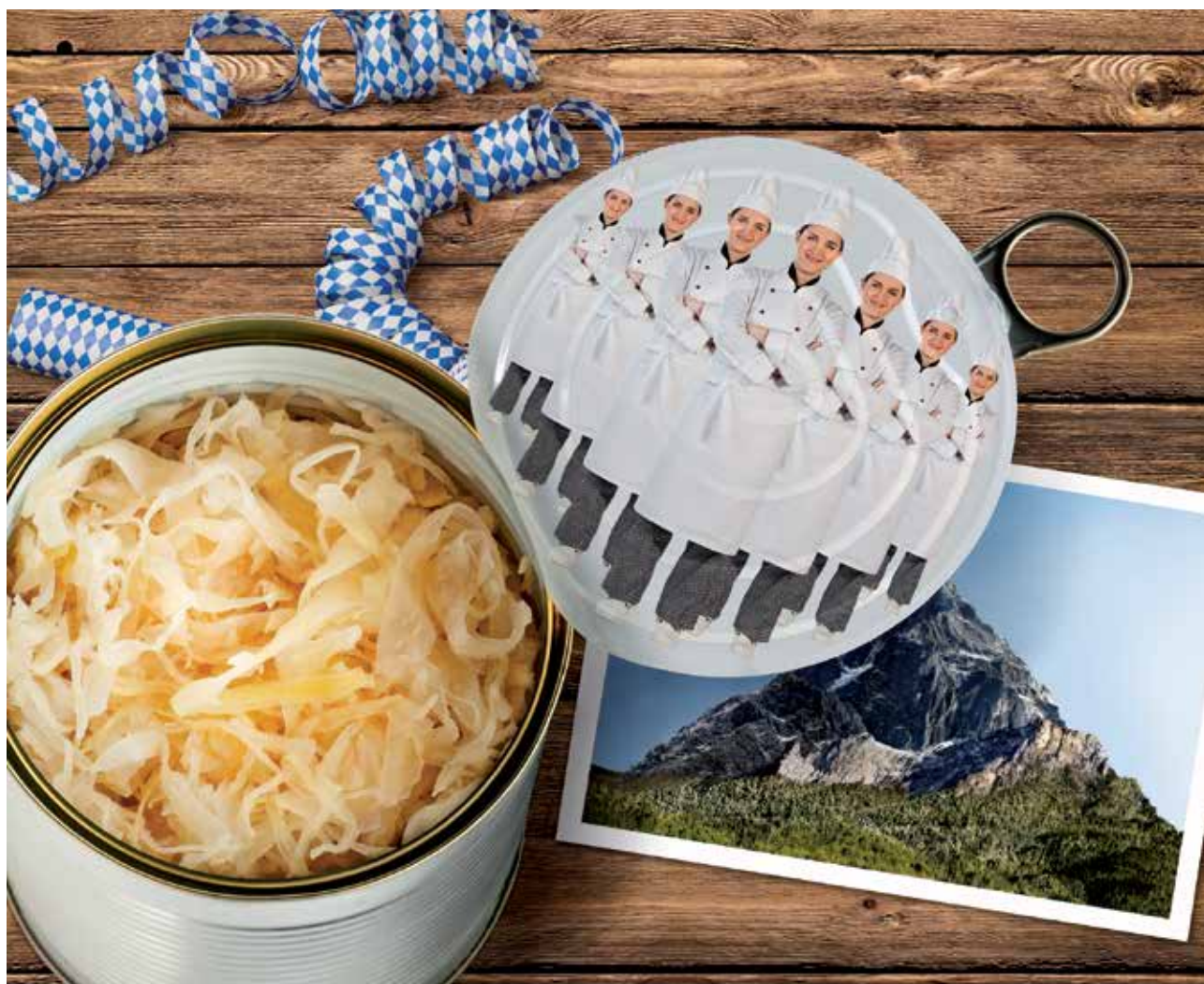


DYNAPOL®

PRODUCT RANGE – POLYESTER RESINS

DYNAPOL®





DYNAPOL®

*HIGH-MOLECULAR WEIGHT COPOLYESTERS.
MEDIUM-MOLECULAR WEIGHT COPOLYESTERS.*

.....

