

RESINS FOR FLOORING METHYL METHACRYLATE FLOORING SYSTEMS



VARADEG

FLOORING RESINS

DESIGNING SAFE TRAFFIC AND SAVING RESOURCES

VARADEG 645, VARADEG 650 and VARADEG 655 are methacrylate resins for durable cold plastic road markings and floorings.

VARADEG based road markings are solvent-free, reactive systems; with recycled methylmethacrylate content. They produce almost no volatile organic compounds (VOC) and do not require external heat input during application.

The VARADEG 645 with approx. 30% recycled MMA content is for cold plastic characterized by excellent visibility and durability while at the same time offering a resource-saving alternative to conventional binders for road markings.

Sustainable offset for:

Cold plastic formulations with

- High storage stability
- Excellent processing characteristics
- Fast curing even at low temperature
- For use in cold and warm climates



VARADEG 645

Methacrylate resin for durable cold plastic road markings.

VARADEG 645 is a a basis resin for the production of PMMA-coatings

TECHNICAL DATA:

	Value	Unit	Test Method
Application period at 25 °C *	approx. 15	min.	-
Viscosity, Rheometer, 20 °C	250 ± 50	mPa.s	Brookfield, Sp- 2/30 UpM
Flash point	approx. 16.5	°C	DIN ISO 2592
Density / 20 °C	0,98	g/cm ³	DIN 51757
Colour, Gardner, delivery form	max. 1	-	DIN ISO 4630
Delivery form	liquid	-	-
Storage time at rt, dark	min. 6 months		

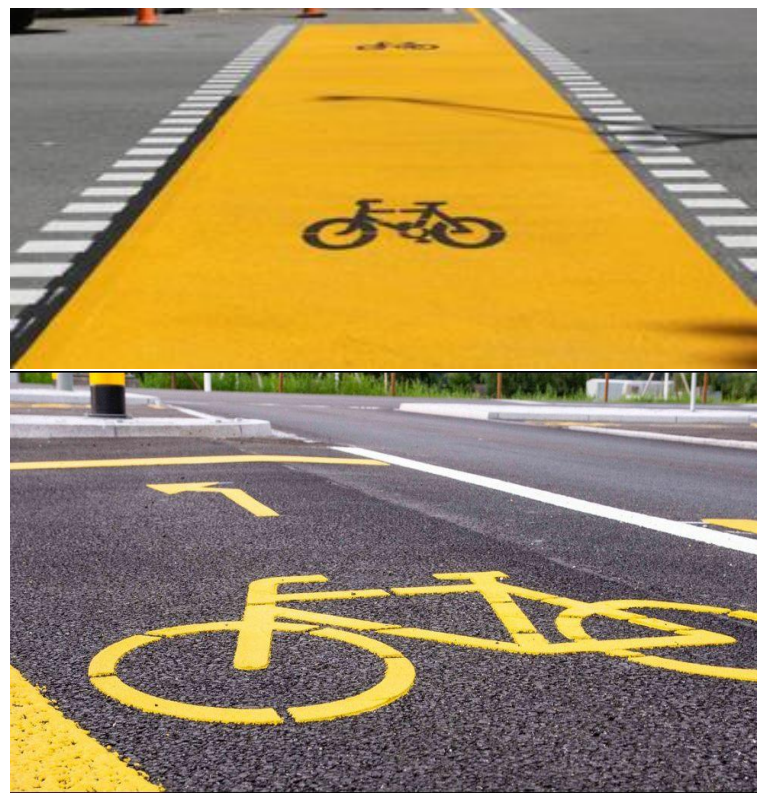
* 100 g resin with 2,5 % hardener (e.g. Peroxan BP-50 W)

APPLICATION:

- Markings at junctions and crossings, stop lines and direction arrows
- Centre markings on freeways and highways
- Manual application by trowel and draw box.

