



## 6.1 GENERALITIES

The Heliroma PE-X pipes with and without barriers were projected for residential and industrial use. They do not suffer any type of corrosion and do not allow any calcareous

sediment to accumulate. These pipes are recommended for hot and cold sanitary waters, heating and radiating floors.

### 6.1.1 PROPERTIES OF POLETHYLENE FOR PE-X PIPES

| Properties                                      | Value                 | Test Method   | Unit              |
|-------------------------------------------------|-----------------------|---------------|-------------------|
| <b>Physical</b>                                 |                       |               |                   |
| Density                                         | 0.954                 | ISO 1183      | g/cm <sup>3</sup> |
| Melt flow rate (MFR) (190°C/21.6kg)             | 2.0                   | ISO 1133      | g/10 min          |
| <b>Mechanical</b>                               |                       |               |                   |
| Modular tension (23°C, v=1mm/min, drying agent) | 1100                  | ISO 527-1, -2 | MPa               |
| Tensile stress at Yield (23°C, v=50mm/min)      | 27                    | ISO 527-1, -2 | MPa               |
| Tensile strain at Yield (23°C, v=50mm/min)      | 9                     | ISO 527-1, -2 | %                 |
| <b>Hardness</b>                                 |                       |               |                   |
| Shore hardness (Shore D (3 sec))                | 65                    | ISO 868       |                   |
| Ball indentation hardness (H 132/30)            | 52                    | ISO 2039-1    | MPa               |
| <b>Thermal</b>                                  |                       |               |                   |
| VICAT Temperature                               |                       | ISO 306       |                   |
| (VST/A/50 K/h (10 N))                           | 132                   |               | °C                |
| (VST/B/50 K/h (50 N))                           | 80                    |               | °C                |
| Temperature Fluidity                            | 134                   | ISO 3146      | °C                |
| Thermal conductivity                            | 0.35                  |               | W/m°C             |
| Expansion coefficient                           | 1,4x10 <sup>-4</sup>  |               | m/m°C             |
| Linear coefficient 20°C/100°C                   | 2,05x10 <sup>-4</sup> |               | m/m°C             |
| Softening temperature                           | 133                   |               | °C                |
| Work temperature                                | - 10 a 95             |               | °C                |
| Specific heat                                   | 2.3                   |               | KJ/Kg °C          |

The PE-X pipes are manufactured with high density polyethylene. Crosslinking is a process which changes the chemical structure in such a way that the polymer chains are connected to each other in order to form a tridimensional network through chemical unions. The resulting structure makes fusion or the dissolution of the polymer impossible,

unless its structure is previously destroyed. Therefore, it is possible to determine the level of transversal union by measuring the gelling percentage. The pipes do not react to additives derived from cement and absorb the thermal expansion avoiding the appearance of cracks in the pipes or in the concrete.



## 6.2 PROPERTIES OF THE ANTI-DIFFUSION OXYGEN BARRIER (EVOH)

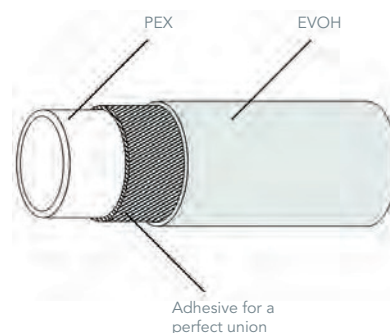
The barrier is comprised of a thin film of copolymer of ethylene and polyvinyl alcohol resins (EVOH). This resin is characterized by its unparalleled barrier properties to gases, odour and taste, as well as its excellent chemical resistance to solvents, products derived from petroleum and vegetable oils.

In hot water pipe applications in closed circuits, with the temperature increase, the pipes' inter-molecular spaces tend to be greater than the oxygen molecule.

The air oxygen molecules penetrate through the pipe's wall creating permanent oxygenation of the water and the consequent continued oxidation of the metal parts of the installation (valves, metal fittings, etc) reducing their durability

by generating material losses and oxidation deposits which can obstruct the pipelines.

The anti-diffusion of Oxygen barrier (EVOH) seals oxygen access and therefore increases the durability of the installation.