SATURATED POLYESTER RESINS FOR STOVING ENAMELS

.....

By developing saturated polyesters, Evonik has played an important role in influencing and extending the possible applications of precoated metals.

These coating raw materials are suitable for the production of coatings with very

good adhesion offering an optimum of flexibility and formability together with an excellent surface hardness. For this reason, lacquers based on DYNAPOL® have proved particularly suitable for stampable and deep drawable coatings.

A wide range of products is available for various requirements of the paint and coating industry. DYNAPOL®

polyester resins are mainly used for stoving enamels in combination with amino resins. Special properties, such as chemical resistance, weathering resistance and flexibility, can be improved by using blocked polyisocyanate resins. Stoving enamels based on highmolecular weight copolyesters show particularly good mechanical properties. Medium molecular weight polyester resins containing more



hydroxyl groups are suitable for the manufacture of stoving enamels with good reactivity and high solids content. In combination with highmolecular weight copolyesters the quality of films can be optimized.

Depending on the technical requirements and the method of processing, DYNAPOL® grades can also be used to manufacture industrial coatings.



DYNAPOL® UB

BLOCKED ONE PACK POLYESTER-POLYURETHANE SYSTEMS.



.....
**PUR SYSTEMS
FOR STOVING ENAMELS**
.....

DYNAPOL® UB systems are made from saturated, hydroxylated polyester resins and blocked, cycloaliphatic polyisocyanate crosslinkers.

Evonik pioneered the development of PUR chemistry for coatings and now

offers a range of high quality monomers, polyisocyanates, prepolymers and PUR systems based on VESTANAT®.

DYNAPOL® UB systems are suitable for the manufacture of industrial coatings, particularly coil coatings with high formability, good surface hardness and outstanding weatherability.

Because of these properties special DYNAPOL® UB types are also used to

formulate high quality, storage stable, 1-pack PUR spray coatings.

The performance profile of DYNAPOL® UB-stoving enamels can be adjusted to the various enduses by suitable paint formulations. Particularly the modification with special Polyamide 12 fine powders (VESTOSINT®) results in special surface textures along with outstanding abrasion resistance and reduced tendency for dirt pick-up.

MORE THAN A GOOD PARTNER.

MORE SERVICE. BETTER QUALITY. A WIDER CHOICE.

If you'd like to know what distinguishes our products from our competitors', the answer is simple: Just that little bit extra – in every particular. To put it more precisely, only the best solutions are our benchmark. So that our achievements in many areas are exceptional.

SERVICE AND CONSULTING

We offer a comprehensive service spectrum, ranging from consulting to an array of add-on services such as the development of guiding formulations. In both, business and technical aspects, our services are based on personal partnerships.

QUALITY

You place outstanding, and highly specific demands on us. We satisfy these to fully meet – and surpass – your expectations. Our products are distinguished by high durability and worldwide consistency. Because, after all, you want to rely on the same level of product quality throughout the world.

PRODUCT RANGE

Whichever way you look at our product range, its depth and diversity are unrivalled. Whether for coil coating (top

coats, backing coats, or primers) or metal packaging (primers, pigmented coatings, and clear coats), we cover the full spectrum of applications. You can choose from medium- or high-molecular weight polyesters or our DYNAPOL® UB range, comprising polyesters with crosslinkers, depending on your profile of requirements.

INNOVATION

We wouldn't stay at the top if we weren't always trying hard to improve. That's why we maintain a research and development department with a team working exclusively on polyester development. Close proximity to our customers often provides the impetus for making improvements, thinking ahead, and spotting trends early.

GLOBAL MARKET LEADER

Why do we, as a global market leader, set such great store by customer orientation? Because, in addition to the factors already mentioned, we have a clear focus on our particular branch of industry. For our customers this translates into specialist expertise and absolute consistency of performance.

DYNAPOL® POLYESTERS – YOUR PRODUCT OF CHOICE.



