

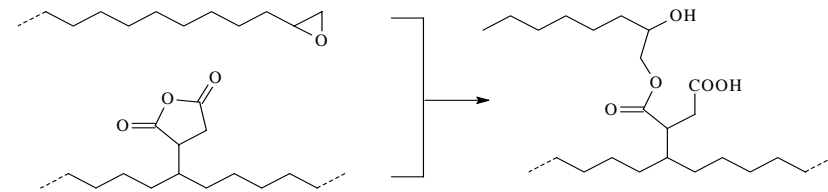
WHY DOES ADHESION INCREASE?

Adhesion performance is linked to adhesive “architecture”

- ◆ **Structure of the grafted chains**

- **Cristallinity**
- **Molecular weight distribution**
- **Maleic Anhydride content**

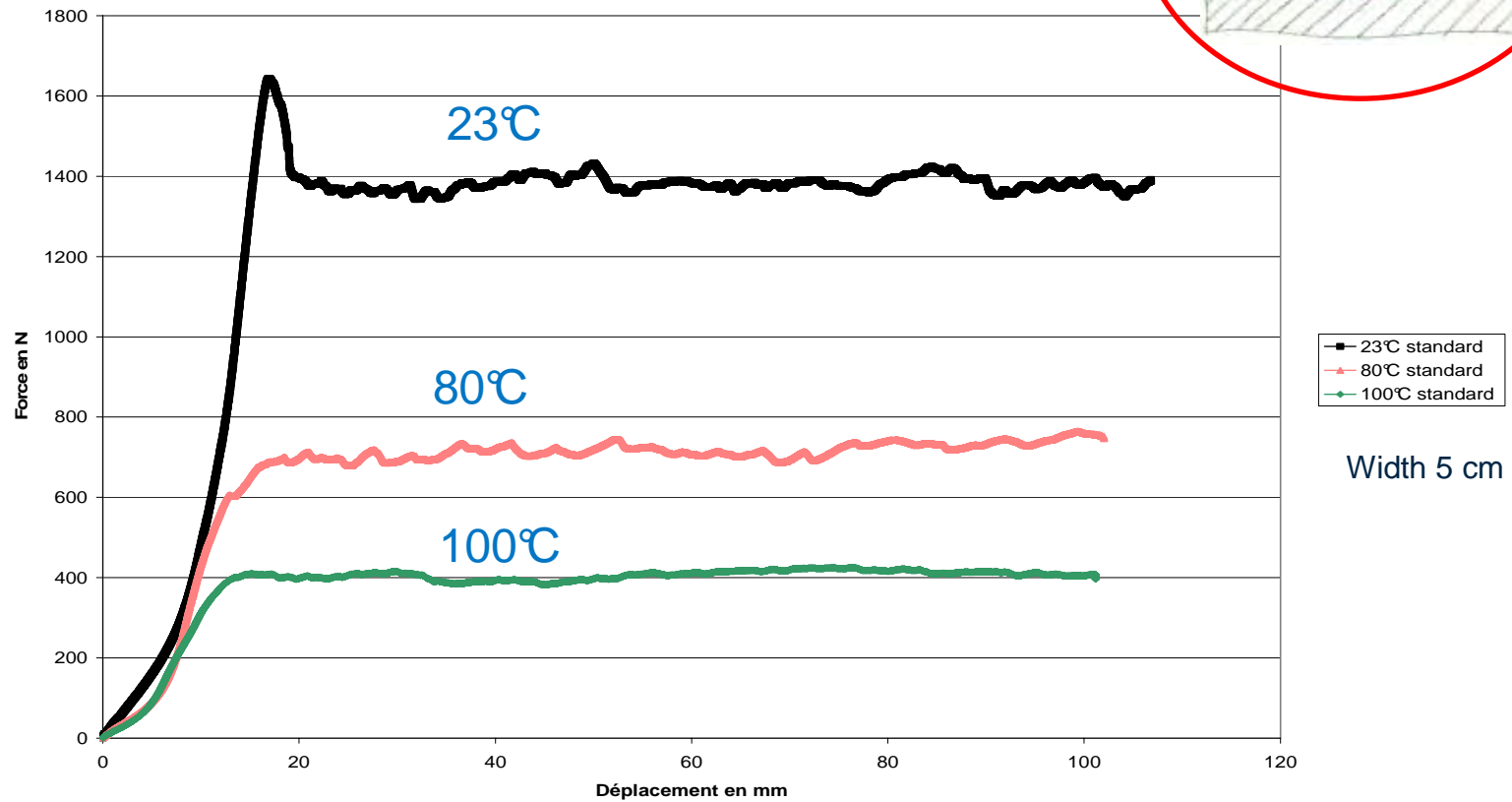
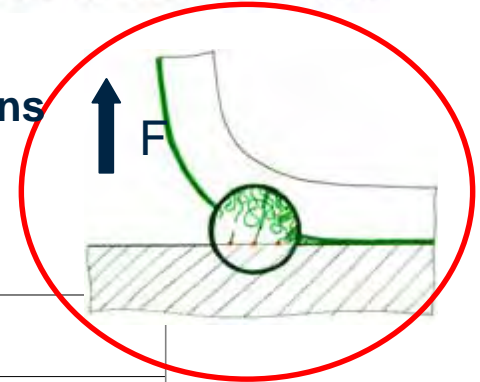
Simplified reaction between Epoxy and Anhydrid groups



- ◆ **Chemical reaction and bonding between epoxy and adhesive**
- ◆ **Mechanical behaviour of the tie layer**
(rheology, processing, thermal stability, ...)
- ◆ **Adapted dissipative properties of the adhesive to the interface**
(plasticity)

