

## **POLIDAN<sup>®</sup> TUX 100, the innovative pipe solution for hot water applications under pressure**



In piping systems for hot water transport applications, like District Heating or Geothermy, the selected material must possess high pressure resistance together with excellent long-term performances at high temperatures, where traditional PE is limited.

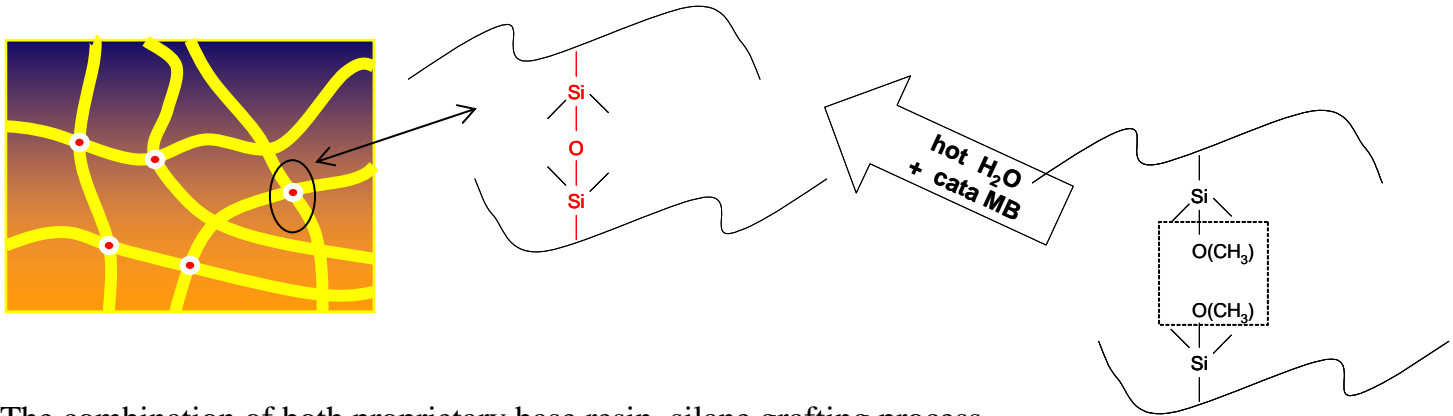
As a strong commitment to deliver high value to its industrial customers and to promote clean and renewable energy sources, Solvay Padanaplast is ready to supply a specially designed crosslinkable PEX-b compound, POLIDAN<sup>®</sup> TUX 100, which allows pipe and fittings produced thereof to meet safely such stringent requirements for these applications.

Alongside, the outstanding mechanical properties of POLIDAN<sup>®</sup> TUX 100 open the door to new remarkably easy installation procedures for the whole piping system. These include laying and welding operations prior to the curing stage, and smartly take advantage of the available hot water flowing through the system as to cure it *in-situ* during first stage of service life, even at normal operation conditions of high temperatures and pressures.



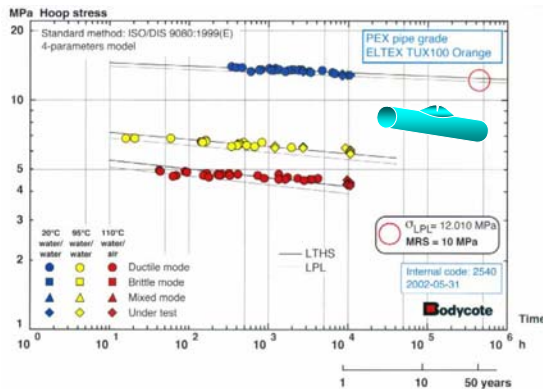
## ◆ what is POLIDAN<sup>®</sup> TUX 100 ? ... which properties and advantages ?

A **ready-to-use** thermoplastic PEX-b compound, which can be easily processed into pipes in standard HDPE extruders, in combination with a special crosslinking catalyst & stabilizing master-batch. The further stage is the curing process of the pipes, involving hot water.

