50 cm for a correct alignment.



##### Step 2

Operate the welding machine by turning the switch on and ensure that the indicator light on the welding machine signals that the welding sockets are hot enough (260 °C) for welding.



##### Step 3

Insert the pipe and fitting into the sockets of the adaptor plate slowly by using the handle and wait until heating time is reached. See the table on section 4.5 for necessary information.



##### Step 4

When the welding time is reached, separate the sockets from the pipe and fitting by using the handle and lift the adaptor plate up. Almost immediately, push both pipe and fitting together until the required depth is reached by using the handle.



##### Step 5

Keep the joint under stress for 1 minute without turning the handle back. Then wait until the cooling time is reached. Release the grips of the clamping jaws. Thus the fusion process is completed.



## 4.5 Welding Depth, Heating, Welding and Cooling Time

The table below provides the necessary information for a good welding joint for various VESBO pipe and fitting sizes. (It also applies to stable pipes.)

Pipe Diameter (mm)	Welding Depth (mm)	Heating Time (sec.)	Welding Time (sec.)	Cooling Time (min.)
20	14.0	5	4	2
25	15.0	7	4	2
32	16.5	8	6	4
40	18.0	12	6	4
50	20.0	18	6	4
63	24.0	24	8	6
75	26.0	30	8	8
90	29.0	40	8	8
110	32.5	50	10	8

**Note:** Heating time starts when both pipe and fitting are pushed into correct depth. Welding time begins when joints are connected. Cooling time is the time taken for the joint completely cured. Never try to reduce cooling time by pouring water or by other means.

## 4.6 Pipe Repair

Pipe repair may be carried out by one of the following methods depending on the following:

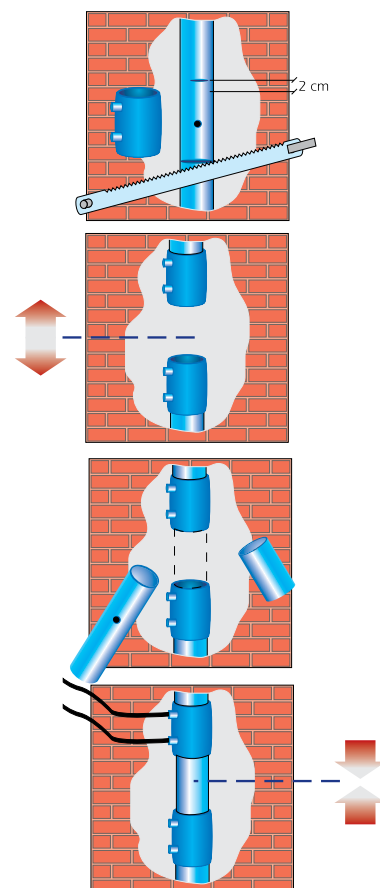
### Pipe with nail holes (not concealed)

If the damaged part of the pipe is not concealed yet (before the pressure test is conducted) the recommended procedure is to cut out that part and replace it by a new part through normal welding for a socket.

### Pipe concealed with two through holes

Using Electrofusion Fittings (see picture on the right)

- Cut the damaged pipe perpendicular by a length equal to that of the corresponding electric socket plus 2 cm.
- Remove the section of the damaged pipe.
- Carefully clean the surfaces of the two pipe sections to be joined, using sanpaper and solvent liquid and wait until the parts of the pipe are perfectly dry.
- Remove the inner stops from 2 electric sockets.
- Fully insert the electric sockets into the pipe section.
- Cut a pipe section having the same diameter and length as the damaged one.
- Fit it into the place of the previous one. Make the 2 electric sockets slide towards the middle of the new pipe piece, by a section equal to the half the length of the socket.
- Weld the socket using an electrofusion welding kit.



### Pipe with one nail hole (concealed)

With a pipe repairing kit you can easily repair holes (max. 10 mm diameter) on the surface of a pipe. This system makes the repairing process easier especially for the pipes installed into places where it is difficult to reach. Only a welding kit, a pipe repairing socket, a pipe repairing stick and a drill with a 6 mm or 10 mm tip is needed.



