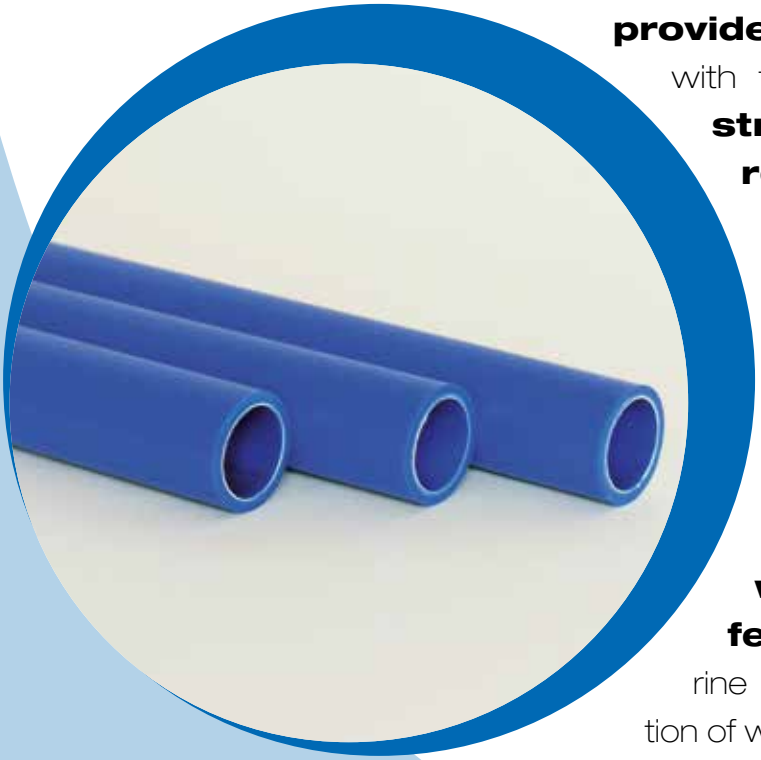
NADIR safe

The evolution of
PE100 Nadir pipe
for drinking water
and chemically treated fluids

INDUSTRIE ITALIANE nupi

The Product

NADIR*Safe* is a multilayer pipe specifically developed by **NUPI Industrie Italiane** to combine the **chemical barrier provided by a liner in PVDF** with the advantages offered by a **structural layer in crack-resistant PE100 RC.**



The presence of a suitable **inner layer in PVDF** gives the pipe **excellent performance in conveying water for human consumption and industrial water containing disinfectant agents** (chlorine, chlorine oxide, chloramines), the application of which tends to take a heavy toll on polyethylene pipes.

Applications

- **Distribution of drinking water**
- **Hospitals**
- **Pools**
- **Water treatment**
- **Energy engineering (cooling and water supply for general uses)**
- **Chemical plants**

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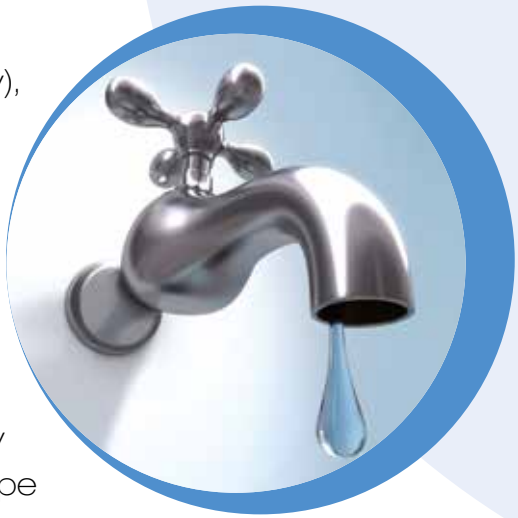
WHY CHOOSE NADIR*Safe*?

NADIR*Safe* was engineered mainly **to solve frequent problems caused by leaks** that tend to form near connections in the drinking water distribution lines.

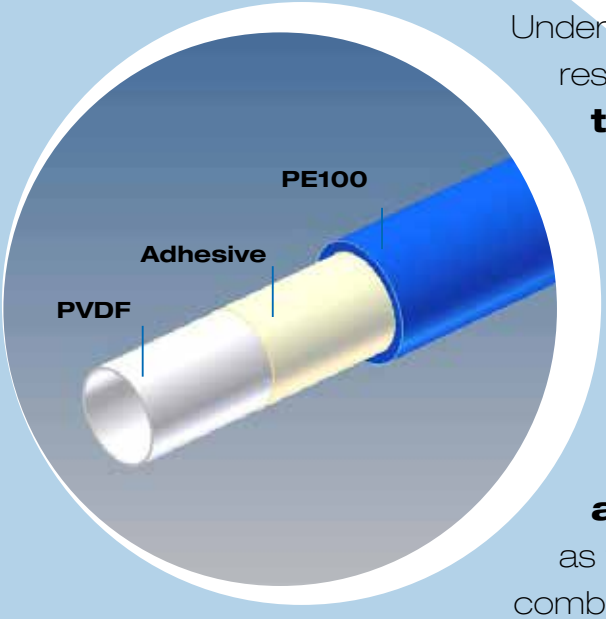


In many European countries (especially France and Italy), premature breaks have been reported, above all on 25 mm and 32 mm diameters (characterised by lower thickness).

