Yparex®

Industrial applications

an extrudable adhesive resin

Unlimited. DSM

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Introduction

Yparex® adhesive resins are extrudable maleic anhydride modified and functionalised polyolefin compounds. Yparex® provides chemical reaction sites for a variety of substrates including PA, EVOH and aluminium, giving reliable and high quality bond strength over time and under changing temperature conditions.

Yparex® is an easy to process polyolefin based material which does not require any special extrusion equipment, other than that commonly found in the market. The material has a broad processing window with mass temperatures allowed up to 290°C. The broad variety in melt flow properties makes Yparex® highly suitable for various (co) extrusion processes, such as film extrusion (blown and cast), extrusion coating, pipe extrusion and other processes.

Applications

Yparex® adhesive resins are used in numerous industrial applications.

- Sanitary and heating pipes
- Floor and wall heating (or cooling)
- Copper & steel pipe coating
- Cables
- Cladding panels

Sanitary and heating pipes

Combinations of PE or cross-linked PE with aluminium are functional materials suitable for use in multi layer composite pipes for sanitary hot and cold water supply or radiator heating systems in buildings. Yparex® makes it possible to combine the strong points of metals and polymers in these structures. The high mechanical and thermal cycle resistance of several suitable Yparex® grades provides an optimal degree of bonding over a wide temperature range, when fitted in a sanitary or heating installation.

Floor and wall heating (or cooling)

Combinations of PE with aluminium or PE with EVOH provide the right oxygen barrier properties and mechanical strength when installed as a pipe for floor heating. Again, as a bonding material Yparex® provides excellent adhesion and long life durability under changing temperatures.

Pipe coating

- Copper pipes: New developments in the copper pipe market have demanded a specially- designed adhesive resin which maintains the initial good adhesive strength over time and under changing temperature conditions. The three layer structure of Cu / YPAREX / PE offers significant cost and weight reduction compared to traditional massive copper pipes in, for example, sanitary hot and cold water applications.
- Steel pipes: Steel pipes for oil and gas transportation need corrosion protection. 3-layer systems of an epoxy base coating / adhesive / Polyolefin top coat show a high degree of corrosion protection in this field of application.

Cable

Today's cables can be combinations of different materials including metals, polymers and fillers. Modern cables are required to be flame retardant, using components which are halogen free in order to avoid toxic fumes and smoke during a fire. The high filler load of the compound demands polymers that show a high degree of compatibility with these fillers and good mechanical performance. Yparex can act as a coupling agent between the filler particles and the polyolefin matrix material. Some cables are sheathed with aluminium or PA layers. Bonding these materials to polyolefins in the cable structure can again be obtained by the use of several specific Yparex® grades.

Cladding panels

In modern architecture, the use of aluminium is continuously growing. Increasingly, sidings of modern buildings are designed with sandwich panels (cladding panels) consisting of a 5 layer structure of aluminium / adhesive / filled PE / adhesive / aluminium. Yparex® provides the required bond strength between aluminium and the high filled polyethylene core. This structure offers a high quality, lightweight and good looking siding solution for modern architecture.

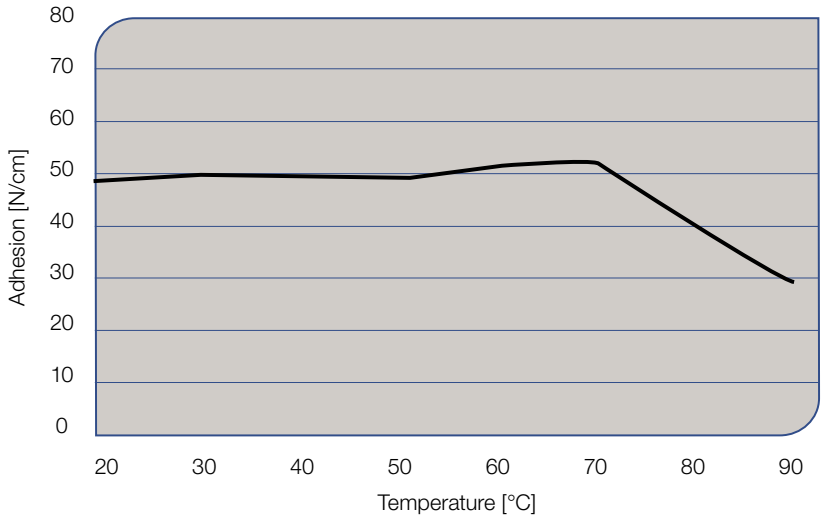
Benefits provided by Yparex®

Yparex grades have been specifically developed for the industrial market in close co-operation with manufacturers, equipment manufacturers, certifying bodies and end-users. Within the Yparex® range, tailormade products are available or can be developed for specific demands. Yparex® features the following advantages:

- Consistent quality of adhesion
- High productivity
- Consistent processability in terms of flow and melt stability
- Maintenance of outstanding adhesion up to 95°C
- Good long-term (thermal) stability
- Can be processed under a variety of (co-) extrusion conditions.