Insert the repairing socket into the welding tool.



Adjust the pipe clip on the socket according to the wall thickness of the pipe to be repaired. It is adjusted by adding a tolerance of +0.1 mm to the wall thickness and moving the rings on the socket. The related data are given in the table on the right.



If the hole diameter on the pipe surface is equal to or smaller than 5 mm expand it with a 6 mm tip. If it is equal to or smaller than 9 mm use a 10 mm tip.



Ensure that the welding tool is hot enough.



Insert the hole to be repaired into the male part of the socket to heat the plastic around the hole and insert the repairing stick to the female part of the socket to heat it.



Adhere to heating, welding and cooling periods for a good welding joint. Increase the periods by 50% when the air temperature is below +5°C



Insert the pipe repairing stick without exceeding the pipe's wall thickness.



Cut the remaining part after the stick cools down.



After an hour later, the pipe should be subjected to a pressure test with its normal operating pressure to see whether it will leak. If the pressure test is successful the repair is completed.

VESBO Pipe	Outer Diameter (mm)	Wall Thickness (mm)	Depth of Socket Clip on the Socket (mm)
SDR 11	20	2.3	2.4
SDR 11	25	2.3	2.4
SDR 11	32	2.9	3.0
SDR 11	40	3.7	3.8
SDR 11	50	4.6	4.7
SDR 11	63	5.8	5.9
SDR 11	75	6.8	6.9
SDR 11	90	8.2	8.3
SDR 11	110	10.0	10.1
SDR 6	20	3.4	3.5
SDR 6	25	4.2	4.3
SDR 6	32	5.4	5.5
SDR 6	40	6.7	6.8
SDR 6	50	8.3	8.4
SDR 6	63	10.5	10.6
SDR 6	75	12.5	12.6
SDR 6	90	15.0	15.1
SDR 6	110	18.3	18.4
SDR 7.4	20	2.8	2.9
SDR 7.4	25	3.5	3.6
SDR 7.4	32	4.4	4.5
SDR 7.4	40	5.5	5.6
SDR 7.4	50	6.9	7.0
SDR 7.4	63	8.6	8.7
SDR 7.4	75	10.3	10.4
SDR 7.4	90	12.3	12.4
SDR 7.4	110	15.1	15.2



## 5. CHEMICAL RESISTANCE

### 5.1 General

VESBO has high resistance to various acids and chlorides due to the chemical properties of polypropylene. As such, VESBO is highly suitable for transportation of hard or soft water or potable water with consumable amount of chlorine, fluids, DI water or industrial chemicals.

### 5.2 Chemical Resistance Chart

The following chart is given for our customers to have an idea for the chemical resistance of VESBO Pipes and Fittings. The customers are strictly recommended to consult our technical department ([technical@vesbo.com](mailto:technical@vesbo.com)) before the design stage of the project.

**G : Good / S : Satisfactory / NS : Non Satisfactory**

Reagent	Concentration	Temperature °C		
		20°C	60°C	100°C
Acetic anhydride	100 %	G	-	-
Acetic di-tri-chloroacetic	sol.	G	-	-
Acetic acid	up to 40 %	G	G	-
Acetic acid	50 %	G	G	S
Acetic glacial acid	over 96 %	G	S	NS
Acetone	100 %	G	S	-
Acetophenone anhydride	100 %	G	S	-
Acrylonitrile	100 %	G	-	-
Air		G	G	G
Almond oil		G	-	-
Alum	sol.	G	-	-
Ammonia (gas)	100 %	G	-	-
Ammonia (saturated in water)		G	G	-
Ammonia liquor	up to 30 %	G	G	-
Ammonium acetate	sat. sol.	G	G	-
Ammonium bicarbonate	sat. sol.	G	G	-
Ammonium chloride	sat. sol.	G	G	-
Ammonium fluoride	sol.	G	G	-
Ammonium hydroxide	sol.	G	-	-
Ammonium methaphosphate	sat. sol.	G	G	G
Ammonium nitrate	sat. sol.	G	G	G
Ammonium phosphate	sat. sol.	G	G	-
Ammonium sulphate	sat. sol.	G	G	G
Amyl acetate	100 %	S	-	-
Amyl alcohol	100 %	G	G	G
Aniline	100 %	S	-	-
Anisole	100 %	S	-	-
Apple juice		G	G	-
Barium carbonate	sat. sol.	G	G	G
Barium chloride	sat. sol.	G	G	G
Barium hydroxide	sat. sol.	G	G	G
Barium sulphate	sat. sol.	G	G	G
Benzoic, acid	sat. sol.	G	-	-
Benzoyl acid	100 %	G	G	-
Benzoin alcohol	100 %	G	S	-
Borax sol.		G	G	-
Boric acid	sat. sol.	G	G	-
Butane	100 %	G	G	-