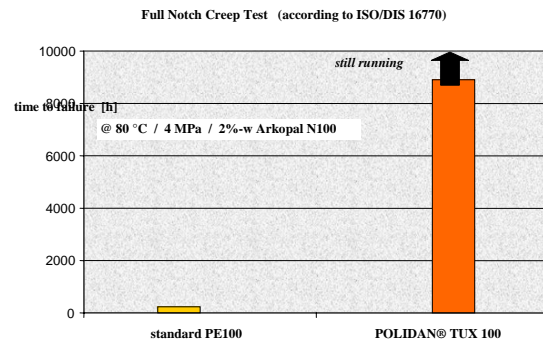


The combination of both proprietary base resin, silane grafting process and catalyst/stabilizing MB allows POLIDAN<sup>®</sup> TUX 100, once cured, to achieve **outstanding mechanical performances** :

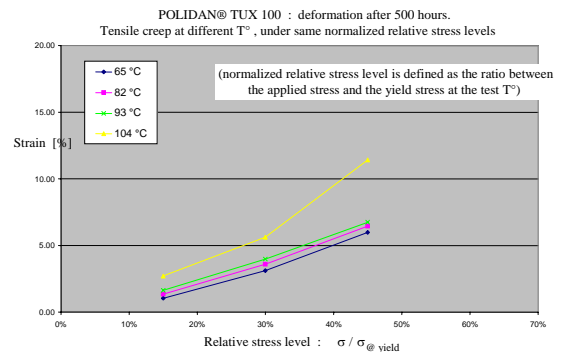
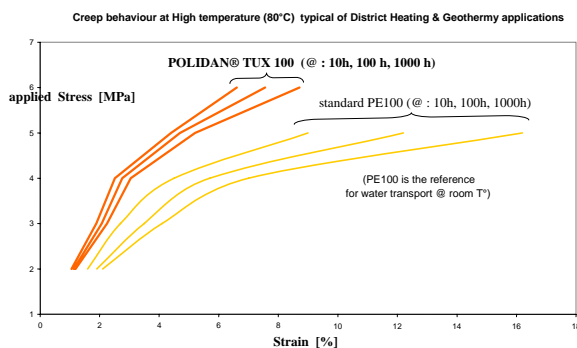
Creep resistance: PE100  
MRS 10 classification (ISO9080)



Environmental Stress Cracking Resistance:  
> 10,000 h in Notched Pipe Test



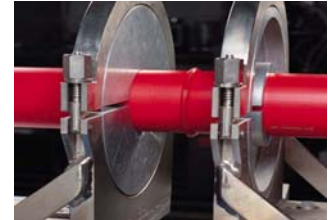
POLIDAN<sup>®</sup> TUX 100 also shows **excellent creep resistance even at high temperatures up to 95°C**, and thus offers a choice solution for hot water applications under pressure.



## ◆ Installing the network ... how connecting the pipes ?

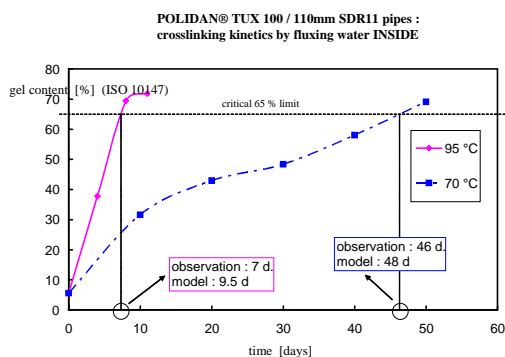
POLIDAN<sup>®</sup> TUX 100 offers good **flexibility**, allowing to the pipes made thereof to be coiled and installed cost-effectively on field. However, once cured with hot water, pipes/fittings can no more be jointed. Consequently, it is necessary to handle the pipes and fittings and to connect them together before they are crosslinked. Which solutions ?

- **for butt-welding** : it is necessary to ensure pipes extremities to keep under a maximum critical degree of gel content, around 30 %, before installation. This can be achieved easily with a special technology developed and patented, where pipe butts are protected from moisture by a sealed releasable aluminum foil.
- **for electro-fusion** (installation or extensions) : Solvay Padanaplast has developed a special crosslinkable coupler made-out from POLIDAN<sup>®</sup> TUX 100. Once cured, it is able to sustain long-term service under temperatures as high as 95 °C. It allows to connect easily together POLIDAN<sup>®</sup> TUX 100 pipes - whatever they are or are not yet crosslinked - using traditional EF welding machines.