The outstanding properties of Yparex® and the intensive product and application development we offer in cooperation with our customers, have made DSM the leader in adhesive resins for industrial applications. As Yparex® has been used in multi-layer pipes right from the start, DSM has gained in-depth technology knowhow on multilayer pipe production and applications.

Adhesion of Yparex® 8702 ES
as function of temperature (in a 16x2 mm MLC pipe)



Working together to optimize your applications

As a leading supplier of engineering plastics, backed by extensive materials and application knowledge, DSM is the perfect partner to unlock hidden value in your products and processes. We are committed to maximizing your line productivity and end-product quality:

- By a constant program of innovation, customer-focused R&D and application development.
- By offering one of the worlds widest ranges of state-of-the art products and grades.
- By providing our customers with knowledgeable, proactive application support.
- By ensuring excellent customer service and logistics through every stage of the supply chain.

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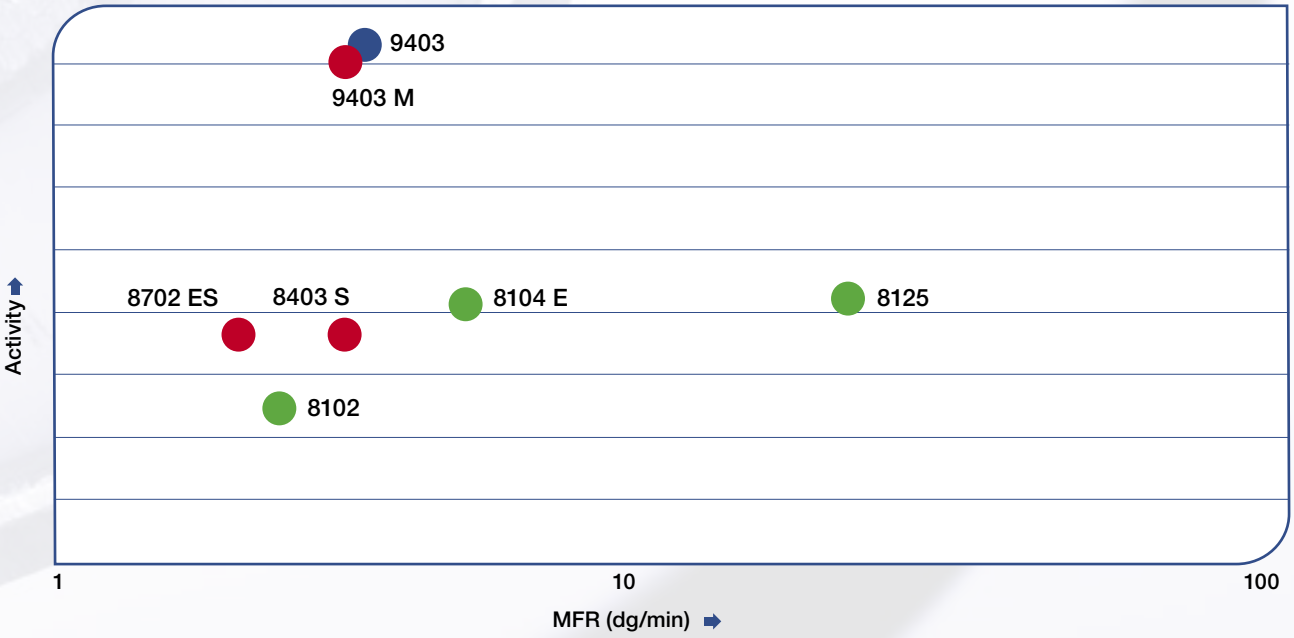
Yparex® Portfolio for Industrial Applications

Properties	Unit	8702 ES	8403 S	9403 M	8102	9403	8104 E	8125	Test method
Base polymer		C6-LLDPE	C6-LLDPE	C6-LLDPE	C8-LLDPE	C6-LLDPE	C8-LLDPE	C4-LLDPE	
Density	kg/m³	920	926	928	923	928	923	929	ISO 1183
Melt flow rate	dg/min	2,1	2,8	2,9	2,3	3	4,6	24	ISO 1133 (190 °C and 2.16 kg)
Vicat softening temperature	°C	93	100	100	102	100	100	103	ISO 306/A50 (50 °C/h 10 N)
Melting temperature	°C	125	124	124	124	124	124	124	ISO 11357-1/-3 (10 °C/min)
Enthalpy of melting	J/g	114	125	128	113	128	110	125	ISO 11357-1/-3
Adhesion against		PE Al EVOH PA	PE Al EVOH PA	PE Cu / Al EVOH PA	PE Al EVOH PA	PE Al EVOH PA	PE Al EVOH PA	PE fillers EVOH PA	



Other Yparex® applications and DSM products

Specialty products from DSM can add value to a wide

- Yparex® in packaging applications
- Akulon® PA6 in convoluted tubes
- Arnitel® COPE for automotive and industrial low voltage
- Arnitel® COPE for high heat wiring harness protection
- Arnitel® COPE for industrial (high) pressure hoses

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