**G : Good / S : Satisfactory / NS : Non Satisfactory**

Reagent	Concentration	Temperature °C		
		20°C	60°C	100°C
Butanol	100 %	G	S	S
Butyglycol	100 %	G	-	-
Butyphenol cold	sat. sol.	G	-	-
Butly phtalate	100 %	G	S	S
Calcium carbonate	sat.sol.	G	G	G
Calcium chloride	sat. sol.	G	G	G
Calcium hydroxide	sat. sol.	G	G	-
Calcium nitrate	sat. sol.	G	G	-
Carbon dioxide, gaesus, dry	100 %	G	G	-
Carbon dioxide, gaesus, wet		G	G	-
Carbon di-sulphide	100 %	NS	NS	NS
Carbon tetrachloride	100 %	NS	NS	NS
Castor oil	100 %	G	G	-
Chloroethanol (2-Chlorethanol)	100 %	G	-	-
Chorome alum	sat. sol.	G	G	-
Chromic acid	up to 40 %	S	S	NS
Citric acid	10 %	G	G	G
Coconut-oil		G	-	-
Corn-oil		G	S	-
Cotton-oil		G	S	-
Cresol	over 90 %	G	-	-
Cupric chloride	sat. sol.	G	G	-
Cupric nitrate	30 %	G	G	G
Cupric sulphate	sat. sol.	G	G	-
Cyclohexane	100 %	G	-	-
Cyclohexanol	100 %	G	S	-
Dextrin	sol.	G	G	-
Dextrose	sol	G	G	-
Di-butly phtalate	100 %	G	S	NS
Di-chloroacetic acid	100 %	S	-	-
Di-chloroethylene	100 %	S	-	-
Di-ethanolamine	100 %	G	-	-
Di-ethyl ether	100 %	G	S	-
Di-ethylen glycol	100 %	G	G	-
Di-glycolic acid	sat. sol.	G	-	-
Di-isooctyl phtalate	100 %	G	S	-
Di-methylamine	100 %	G	-	-
Di-methylformamide	100 %	G	G	-
Di-octyl phtalate	100 %	S	S	-
Dioxan	100 %	S	S	-
Ethanolamine	100 %	G	-	-
Ethylalcohol (ethanole)	up to 95 %	G	G	-
Ethylene chloride	100 %	NS	NS	-
Athyleneglycole	100 %	G	G	G
Formaldehyde	40 %	G	-	-
Formic acid	10 %	G	G	S
Formic acid	85 %	S	NS	NS
Formic acid (anhydrous)	100 %	S	S	S