USE OF MMA FLOORING SYSTEMS:

- Food processing facilities
- Retail
- Pool decks
- Driveways and walkways
- Sports and educational facilities
- Hotels and restaurants
- Industrial facilities
- Laboratories



PRINCIPAL PROPERTIES:

- Suitable for high temperatures
- Permanently elastic
- Resistant to ageing and weathering
- Colorfast
- Abrasion-proof
- Resistant to de-icing salt and fuels
- Low tendency to graying
- UV stability
- Low maintenance
- Excellent chemical, water, and abrasion resistance
- Very fast curing, even at low temperatures
- Outstanding strength capabilities
- Low degradation
- Slip resistance
- Antimicrobial properties
- Low VOC

DESCRIPTION:

- Low viscosity methacrylate resin used as a binder for permanent markings based on cold plastic
- Permanently elastic and is processed without plasticizers
- Viscosity of ready formulated material is stable over a long period
- Versatile use as: flat line, profiled and structure markings
- Recommended surface temperature for application is between 5 °C and 60 °C
- Good wetting properties for fillers and pigments, outstandingly fluid cold plastics can be produced for use in cold and warm climates



METHACRYLATE RESIN FOR DURABLE COLD PLASTIC ROAD MARKINGS

Typical formulations: 645 - 1 / up to 7 mm / 100:2 system / profile: application with suitable machines with profile function.

Binder / resin	VARADEG 645	20,00
Dispersing additive	Disperbyk 167	0,10
Rheology additive	Byk D 410	0,15
Rheology additive	Bentone 27	0,15
Pigment (TiO ₂)	Tioxide TR 92	10,00
Fine filler (15 µm)	Omyacarb 15GU	20,0
Coarse filler (0,1 – 0,4 mm)	Cristobalite M72	25,0
Premix beads	50 – 250 µm	25,0

PROPERTIES:

Viscosity at 23 °C:	approx. 6 cm	blot test for CP
Viscosity at 23 °C:	between 10 - 12	Daniel flow gauge
Shore D hardness:	50 - 60	DIN 53505
Density:	1,85 g/cm ³	DIN 51757
Consumption:	4 – 6 kg/m ²	depending on used profile

INITIATOR/HARDENER

Hardener powder 50W (50% BPO), temperature dependent.

POT LIFE AND TYPICAL:

Approved hardener: Hardener powder, as a proportion of total formulation

Temperature / °C [surface]	Hardener / 50% DBPO [% by weight]	Pot life [min]	Setting time [min]
+10	3.0	14	45
+10	2.0	18	50
+20	2.0	10	30
+20	1.0	15	35
+30	1.0	8	20
+30	0.5	12	30
+40	0.5	6	18

NOTE:

Manual dosage of hardener powder can use mixing ratios from the table. Automatic dosage of hardener usually uses a mixing ratio between 1.5 – 2.5 %.

METHACRYLATE RESIN FOR DURABLE COLD PLASTIC ROAD MARKINGS

Typical formulations: 645 - 2 / up to 3 mm / 100:2 system / profile: application for hand, draw box or machine.

Binder / resin	VARADEG 645	20,00
Dispersing additive	Disperbyk 167	0,10
Rheology additive	Byk D 410	0,10
Rheology additive	Bentone 27	0,10
Pigment (TiO ₂)	Tioxide TR 92	10,00
Fine filler (15 µm)	Omyacarb 15GU	20,0
Coarse filler (0,1 – 0,4 mm)	Cristobalite M72	25,0
Premix beads	50 – 250 µm	25,0

PROPERTIES:

Viscosity at 23 °C:	approx. 8 - 9 cm	blot test for CP
Viscosity at 23 °C:	between 13 - 14	Daniel flow gauge
Shore D hardness:	50 - 60	DIN 53505
Density:	1,85 g/cm ³	DIN 51757
Consumption:	approx. 3,7 kg/m ²	for 2 mm thickness



VARADEG VERSATILE AND DURABLE RESINS

Methyl methacrylate (MMA) systems provide versatile flooring options, especially suitable for areas where a quick return to service is needed. The system of three resins (primer, base coat, and topcoat) can be applied at the temperatures below 0 °C, and it offers the durability to withstand even extreme conditions.



ROAD GUIDANCE SYSTEMS VARADEG PUMMA

Urethane-modified MMA-Acrylic resin

VARADEG PUMMA ground surface indicators as tactile guidance systems provide blind and partially sighted people with more safety in road traffic and in other public areas. Ribbed and studded flooring tiles made of acrylic resins ensure good perception when walking on them or detecting them with the white stick; they offer good stability.