DYNAPOL® FOR PACKAGING COATINGS

Our paint binders are the products of choice for every paint film on pre-coated rigid metal containers for food and non-food applications. They combine superior protection properties with high flexibility, sterilisation resistance, film hardness and scratch resistance. Due to their excellent adhesion to various metal and plastic foil substrates our polyesters are also an essential part, as binder or co-binder, in many kinds of flexible packaging applications like pre-printing primers, printing inks, hot laminating adhesives or as a component for heatseal laquers.



DYNAPOL® FOR COIL COATINGS

Our paint binders are available to meet every different requirement. Their outstanding performance is the base for safety and reliability when used for wall claddings, roofing, garage doors, linds, window frames, domestic appliance body housings, ceiling panels, air condition devices, pre-coated automotive parts and any other interior and exterior pre-coated metal application you can imagine.

DYNAPOL® L

Characteristic values ¹⁾²⁾							Solubility ⁶⁾				Production of									
Glass transition temperature** (°C/°F) ⁴⁾	Molecular mass	Viscosity number (cm ³ /g)	Structure ⁵⁾	OH value (mg KOH/g)	Acid value (mg KOH/g)	Solvent Naphtha 150	Solvent Naphtha 200	Methoxypropyl acetate	Dibasic ester mixture (DBE)	Primer for hot dip galv. steel	Primer for aluminium	Hot laminating adhesives	Appliance finishing	Elastification resin	Metal decorating enamels	Tube- and aerosol can coatings	Interior can coatings	Adhesion promoters	Foil primers, printing inks	Heat sealing lacquers
Grades ¹¹⁾											Coil Coating					Can Coating				
L 912	105/221	15000	L	5	3	+	+	-	-						○		●			
L 914	100/212	15000	L	7	4	+	+	-	-						○		●			
L 907	75/167	15000	L	7	4	+	+	-	-						○		●			
L 952	70/158	18000	L	6	2	-	+	+	+	○			●		○		●			
L 205	67/153	15000	L	6	2	-	+	+	+	●	○		○		○		○			
L 206	67/153	20000	L	5	2	-	+	+	+				○						●	○
L 208	65/149	20000	B	6	6	-	+	+	+	●	●	●							○	
L 210	63/145	20000	L	5	2	-	+	+	+			●							●	○
L 411	47/117	16000	L	5	2	-	+	+	+	●	●	●	○	●	●		●	○	●	●
L 490	40/104	15000	B	9	3	-	+	+	+					○	●	●	●	○		
L 651	40/104	15000	L	5	2	+	+	+	+						○		●	●		○
L 658	40/104	20000	B	8	4	-	+	+	+					○	○		●			
L 850	40/104	15000	L	4	2	+	+	+	+					●	○	●				
L 323	30/86	15000	L	6	2	+	+	+	+						○			●	○	●

** in order of decreasing glass transition temperature

DYNAPOL® P/S

Grades ¹¹⁾

P 1500	25/77	88	partially crystalline polyester for thermoplastic application
S 1510	-23/-9	97	partially crystalline polyester for thermoplastic application

DYNAPOL® LS

Solutions		Characteristic values ^{1) 2)}							Fields of application ³⁾													
Solvent blend ³⁾	Supply form (% by weight)	Glass transition temperature ** (°C/°F) ⁴⁾	Molecular mass	Structure ⁵⁾	OH value (mg KOH/g)	Acid value (mg KOH/g)	Compatibility with DYNAPOL® L ⁷⁾	Exterior architecture	Interior architecture	Appliance finishing	Traffic uses	Primer for hot dip galv. steel	Primer for aluminium	Back coatings	Metal decorating enamels	Tube- and aerosol can coatings	Interior can coatings	Adhesion promoters	Foil primers, printing inks	Heat sealing lacquers		
Grades ¹¹⁾									Coil Coating							Can Coating						
LS 415	-10	40	12/54	25000	L	5	3	+		○	○				●		○	●	●	○		
LS 436	-12	60	-5/23	7000	L	15	2	+	●	●									○			
LS 4131	-10	40	-5/23	25000	L	5	3	+		●												
LS 615		100	-50/-58	4000	L	25	2	(+)											●	○		

Development of guiding formulations. Technical service.

