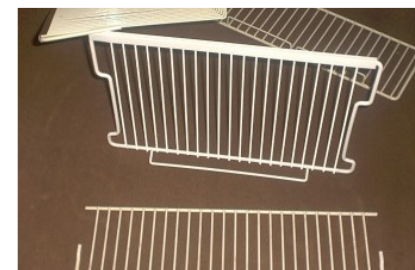


WATER-BORNE EPOXY/PHENOLIC PRE-CONDENSATES

FAMILY OF ALLNEX



PRODUCT PORTFOLIO – PHENODUR® VPW – KEY FEATURES



Heat curing primers with:

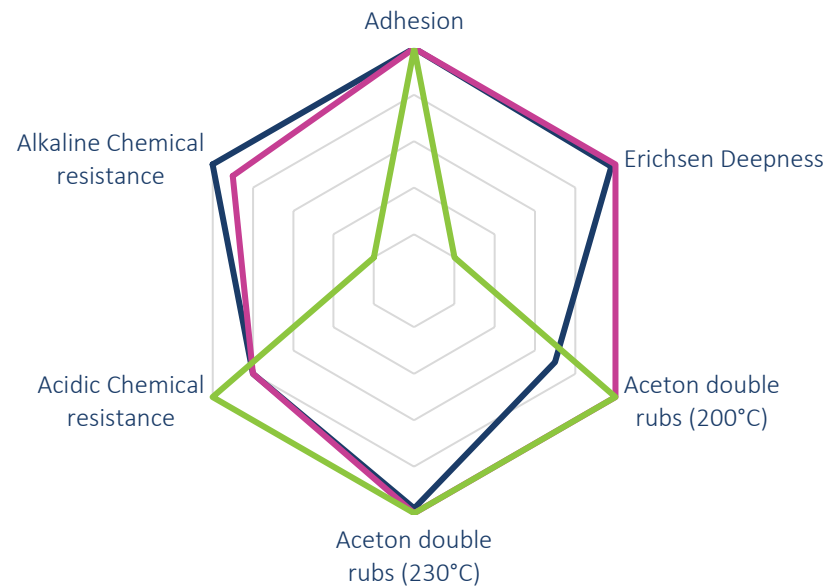
- excellent corrosion resistance
- acid and alkaline resistance
- high thermal-stability

PRODUCT PORTFOLIO - PHENODUR® VPW – TECHNICAL PERFORMANCE



Technical performance profiles *

Typical application cycle: 10-15' at > 180°C



* Inner circle = poor, outside circle = excellent

PHENODUR® VPW 1942/52 WA

PHENODUR® VPW 1946/46 WA

PHENODUR® VPW 1947/50 WA

(phenolic compound with internal catalyst)






PRODUCT PORTFOLIO - PHENODUR® VPW – APPLICATION AREAS



Intended application areas:

- Interior - drum linings
- Heat-curing primer on metal - (OEM, COIL)
- Electrical - insulation
- Corrosion protection - (tanks, coolers, radiators)
- Composites

PRODUCT PORTFOLIO – PHENODUR® VPW – LABELLING

Grade	PHENODUR® VPW 1942/52WA	PHENODUR® VPW 1946/46WA	PHENODUR® VPW 1947/50WA
Chemical characteristic	Epoxy/phenolic pre-condensate	Epoxy/phenolic pre-condensate with increased phenolic amount	Straight phenol phenolic resin + “internal catalyst”
Free formaldehyde [%]	< 0.01	< 0.1	< 0.2
Free monomers [%]	< 0.1	< 0.2	< 0.5
Organic co-solvent [%]	< 2.0	< 7.5	< 3.5
Labeling elements		 	 
Acetone double rubs (200/230 °C)	> 150 / >150	> 150 / >150	> 150 / >150
Erichsen deepness (> 9mm)	pass	pass	1 mm
Adhesion (GT “0”)	pass	pass	pass
Acidic chemical resistance (sulfuric acid; etc.)	OK	excellent	good
Alkaline chemical resistance (ammonia; etc.)	excellent	very good	low

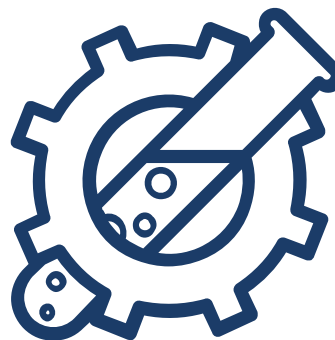
VPW 1947 has somewhat unfavorable labeling vs. VPW 1942 & VPW 1946 due to a free formaldehyde concentration of < 0.2%, resulting in GHS hazard pictogram GHS08 “*Danger or Warning, Systemic health hazards*”

PRODUCT PORTFOLIO – PHENODUR® VPW – TAKE AWAYS

Existing water-based portfolio includes epoxy/phenolic grades with:

- Very low concentration of free formaldehyde (< 0.01%)
- eco-friendly resins (free formaldehyde and free monomers of max. < 0.2%)
- Very low level of organic co-solvent(s) of < 0.2%
- Excellent corrosion resistance, acid and alkaline resistance, paired with high curing speed

PHENODUR® VPW 1942/52WA has free formaldehyde of < 0.01% to avoid classification as skin sensitizer (0.02%)



Recent projects addressing the need to:

- Design new phenolic resins type PHENODUR® VPW 1947 completely free of formaldehyde as building block. Work already ongoing in R&D
- Design new phenolic resins type PHENODUR® VPW 1942 completely free of formaldehyde as building block. Work already ongoing in R&D
- Functionalize new phenolic developments with bio-based raw materials for different application areas

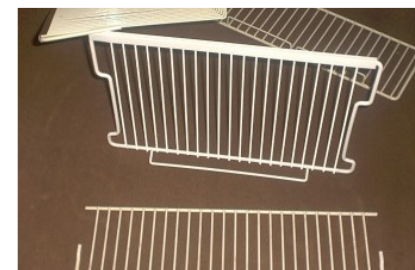
How allnex enables green growth with existing and in-progress solutions

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THANK YOU FOR YOUR ATTENTION

QUESTIONS?



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