Substitution of styrene containing UP resins by **VARADEG 2100 PUMMA, in MMA** in sustainable and challenging applications

- + because of health and safety concerns
- + because of higher UV resistance (outdoor application is possible)
- + because of better properties in the field of fire protection
- + because of comparable or even better mechanical properties



VARADEG 1800 PUMMA HYBRID

Low-viscous, elasticized PU-MMA resin with high flexibility at very low temperatures. For 2-component floor coatings on concrete substrates in coolers and freezers. Also to be used as liquid water-proofing and joint grouting mass for movement joints. VARADEG 1800 PUMMA is for self-leveling methylmethacrylate coatings, road marking, concrete coloration, metallic adhesive finishes, wetting agent for acrylic solid surface.

TECHNICAL DATA:

	Value	Unit	Test Method
Application period at 25 °C *	approx. 15	min.	-
Viscosity, Rheometer, 20 °C	max. 100	dPas	Brookfield, cP60/2°
Flash point	approx. 15	°C	DIN ISO 2592
Density / 20 °C	0,98	g/cm ³	DIN 51757
Colour, Gardner, delivery form	max. 1	-	DIN ISO 4630
Delivery form	liquid	-	-
Storage time at rt, dark	min. 6 months		

* 100 g resin with 2,5 % hardener (e.g. Peroxan BP-50 W)

VARADEG 2100 PUMMA

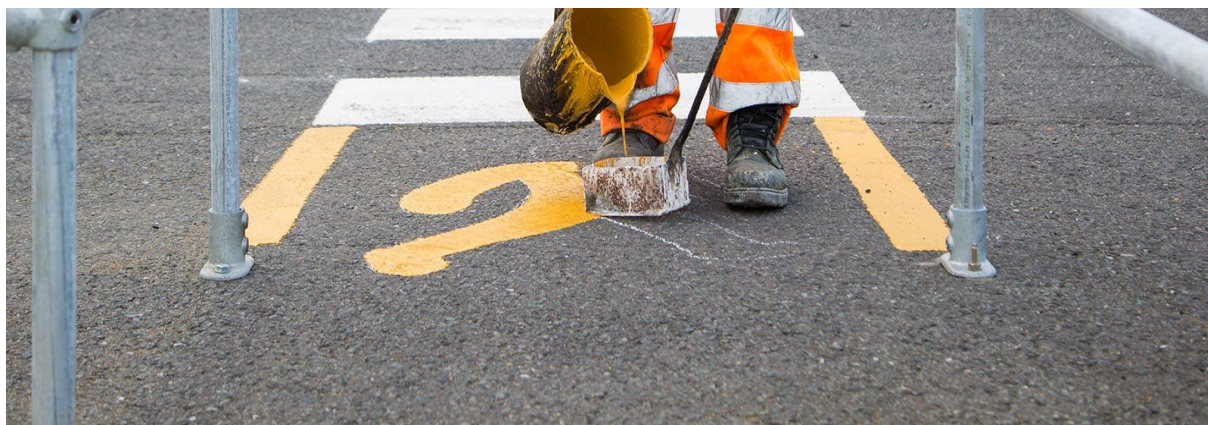
A dissolved in methyl methacrylate binder based on a urethane-modified polyalkyl methacrylate resin having reactive, cycloaliphatic side chains, as a binder for the production of solid surface. It is characterized by high reactivity and can be used when appropriate combinations of peroxides and accelerators even without heat at low cure shrinkage.

TECHNICAL DATA:

	Value	Unit	Test Method
Viscosity, Rheometer, 25 °C	200 – 600	mPa.s	Brookfield, Spindel 3/50 UpM
Colour, Gardner, delivery form	max. 2	-	DIN ISO 4630
Delivery form	liquid	-	-
Storage time at rt, dark	min. 6 months		

* 100 g resin with 2,5 % hardener (e.g. Peroxan BP-50 W)

VARENA CHEMICALS offers a range of high quality resins for reliable road markings solutions, to meet all national / international standards, that suits every surface type and operational performance requirement, temperature, humidity, wind speed, and barometric readings ,this range includes.