## ◆ *In-situ* self-curing: just let the nature play !

Once laid and jointed all together, crosslinkable POLIDAN<sup>®</sup> TUX 100 pipes & fittings components must still be cured. Easy and cost-saving solution ? : **just let the nature play !** ... Indeed, in hot water transport applications, alike District Heating or Geothermy, just operate the network and **take advantage of the readily available hot water/steam fluxing through**, as to spontaneously proceed *in situ* the crosslinking process from the inside-out.



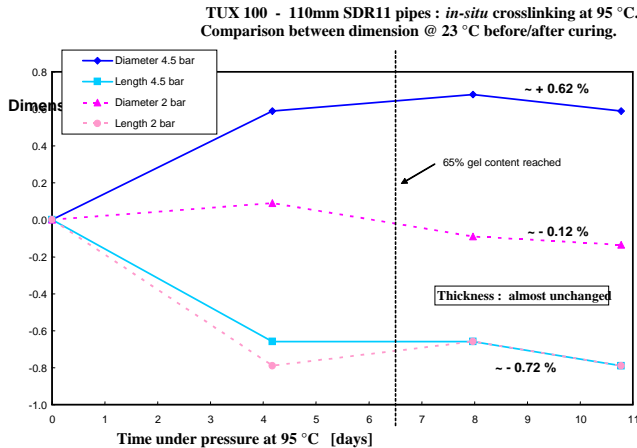
No capital to invest in water baths or steam cabinets and no time to spend on-the-plant in a long-lasting curing step of thick pipes ! ...

Solvay Padanaplast has developed a ready-to-use modeling software to help you to predict the time your network will require for becoming fully crosslinked.

Accurate SDR design of the network will finally depend on the service conditions in term of temperature and pressure.

◆ Commissioning the network: dimensional stability ? ... at which operation conditions ?

Once commissioned, the network will begin spontaneously its *in-situ* curing. At this early stage, could pipes undergo some undesired dimensional changes ?



During typical normal operations (e.g. 95 °C / 4.5 Bar), **all pipe dimensions will almost keep unchanged**, because several different complex contributions actually compensate each other.

However, some restraining systems (like concrete blocks) should be presumably designed to limit longitudinal retraction during further shutdowns.

The early stage of piping system operation will coincide with the *in-situ* self-curing process, where the material is not yet fully crosslinked and has yet to bear the network pressure besides high temperatures. Nevertheless, POLIDAN® TUX 100 is able to successfully accommodate these stringent curing conditions and preserve its final mechanical properties. Thereby, **no reduction in temperature nor in pressure is needed during the commissioning**: just start and let run the network at its nominal service conditions !

	pressurized <i>in-situ</i> curing (4.5 bar – 95 °C)	Pressure-less bath curing (95 °C)
pipe failure time @ 6.1 MPa / 95 °C	1100 hours	1000 hours

◆ *In-situ* self-curing technology: other alternative applications ?

Even if *in-situ* crosslinking process is especially well suited to hot water transport applications like District Heating and Geothermy, it could be envisioned in other industrial markets, like oil relining application, where hot water is readily available in mixtures with crude oil.



**Crosslinkable POLIDAN® TUX 100** together with *in-situ self-curing* technology constitute an eligible and attractive alternative to insulated steel in piping systems for hot water transport applications under pressure, like District Heating and Geothermy.

Due to the combination of proprietary know-how's, they offer outstanding long-term performances and provide a set of very cost-effective, time-sparing and fit-to-purpose advantages:

- pipes can easily be manufactured using conventional PE extruders ; material flexibility and lightness lead to nice pipe installation techniques
- traditional PE welding methods can be employed, either using butt-welding or specially designed POLIDAN® TUX 100 electro-fusion couplers
- crosslinking process is carried out *in-situ* during early stage of service, just smartly using available flowing hot water ; network commissioning can be safely run under nominal operating conditions of pressure and temperature
- such *in-situ* crosslinked POLIDAN® TUX 100 pipes & fittings, in a properly designed network, will offer outstanding resistance to creep and stress cracking, thus providing long-term service safety.

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