DYNAPOL® Terra

Solutions		Characteristic values ^{1) 2)}							Fields of application ³⁾										
Solvent blend ³⁾	Supply form (% by weight)	Glass transition temperature ** (°C/°F) ⁴⁾	Molecular mass	Structure ⁵⁾	OH value (mg KOH/g)	Acid value (mg KOH/g)	Compatibility with DYNAPOL® L ⁷⁾	Exterior architecture	Interior architecture	Appliance finishing	Traffic uses	Primer for hot dip galv. steel	Primer for aluminium	Back coatings	Metal decorating enamels	Tube- and aerosol can coatings	Lacquers for aluminium foils	Interior can coatings	
Grades ¹¹⁾									Coil Coating							Can Coating			
Terra 125		100	-50/-58	4000	L	25	3	(+)	●	●	○								
Terra 127	-03	60	20/68	3000	L	35	3	(+)	●	●	○								

DYNAPOL® LH

Solutions		Characteristic values ¹⁾²⁾							Fields of application ³⁾										
Solvent blend ³⁾	Supply form (% by weight)	Glass transition temperature ** (°C/°F) ⁴⁾	Molecular mass	Structure ⁵⁾	OH value (mg KOH/g)	Acid value (mg KOH/g)	Compatibility with DYNAPOL® L ⁷⁾	Exterior architecture	Interior architecture	Appliance finishing	Traffic uses	Primer for hot dip galv. steel	Primer for aluminium	Back coatings	Metal decorating enamels	Tube- and aerosol can coatings	Lacquers for aluminium foils	Interior can coatings	
Grades ¹¹⁾									Coil Coating							Can Coating			
LH 820*	-16	55	60/140	5000	L	20	2	+			○			●					
LH 815	-05	50	55/122	7000	L	20	4	+				○	○		●	●			●
LH 833	-03	50	55/120	4000	B	35	2	+			○		●	●	○				
LH 824	-16	60	45/113	4000	L	30	3	+			○		●						
LH 818*	-05	50	30/86	6000	L	20	1	+		●	●	○	●		●				
LH 826	-05A	55	30/86	6000	L	20	2	+		●	○	○	○		●				
LH 773	-01	55	30/86	4000	B	35	2	+							●	●			
LH 538	-02	65	20/68	3000	B	45	2	+	●		●	●							
LH 898*	-14	65	20/68	3000	L	35	2	+	●	●	○	●							
LH 830	-02	60	20/68	4000	B	35	2	+	●	●	●	●			○	○			
LH 775	-52	55	20/68	4000	B	40	3	+							●	●			
LH 318	-02	55	20/68	5000	L	20	2	+							○				●
LH 823	-01	60	20/68	6000	B	20	10	+							○	●			
LH 822	-01	55	15/59	6000	L	20	2	+		●	○	●			○				
LH 832	-02	60	15/59	4000	B	35	2	+	●	●	●	●			○				
LH 724	-24	70	10/50	2000	B	70	5	+	●	●	○	○							
LH 838	-02	65	10/50	3000	L	35	2	+	●	●	○								
LH 831	-24	70	10/50	2000	L	50	5	+	●	●	○		○		○				
LH 834	-02	65	10/50	3500	L	30	8	(+)	●	●	○								
LH 828	-24	70	5/41	2000	L	50	10	-	●	●	○			●					
LH 727	-02	65	0/32	2000	B	100	10	-						●					
LH 874	-26	75	-10/14	2000	L	60	7	+		●	○			○					

* further solvent blends available ** in order of decreasing glass transition temperature

Consistent product properties worldwide.