ADHESION BEHAVIOUR

Interfacial interactions
Epoxy/adhesive



PEELING ASPECT

At all temperatures: 23, 60, 80 and 100°C
Peeling aspect remains **cohesive**



23°C



60°C



80°C



100°C

AGEING TEST: 1000h in hot water (100°C)

No adhesive delamination at 23, 60, 80 and 100°C

Cohesive aspect

Key points to ensure integrity of full system

- ◆ Epoxy choice (Low water absorption formulation)
- ◆ Surface treatment



When the epoxy is not adapted or in the absence of surface treatment, delamination occurs inside the epoxy layer



AGEING TEST: 3 months at 100°C



Pipes tested during 3 months in a heating chamber
(regulation: 100°C +/-2°C)

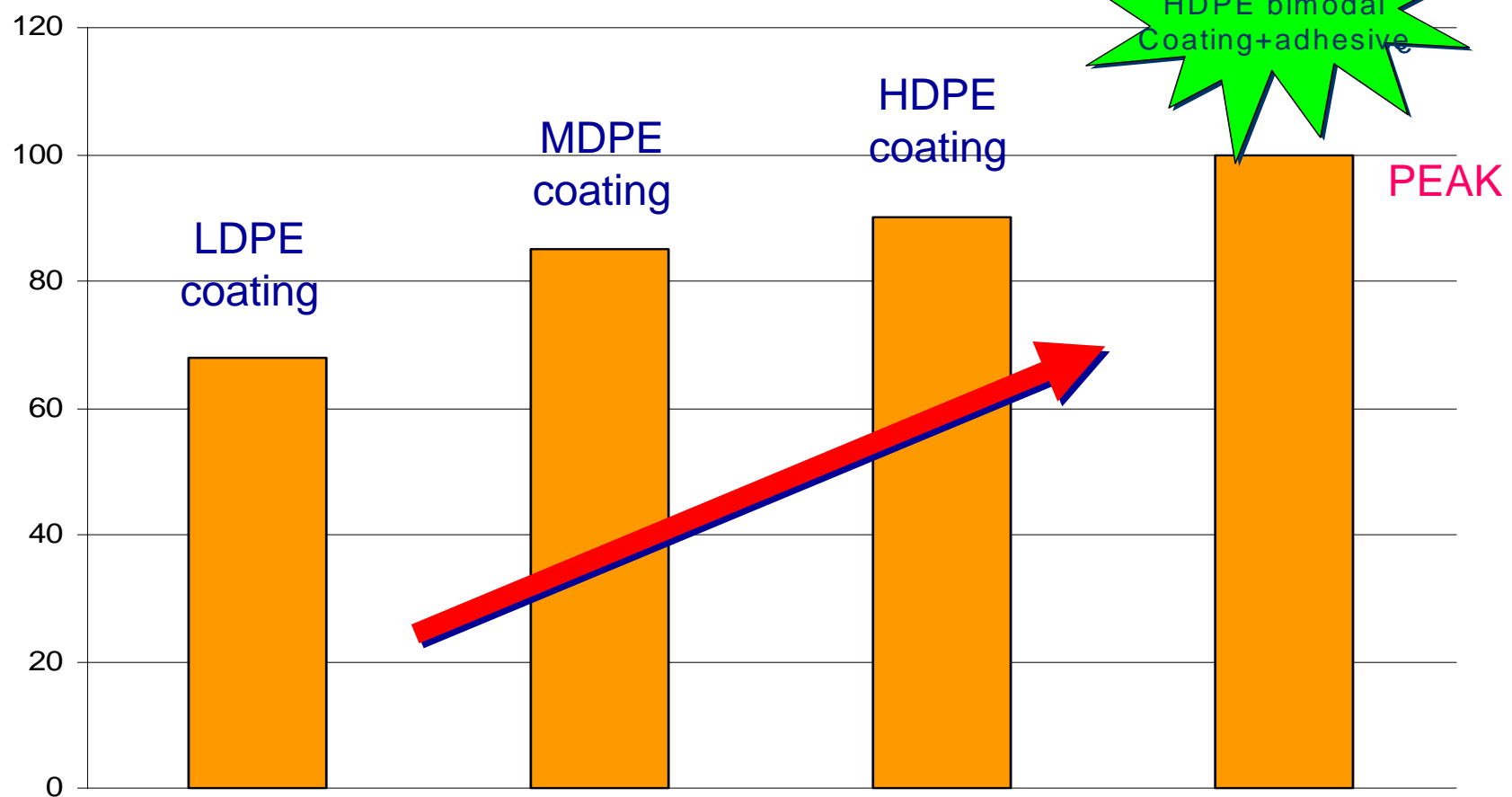


Results

- ◆ No delamination between epoxy and top coat
- ◆ Peeling test at 23, 60, 80 & 100°C
→ Cohesive aspect



OPERATING TEMPERATURE



WHAT ABOUT LOW TEMPERATURE?

New ADHESIVE has a brittleness temperature of -121°C

New HDPE has brittleness temperature < -75°C

- ◆ **Elongation at break > 100% at -45°C**



**We develop a new method for testing at low temperature
(Tests ongoing, more information next year)**



HDPE anti-corrosion pipe coating system with outstanding performance

Total Petrochemicals 4206B
bimodal HDPE topcoat with hexene as comonomer

&

Arkema Orevac 18410, new generation of adhesive

Improve

- ◆ **Both interfacial bonding (epoxy – topcoat)**
- ◆ **Adhesion properties remain outstanding up to 100°C**

Allow

- ◆ **Peak temperature up to 100°C**
- ◆ **A higher safety factor for end use**



TOTAL PETROCHEMICALS

BHR Group



**With more than 20 years presence
on the pipe coating market
Total Petrochemicals and Arkema
have developed a new PE system
responding to the highest expectations of the market**

**Thank you
for your attention**

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