**G : Good / S : Satisfactory / NS : Non Satisfactory**

Reagent	Concentration	Temperature °C		
		20°C	60°C	100°C
Fructose	sol.	G	G	G
Fruit juice		G	G	G
Glucose	20 %	G	G	G
Glycerine	100 %	G	G	G
Glycolic acid	30 %	G	-	-
Hexane	100 %	S	S	-
Hydrobromic, acid	up to 48 %	G	S	NS
Hydrocloroyc acid	2 %	G	G	G
Hydrocloroyc acid	10 %	G	G	-
Hydrocloroyc acid	30 %	G	S	S
Hydrocloroyc acid	35 %	G	-	-
Hydrocloroyc acid, gas, dry	100 %	G	G	-
Hydrofluoric acid	dil. sol.	G	-	-
Hydrofluoric acid	40 %	G	-	-
Hydrogen	100 %	G	-	-
Hydrogen peoxide	up to 10 %	G	-	-
Hydrogen peroxide	up to 30 %	G	-	-
Hydrogen sulphide, gas, dry	100 %	G	G	-
Iodine (alcoholic solution)		G	-	-
Isopropylalcohol	100 %	G	G	G
Isopropylether	100 %	S	-	-
Jelly	100 %	G	G	-
Lactic acid	up to 90 %	G	G	-
Lanolin		G	S	-
Linseed-oil		G	G	-
Magnesium carbonate	sat. sol.	G	G	G
Magnesium chloride	sat. sol.	G	G	-
Mercurous nitrate	sol.	G	G	-
Mercury	100 %	G	G	-
Melty acetate	100 %	G	-	-
Melty alcohol	5 %	G	S	S
Melty ethly ketone	100 %	G	-	-
Metlylamine	up to 32 %	G	-	-
Milk		G	G	G
Monochloracetic acid	over 85 %	G	G	-
Naphta		G	NS	NS
Nickel chloride	sat. sol.	G	G	-
Nickel nitrate	sat. sol.	G	G	-
Nickel sulphate	sat. sol.	G	G	-
Nitric acid	10 %	G	NS	NS
Nitric acid	30 %	S	-	-
Nitric acid, fuming		NS	NS	NS
Nitrobenzene	100 %	G	S	-
Olive-oil		G	G	S
Oxalic acid	sat. sol.	G	S	NS
Oxygen	100 %	G	-	-
Peanut-oil		G	G	-
Peppermint-oil		G	-	-

**G : Good / S : Satisfactory / NS : Non Satisfactory**

Reagent	Concentration	Temperature °C		
		20°C	60°C	100°C
Perchloric acid	2N	G	-	-
Petroleum-ether (ligroin)		S	S	-
Phenol	5 %	G	G	-
Phenol	90 %	G	-	-
Phosphoric acid	up to 85 %	G	G	G
Phosphorus oxychloride	100 %	S	-	-
Picric acid	sat. sol.	G	-	-
Potassium bicarbonate	sat. sol.	G	G	-
Potassium borate	sat. sol.	G	G	-
Potassium bromate	up to 10%	G	G	-
Potassium bromite	sat. sol.	G	G	-
Potassium carbonate	sat. sol.	G	G	-
Potassium chlorate	sat. sol.	G	G	-
Potassium chloride	sat. sol.	G	G	-
Potassium chromate	sat. sol.	G	G	-
Potassium cyanide	sol.	G	-	-
Potassium fluoride	sat. sol.	G	G	-
Potassium hydroxide	up to 50 %	G	G	G
Potassium iodite	sat. sol.	G	-	-
Potassium nitrate	sat. sol.	G	G	-
Potassium perchlorate	10 %	G	G	-
Potassium permanganate	2N	G	-	-
Potassium persulphate	V	G	G	-
Potassium sulphate	V	G	G	-
Propane	100 %	G	-	-
Propionic acid	over 50 %	G	-	-
Pyridine	100 %	S	-	-
Silicone-oil		G	G	G
Silver	sat. sol.	G	G	G
Sodium acetate	sat. sol.	G	G	G
Sodium benzoate	35 %	G	S	-
Sodium bicarbonate	sat. sol.	G	G	G
Sodium bisulfite	sol.	G	G	-
Sodium bisulphate	sat. sol.	G	G	-
Sodium carbonate	up to 50 %	G	G	s
Sodium chlorate	sat. sol.	G	-	-
Sodium chloride	10 %	G	G	G
Sodium chlorite	2 %	G	N	NS
Sodium chlorite	20 %	G	S	NS
Sodium dchromate	sat. sol.	G	G	G
Sodium hydroxide	1 %	G	G	G
Sodium hydroxide	up to 60 %	G	G	G
Sodium hypochlorite	5 %	G	-	-
Sodium hypochlorite	10 %	G	-	-
Sodium hypochlorite	20 %	S	-	-
Sodium metaphosphate	sol.	G	-	-
Sodium nitrate	sat. sol.	G	G	-