DYNAPOL® UB

Solutions		Characteristic values ^{1) 2)}			Fields of application ³⁾												
Solvent blend ³⁾	Supply form (% by weight)	Approx. glass transition temperature ^{**} (°C/ ^{°F}) of cured paint film	Class ⁹⁾	Reactivity ¹⁰⁾	Exterior architecture	Interior architecture	Appliance finishing	Traffic uses	Primer for hot dip galv. steel	Primer for aluminium	Industrial coatings	Metal decorating enamels	Tube- and aerosol can coatings	Adhesion promoters	Foil primers, printing inks	Heat sealing lacquers	
Grades ¹¹⁾					Coil Coating							Can Coating					
UB 790	-03	60	35/95	I	B	●	●	○	●	●	●	○					
UB 791	-03	60	35/95	I	C	●	●	○	○	●	●						
UB 1173	-03	60	35/95	II	C	●			●								
UB 1052	-03	60	35/95	II	C	●			●								
UB 1174	-27	70	35/95	II	B	●			○		○						
UB 877	-01	60	40/104	I	C				●	●							
UB 41	-05	54	40/104	I	B		○	○			○	●					
UB 1256	-06	60	50/122	III	C	●		○	●								
UB 909	-06	60	50/122	III	A	●			○			●					

** in order of decreasing glass transition temperature

CATALYSTS

DYNAPOL® Catalyst 1203

50 % (b.w.) in xylene

non-ionic blocked sulfonic acid catalyst for aminoplast crosslinking

DYNAPOL® Catalyst C 31

50 % (b.w.) in xylene

tin (IV) alkoxyate catalyst for polyisocyanate crosslinking

Solvent blend code

-01	Solvent Naphtha 150	-14	Solvent Naphtha 150 / Xylene
-02	Solvent Naphtha 150 / Butylglycol	-16	Solvent Naphtha 150 / MPA / Methoxypropanol
-03	Solvent Naphtha 150 / DBE	-23	Solvent Naphtha 100
-05/05A	Solvent Naphtha 150 / Solvent Naphtha 200	-24	Solvent Naphtha 100 / Butylglycol
-06	Solvent Naphtha 150 / Methoxypropylacetate (MPA)	-26	Solvent Naphtha 100 / Methoxypropanol
-10	Solvent Naphtha 150 / DBE / Solvent Naphtha 200	-27	Solvent Naphtha 100 / Methoxypropylacetate (MPA)
-12	Solvent Naphtha 150 / DBE	-52	Methoxypropanol / Methylidipropylenglycol

- 1) test methods
- 2) typical values
- 3) solvent blend codes
- 4) measured on solvent free polyester resin; guide parameter for the product list (values decreasingly listed)
- 5) L = linear, B = branched
- 6) 30 % solutions: + = soluble, - = insoluble, at best suitable as thinner; (ketones always +, glycolethers as thinners only; aliphatic hydrocarbons and alcohols -)
- 7) (except for L 912): + = compatible, (+) = compatibility very limited, - = incompatible
- 8) ● = important reference, ○ = less important use
- 9) polyol-hydroxyl value: class I: 30-50; class II: 50-100; class III: > 100 (mg KOH/g)
- 10) minimum stoving temperature (°C/°F): A: 150 / 302 resp. 210 / 410 PMT;
B: 160 / 320 resp. 220 / 428 PMT;
C: 180 / 356 resp. 230 / 446 PMT
(peak metal temperature)
- 11) further DYNAPOL® grades available on request

CONTINUAL INNOVATION AND DEVELOPMENT.

METHODS OF DETERMINING CHARACTERISTIC VALUES

GLASS TRANSITION TEMPERATURE

Determination by DSC method
(differential scanning calorimetry)

MOLECULAR MASS

Values calculated based on contents of
hydroxyl- and carboxyl endgroups

VISCOSITY NUMBER

DIN 53 728. The procedure is to dis-
solve 0.5 g of the substance in 100 ml
of solvent, consisting of 50 parts by
weight of phenol and 50 p.b.w. of
1,2-dichlorobenzene, and to measure

the efflux time of this solution in an
Ubbelohde capillary viscometer at
a temperature of 25 °C.