Scientific studies demonstrated that **disinfectant agents cause premature consumption** (a few years) of the antioxidants contained in the polyethylene up to a depth of 1 mm.

The structural layer is therefore worn in proportions that vary depending on the diameter (for example, ø 32 mm SDR11 pipe with 3 mm total thickness, may manifest 33% less mechanical resistance after functioning a few years under critical conditions).

This **chemical action** is then aggravated by mechanical forces caused not only by internal operating pressure but also by potential curves made in the pipes during laying/installation. The modulus of elasticity is a characteristic of the material; it indicates the resistance of a specific pipe with a specific thickness when subjected to bending.



Under conditions that already push the material to its limit of resistance for bending, **additional damage due to corrosive chemicals may indeed give rise to a drift in mechanical resistance**.

The effect of **fluid flow** must also be taken into account. Under high-speed flow, this effect may in fact exacerbate the damage described above by adding **"erosion"** to the numerous factors already taken into account.

This combination of factors highlights how **pipes are exposed to serious risk of failure**, as they are no longer capable of sustaining the complex combination of stress they are subjected to.

This **overlapping of effects (chemical and mechanical) may cause early degradation of polyethylene pipes**, which should instead have a life span of at least 50 years.

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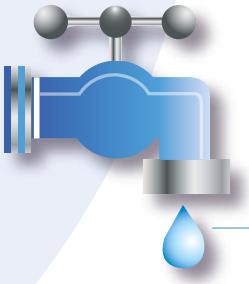
The factors that make this phenomenon more critical are:

- The dimensions of the pipe (small diameters and thicknesses)
- Operating and installation conditions (temperature, concentration of disinfecting agents, internal pressure, bending stress, fluid velocity)

The increasingly common practice of **chemical water disinfection** with chlorinating agents (with a strong oxidizing effect on polyethylene), such as sodium hypochlorite, chlorine dioxide and chloramines, used in more and more critical combinations of frequency/concentrations/temperature, and the **increased mechanical stress** on connections (bending stress that translates as tensile stress and compression within an already limited thickness) require an **alternative engineering solution** that is more accurate and offers greater guarantees for durability.



Millions of Euro and billions of cubic metres of water are wasted every year

Industrial cost of losses
226 million per year

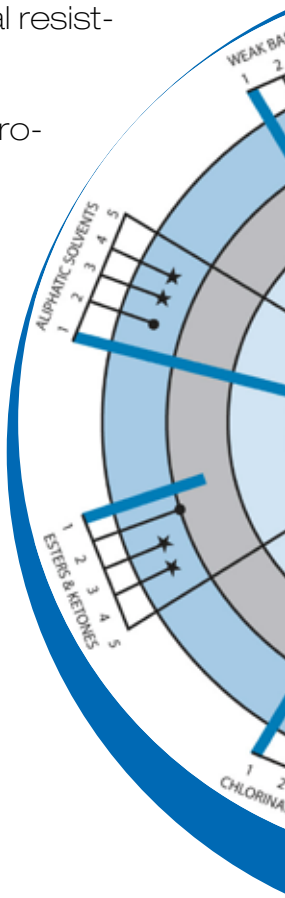
Quantity of water wasted
2.61 billion cubic metres per year

Lost proceeds for the Italian economy
3 billion per year

The solution proposed by **NUPI Industrie Italiane** is **NADIR*Safe*** pipes, which are chemically protected and structurally improved so as to guarantee maintenance of all the characteristic advantages of polyethylene pipes.

The multilayer NADIRSafe pipe consists of:

1. An **external layer in blue PE100 RC** for improved mechanical resistance.
2. An **inner layer in PVDF**, which serves as a chemical barrier to corrosive fluids. The grade of the PVDF used for this layer is suitable to come into contact with water for human consumption.
3. An **inner layer of adhesive** to help create a perfect seal between the PE100 RC and the PVDF.



RANGE OF DIAMETERS AVAILABLE

NADIR*Safe* was designed in diameters of **25, 32, 50, 63 mm** with **SDR11**

Quality Guarantee

NADIR*Safe* conforms to the following regulations:

- **EN 12201** for polyethylene piping systems for water supply intended for human consumption and for drainage and sewerage (thanks to a layer of PE100 RC)
- **ISO 21004** for multilayer thermoplastic pipe systems for the conveyance of water (up to 40°C)
- **UNI EN 1622** concerning odour and flavour requirements
- **DM174** concerning requirements for human consumption