**G : Good / S : Satisfactory / NS : Non Satisfactory**

Reagent	Concentration	Temperature °C		
		20°C	60°C	100°C
Sodium ortho-phosphate	sat. sol.	G	G	-
Sodium perborate	sat. sol.	G	-	-
Sodium silicate	sol.	G	G	-
Sodium sulfite	sat. sol.	G	-	-
Sodium sulfite	40 %	G	G	G
Sodium sulphate	sat. sol.	G	G	-
Sodium thiosulphate	sat. sol.	G	-	-
Soybean-oil		G	S	-
Stannic chloride	sat. sol.	G	G	-
Succinic acid	sat. sol.	G	G	-
Sulphur dioxide, dry, gas	100 %	G	-	-
Sulphur dioxide, wet, gas	100 %	G	-	-
Sulphuric acid	up to 10 %	G	G	G
Sulphuric acid	100 %	G	G	-
Sulphuric acid	50 %	G	S	G
Sulphuric acid	96 %	G	S	NS
Sulphurous acid	sol.	G	-	-
Tartaric acid	10 %	G	G	-
Thiophene	100 %	G	S	-
Trichloroacetic acid	up to 50 %	G	G	-
Triethanolamine	sat. sol.	G	-	-
Urea	sat. sol.	G	-	-
Vinegar		G	G	-
Water, brackish		G	G	G
Water, distilled	100 %	G	G	G
Water, drinkable		G	G	G
Water mineral		G	G	G
Water (sea water)		G	G	G

## 6. HANDLING

<h1>You must not</h1>		1- subject the pipe ends to shock or impact	2- use pipes that are damaged or cracked at the interfaces
			
3- twist pipe or fittings after joining	4- use conical threads	5- expose VESBO to UV radiation for a long period	6- use metal plugs as connectors
			
7- subject VESBO to heavy shocks or falling stones	8- use excessive amounts of hemp when sealing in fittings	9- heat with a naked flame	10- bind up contaminated pipes or fittings
			
<h1>You must</h1>		1- handle VESBO with care	2- only use sharp tools to cut the pipe
			
3- not correct by more than 5° after joining	4- only use fittings with parallel threads, not tighten too firmly	5- store VESBO sheltered from sun and rain	6- use plastic plugs
			
7- protect exposed pipes from damage	8- only heat with hot air for bending, max bending temperature 140°C	9- use sealing tape or sealing compound; apply hemp moderately	10- only install clean material
			

## 7. DISCLAIMER

VESBO accepts no responsibility or liability whatsoever with regard to the any failure, defect or damage caused by situations and events including, but not limited to, the following:

- Misuse, abuse, neglect or improper handling or storage.
- Improper installation or use of accessories not in strict adherence to VESBO's below mentioned written general instructions.
- Defects in other manufacturer's components incorporated during installation.
- Fire, earthquake, flood, lightning, hurricane, tornado or other casualty or acts of God.
- Exposure to chemicals and many other local influences over which VESBO has no control.
- Any other cause not involving inherent manufacturing defects in the pipes and fittings supplied by VESBO.

The pipes and fittings are not warranted against color discoloration or other damage caused by normal weathering resulting from exposure to the elements. Normal weathering is defined as exposure to sunlight and extremes of weather and atmosphere which will cause any colored surface to gradually fade or accumulate stains.

VESBO shall have sole discretion to determine whether the pipe and fittings are suffering from normal weathering, which conclusion shall be based on reasonable criteria. In the event the material weathers to a degree which is determined by VESBO to be beyond normal, then VESBO shall either repair or replace, at its option.