## 6.3 MECHANICAL CHARACTERISTICS

| Characteristics                 | Requirement                      | Testing Parameters                  |                     |             |                      | Test Method               |
|---------------------------------|----------------------------------|-------------------------------------|---------------------|-------------|----------------------|---------------------------|
|                                 |                                  | Hydrostatic stress (tangential) MPa | Test temperature °C | Test time h | Number of test tubes |                           |
| Resistance to internal pressure | No faults during the test period | 12                                  | 20                  | 1           | 3                    | ISO 1167-1 and ISO 1167-2 |
|                                 |                                  | 4,8                                 | 95                  | 1           | 3                    |                           |
|                                 |                                  | 4,7                                 | 95                  | 22          | 3                    |                           |
|                                 |                                  | 4,6                                 | 95                  | 165         | 3                    |                           |
|                                 |                                  | 4,4                                 | 95                  | 1000        | 3                    |                           |

## 6.4 PHYSICAL-CHEMICAL CHARACTERISTICS

| Characteristics                                     | Requirement           | Testing Parameters   |                             | Test Method           |                           |
|-----------------------------------------------------|-----------------------|----------------------|-----------------------------|-----------------------|---------------------------|
|                                                     |                       | Parameters           | Value                       |                       |                           |
| Longitudinal retraction                             | 3%                    | Temperature          |                             | 120° C                | UNE EN ISO 2505           |
|                                                     |                       | Test time for:       | e <sub>n</sub> ≤ 8mm        | 1h                    |                           |
|                                                     |                       |                      | 8mm < e <sub>n</sub> ≤ 16mm | 2h                    |                           |
|                                                     |                       |                      | e <sub>n</sub> > 16mm       | 4h                    |                           |
|                                                     |                       | Number of test tubes |                             | 3                     |                           |
| Thermal stability through hydrostatic pressure test | No faults during test | Type of test         |                             |                       | ISO 1167-1 and ISO 1167-2 |
|                                                     |                       | Hydrostatic stress   |                             | Water and air 2,5 MPa |                           |
|                                                     |                       | Test temperature     |                             | 110°C                 |                           |
|                                                     |                       | Test duration        |                             | 8760h                 |                           |
|                                                     |                       | Number of test tubes |                             | 1                     |                           |
| crosslinked by:                                     |                       |                      |                             |                       | ISO 10147                 |
| peroxide                                            | ≥70%                  |                      |                             |                       |                           |
| silane                                              | ≥65%                  |                      |                             |                       |                           |
| radiation                                           | ≥60%                  |                      |                             |                       |                           |
| azo                                                 | ≥60%                  |                      |                             |                       |                           |



## 6.5 MARKING

| Description                                        | Marked Symbol                     |
|----------------------------------------------------|-----------------------------------|
| Standard number                                    | ISO 15875                         |
| Manufacturer's name and/or trademark               | Name or code                      |
| Nominal rim diameter and thickness of nominal wall | ex.: 16x2,2                       |
| Pipe dimension class                               | ex.: A                            |
| Material                                           | PE-Xa                             |
| Application class combined with work pressure      | Field of application and pressure |
| Manufacturer information                           | Production Order and date         |

## 6.6 ADVANTAGES OF THE SYSTEM WITH PIPES PE-Xa (PE-X ROMA)

- Designed to work at high temperatures and pressures.
- Hammering damage is reduced when compared with metal pipes
- Resists the wear and tear caused by water
- Manufactured in rolls allowing easy transport
- Several certifications issued by International entities
- Do not react to water with low PH
- Silent system
- Not affected by corrosion
- Simple and easy installation
- Flexible

### CROSSLINK LEVEL BETWEEN PE-Xa Vs PE-Xb

| PE-X Type | Polyethylene Crosslinking Type | Minimum Crosslink Level EN ISO 15875 |
|-----------|--------------------------------|--------------------------------------|
| PE-Xa     | Peroxide                       | 70%                                  |
| PE-Xb     | Silane                         | 65%                                  |