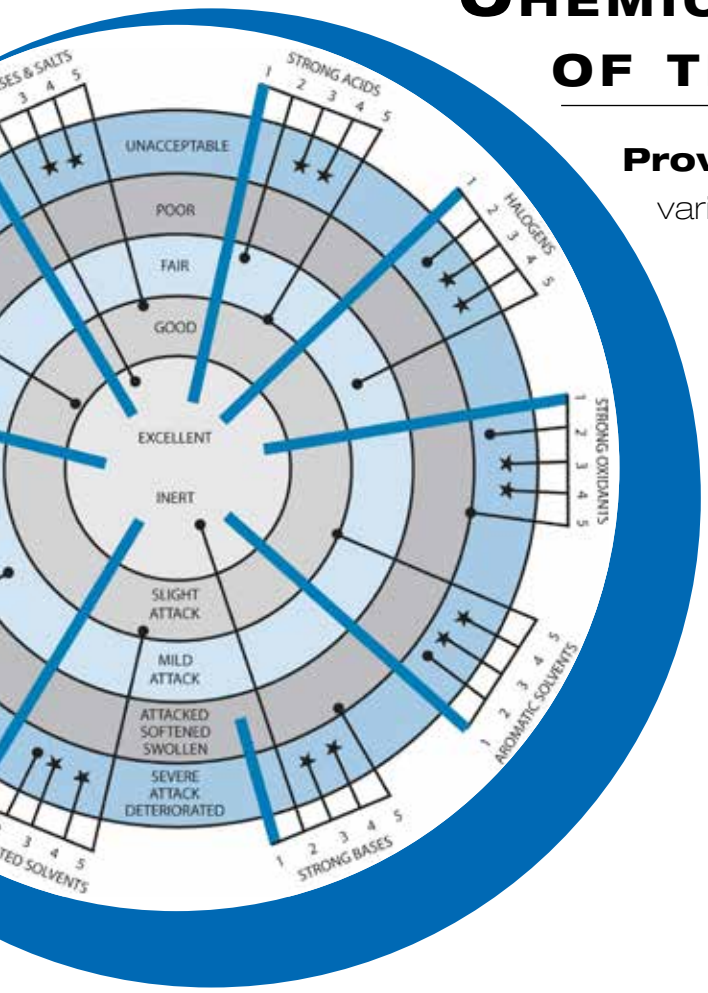
Characteristics and Advantages

- **High chemical resistance** to chlorinated waters and corrosive fluids
- **Electrically welded joints and complete traceability thanks** to barcode technology
- **High flexibility** and lightweight, comparable to PE100
- **High resistance to chipping, cracking, and point loading thanks** to the external layer in PE100 RC
- **Low head loss thanks** to the low roughness of the inner layer

Another important peculiarity of **NADIR*Safe*** is the possibility to continue using **standard joining and installation techniques** typical of a traditional polyethylene system.

NADIR*Safe* can be electrically welded by electrofusion and is therefore compatible with the whole range of **ELOFIT electrofusion fittings**.

Chemical performance of the PVDF barrier



Proven chemical resistance to a wide variety of chemical substances, like:

- **Acids**
- **Saline solutions**
- **Oxidising agents**
- **Alcohols**
- **Chlorinated solvents**
- **Hydrocarbons**

The chemical barrier offered by this fluoropolymer ensures **the complete mechanical integrity of the PE100 RC** and grants the pipes **high durability** under the most critical operating conditions in terms of "stress cracking".

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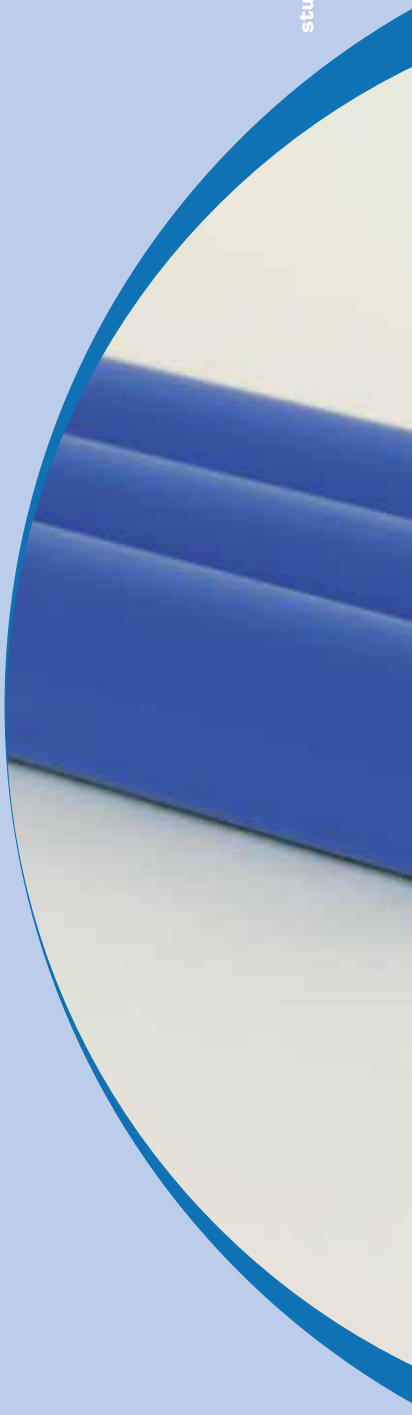

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