VESBO reserves the right to discontinue or modify any of its products.

## 8. GENERAL INSTRUCTIONS

### 8.1 Transport & Storage

- Store VESBO sheltered from sun and rain. Do not expose to UV radiation for a long period.
- Handle VESBO with care at low temperatures. Do not store at temperatures below 0°C. Impacts can form cracks on pipes.
- Protect exposed pipes from damage; do not subject the pipe to heavy shocks or falling Stones.

### 8.2 Installation

- Install the VESBO pipes and fittings according to the pressure, temperature and expansion limitations indicated in VESBO's Technical Catalogue or on [www.vesbo.com](http://www.vesbo.com).
- Do not use pipes that are damaged or cracked at the interfaces. Use only special pipe cutter to shorten the pipe.
- Install only clean material; do not bind up contaminated pipes and fittings. Before welding, be sure that both pipe and fitting surfaces should be removed from chemicals and paint. If it is required to paint the installation after welding, insulate VESBO surfaces should be removed from chemicals and paint. If it is required to paint the installation after welding, insulate VESBO pipeline to prevent the passage of chemicals inside the paint, which will cause contamination of water or affect the service life of the installation, through the pipe wall. VESBO does not warrant any responsibility regarding the exposure to chemicals and paints. The customers are strictly recommended to consult our technical department before the design stage of the project.
- Use only fittings with parallel threads, do not use conical threads and do not tighten too firmly.
- Do not use metal plugs as connectors, prefer using plastic plugs.
- While sealing in fittings use sealing tape or sealing compound. If you have to use hemp; apply hemp moderately; do not use excessive amounts of hemp.
- For hot bending of pipes, a hot air gun should be used, not an open flame. The hot air temperature meeting the PP-R pipe surface should not exceed 140°C.
- Do not twist pipe or fittings after joining; correct by not more than 5°.
- For exterior installation, it is necessary to insulate VESBO to prevent excessive heat loss and to protect from UV radiation.
- For a good welding joint, refer to the welding depths and periods that are indicated in VESBO's Technical Catalogue Part 4. Ensure that the indicator light on the welding tool signals that the tool is hot enough (260°C).
- It is recommended to cut the pipe ends by 4-5 cm before the welding process.
- Temperature of the welding adaptors should be high enough for welding process. After the indicator light on the welding machine switches off, adaptors temperature will be suitable for welding. Welding process should be carried out after this signal. Cold welding affects the stabilization of the raw material and service life of the product.
- Everyday usage of the machine may cause excess temperature of 300-320°C. Excessive heat causes excessive melting of the material. To prevent this, the operator should wait the 2nd signal of the indicator light since the adaptors temperature does not change and fixes at 260°C after the 2nd signal.
- VESBO Caps are used ONLY during the pressure tests which should be carried out after the installation of the piping system. Do not use as a premanent stopper at the pipeline ends. Prefer fittings with parallel threads.

### 8.3 Chemical Resistance

- Consult VESBO Technical Department for transportation of a chemical before installation.
- Remove the installation from chemicals that can affect the service life. VESBO does not warrant any responsibility for the contaminated water that has been affected by permeable chemicals.

#### **Warning:**

VESBO products are not to be used with compressed air or gases. VESBO does not recommend that piping systems that include its products or components be tested with compressed air or compressed gases.



## **What the Consumer Must Do**

The original end user must immediately notify VESBO of any manufacturing defect and provide proof of the date of installation, as well as proof of property ownership, in order to provide VESBO an opportunity to investigate the claim and examine the material claimed to be defective. All notifications must be sent to Novaplast Co., ATTN: Quality & Control Dept. If requested, the original end user must submit a sample of the allegedly defective material to VESBO for analysis (shipping to be paid by VESBO). VESBO will then investigate the claim and examine the material claimed to be defective. If a defect covered by this warranty is confirmed, VESBO, within a reasonable amount of time after the inspection, will make the necessary repair or replacement, per the terms of this warranty.

**VESBO is a registered trademark of Novaplast Co.**



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