The viscosity number is calculated
with the following formula:

$$VZ = 100 \frac{t_1 - t_2}{t_2} \quad (\text{cm}^3/\text{g})$$

t1 = efflux time of the solution

t2 = efflux time of the solvent

OH VALUE (HYDROXYL VALUE)

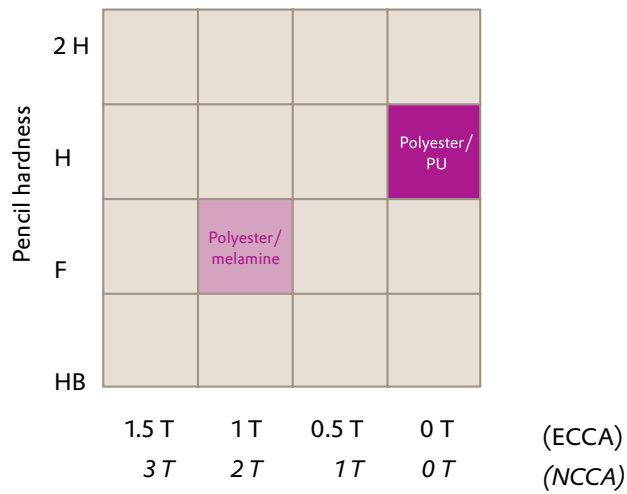
DIN EN ISO 4629-2. Approx. 3 g
of polyester are dissolved in

dichloromethane. The OH groups
contained in the solution are esterified
at room temperature with acetic anhy-
dride, 4,4-dimethyl amino-pyridine
being used as a catalyst. Following the
hydrolysis of the anhydride, the titration
is made using 0.5 N methanolic KOH
solution.

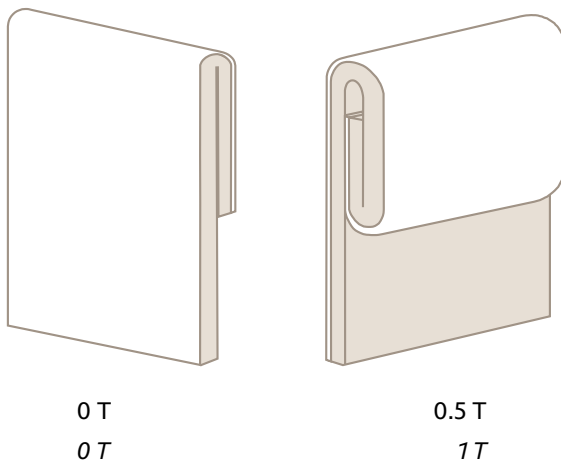
ACID VALUE

DIN EN ISO 2114. Approx. 4 g of poly-
esterare dissolved in 50 ml of dichloro-
methane or tetrahydrofurane. A titration
is made with 0.1 N methanolic or ethano-
lic KOH with phenolphthalein as indicator.

BALANCE OF HARDNESS AND FLEXIBILITY POLYESTER/PU VS. POLYESTER/MELAMINE



Flexibility in ECCA / NCCA units (crack free on T-bend)



T-bend test

MORE SERVICE. BETTER QUALITY. A WIDER CHOICE. SPECIALIST FOR PRECOATED METAL.

DYNAPOL® FOR ...

... PACKAGING COATINGS

FIELDS OF APPLICATION

- Functional and decorative stamping enamels for cans, caps and closures
- Decorative enamels for tubes and aerosol cans
- Clear overprint varnishes
- Interior food contact finishes
- Adhesion promoter for caps and closures
- Foil lacquers, heat-seal lacquers, printing inks

PROPERTIES

- Excellent adhesion to metals, even after extreme deformation and exposure to heat (sterilization)
- Completely tasteless / no smell
- Good processability (solids content, mild solvents, reactivity, resistance to yellowing even if overbaked)
- Depending on the grade, also suitable for contact with food

... COIL COATINGS

FIELDS OF APPLICATION

- Exterior and Interior architecture (roofings, claddings, panels, venetian blinds, ceilings, lighting fixtures)
- Appliance finishing (domestic appliances, steel furniture)
- Transportation uses (automotive construction, trailer- and mobile home claddings, licence plates)
- Primer for galvanized steel or aluminium
- Hot laminating adhesives for films

PROPERTIES

- Very good adhesion to aluminium, steel and galvanized steel
- Excellent flexibility and formability
- Depending on the grade, good to excellent weathering resistance
- Good processability (reactivity, solids content, overbake resistance)
- Wide range of grades with special properties for different applications







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