## 6.7 PIPE CHARACTERISTICS

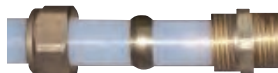
| Dimension (mm) | Thickness (mm) | Interior Diameter (mm) | Flow Limit (l/h) | Flow Limit (l/s) | Series |
|----------------|----------------|------------------------|------------------|------------------|--------|
| 12x2,0         | 2              | 8                      | 362              | 0.1              | 2.5    |
| 16x1,8         | 1.8            | 12.4                   | 869              | 0.241            | 4      |
| 16x2,0         | 2              | 12                     | 814              | 0.226            | 3.5    |
| 16x2,2         | 2.2            | 11.6                   | 761              | 0.211            | 3.2    |
| 20x1,9         | 1.9            | 16.2                   | 1483             | 0.412            | 5      |
| 20x2,0         | 2              | 16                     | 1447             | 0.402            | 4.5    |
| 20x2,8         | 2.8            | 14.4                   | 1172             | 0.326            | 3.2    |
| 25x2,3         | 2.3            | 20.4                   | 2352             | 0.653            | 5      |
| 25x3,5         | 3.5            | 18                     | 1831             | 0.509            | 3.2    |
| 32x2,9         | 2.9            | 26.2                   | 3880             | 1.078            | 5      |
| 32x4,4         | 4.4            | 23.2                   | 3042             | 0.845            | 3.2    |



## 6.8 ASSEMBLY TECHNIQUE



- 1) The pipe should be cut with an appropriate scissors. The blade should be positioned as perpendicular as possible to the pipe to be cut. The pipe should not present shavings.



- 2) In the mechanical fittings (ROMAFIT), the different elements should be installed in the following order on the pipe:
  - Pressure nut
  - Compression washer
  - Adapter to the end of the catch



- 3) With the Press fittings (ROMAPRESS – RF), the pipe should be inserted in the press fitting until the end of the pipe and then press with specific tool as shown in the image. In this case, the isolating ring is used to check if the pipe is correctly introduced in the fitting.



## 6.9 RECOMMENDATIONS FOR THE APPROPRIATED USE OF THE SYSTEM

### Storage

The HELIROMA PE-X pipes are supplied in a bar or coil, packed in a plastic sleeve and cardboard boxes. Avoid exposing the pipes to sunlight (UV rays) or chemical compounds which can jeopardize the integrity of the system.

### Bending the pipes

The PE-X HELIROMA can be bent without the use of any type of equipment. However, to obtain small bends, a reinforcement of the bend should be used.

### Bending the pipe

In the event that the pipe is bent during installation, it can be slightly heated with a hot air device so that the thermal memory is activated and the pipe recovers its original shape. Note that for this procedure, a flame should not be used as the uncontrolled temperature applied can compromise the integrity of the pipe.

### Support and installation of pipes

The application of pipes with a corrugated sleeve when installing distribution manifolds facilitates its substitution in case of repair. However, the contour of the curves should be reduced to the maximum and with a high radius of curvature for easy substitution.





## 6.10 INSTALLATION OF BUILT-IN PIPES

### Pipes applied with protective sleeves

Usually, the protective sleeve (e.g. corrugated sleeve) is used in embedded pipes with a diameter smaller or equal to 25mm when collectors in accessible boxes are used. This installation is easy and allows the pipe to be replaced without having to break a wall and/or floor. To remove the pipe, you only need to unlock the collector pipe and remove it through the water outlet. The pipe will be removed without difficulties and a new pipe can immediately be inserted.

To facilitate the work of removing or inserting a pipe in an embedded corrugated pipe in the wall, it is recommended that the curve bends have a minimum radius equal to eight times the diameter of the PE-X tube to be introduced. You should also avoid introducing cement between the pipe and the protective sleeve. In these cases, it is not necessary to consider the thermal expansion; you only need to fix the pipes to the ends of the walls or floor, for example, on the end of a collector and on the joint of the fixing base of the other.

### Pipes applied without a protective sleeve

Pipes can easily be embedded in pavements or walls because the expansion forces or contractions are minor when compared with metal pipes and do not originate any type of crack as a result of expansions.

#### 1. Thick walls

Apply cement paste of rapid curing on the changes of direction (Joints and Tees) at each 50 cm along the pipeline. Afterwards, fill with normal cement paste. This paste should be as thick or thicker than the pipe diameter.

#### 2. Thin walls

Apply strong cement past of rapid curing on the changes of direction (Joints and Tees) at each 50 cm along the pipeline. Afterwards, fill with strong cement paste.

When installing, place the pipe in order to avoid possible perforations. In the case of the application of pipes on the exterior of the wall, rail support should be used to keep its shape.

## 6.11 CERTIFICATION

| Product | Document No. | Certifying Entity |
|---------|--------------|-------------------|
| PEXROMA | TPM-025/2010 | CERTIF            |
|         | 001/005216   | AENOR             |

### Installation test

The pipe system should be slowly filled with water in order to avoid creating air bubbles and air should be purged from the system at the highest point. The system pressure test must be performed to guarantee that the system is sealed.

### Protocol Test

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