THERMOPLASTIC ACRYLIC RESINS

VaraCryl TPA 5650 T60

VaraCryl TPA 5650 X60

Thermoplastic styrene acrylic-copolymer for 1-component coatings

	Value	Unit	Test Method
Non-volatile content, 1h/125 °C	60 ± 1	%	DIN EN ISO 3251
Viscosity, Rheometer, 25 °C	7000 - 9000	mPa.s	DIN EN ISO 2555
Acid value, on solids	max. 15	mg KOH/g	DIN EN ISO 2114
Glass transition temperature	50	°C	-
Colour, Gardner, delivery form	max. 1	-	DIN ISO 4630
Delivery form	60 ± 1 in toluene	%	-

VaraCryl TPA 5650 T60 is an air drying acrylic styrene copolymer for the manufacture of rapid physical drying road marking paints as well as in the building protection. It is used alone or in combination with acrylic resin or chlorparaffine. VaraCryl TPA 5650 T60 has high hardness, good adhesion. VaraCryl IPA 5650 T60 is also for industrial quick drying paints, as acrylic top coats for textured paints, for semi gloss & matt industrial coatings and concrete coatings.

VaraCryl TPA 5630 T60

VaraCryl TPA 5630 X60

VaraCryl TPA 5630 S60

A thermoplastic styrene acrylic-copolymer for 1-component coatings

Technical Data:

	Value	Unit	Test Method
Non-volatile content, 1h/125 °C	60 ± 1	%	DIN EN ISO 3251
Viscosity, Rheometer, 20 °C	5.000 – 15.000	mPa.s	DIN EN ISO 2555
Acid value, on solids	10 - 15	mg KOH/g	DIN EN ISO 2114
Glass transition temperature	42	°C	-
Colour, Gardner, delivery form	max. 1	-	DIN ISO 4630
Delivery form	60% in solvesso 100/acetone	%	-

VaraCryl TPA 5630 SA60 is an acrylic copolymer for the manufacture of rapid physical drying road marking paints as well as in the building protection.



VaraLan for Concrete Coatings

Polyurethane- / epoxy silan-curable, dispersions acrylic resins

Hydroxyl functional cationic acrylic solution, crosslinks at ambient or elevated temperature for solvent resistant coating.

VaraLan KX-ACRYLIC DISPERSIONS are hydroxyl functional cationic acrylic solution polymers. VaraLan KX-4499 polymer will crosslink at room temperature with polyisocyanates and epoxy silanes. The fastest and most resistant coating can be formulated with the combination of a polyisocyanate and an epoxy silane. We recommend a maximum of 20% epoxy silane and 20% polyisocyanated based on solids. The ambient curing happens very quickly, in less than one hour the film will have water resistance. Allowing the film to cure for two hours will result in a film that has over 100 double rubs acetone resistance. Detergents and cleaners will not remove this film. Water resistance is excellent. The dried film will also resist staining.

For concrete coatings the cured film resists the following: Gasoline, Motor Oil, Anti-freeze, Brake Fluid and Alkaline Cleaners commonly used for concrete and Hot Tire Mark.

Product	Monomer	Supply Form [%]	pH value	Tg [°C]	Viscosity [mPa.s]/20°C
KX-4499	Hydroxyl functional cationic acrylic	29 - 31 in water	5.0-6.0	32	300 – 800
KX-4470	Hydroxyl functional cationic acrylic	37 - 39 in water	5.0-6.0	32	500 – 1.500
KX-4463	Hydroxyl functional cationic acrylic	39 - 41 in water	5.0-6.0	38	500 – 1.500



Concrete Coatings

VaraMol PU 450

POLYURETHANE FLOORING

A branched, solvent free, low viscose polyether polyol containing hydroxyl groups in the formulation of tough-elastic PU coatings.

TECHNICAL DATA:

	Value	Unit	Test Method
Acid number (solid resin)	≤ 2	mg KOH/g	DIN EN ISO 3682
Colour index (as delivered)	≤ 5	Gardner	DIN ISO 4630
Hydroxyl content,(solvent free)	4.7 ± 0.2	%	DIN 53240/2
Viscosity at 23°C (rheometer)	3500 ± 500	mPas	DIN 53015
Flash point	approx. 127	°C	DIN EN 22719
Density / 20 °C	1,01	g/ml	DIN EN ISO 2811-2
Delivery	solvent free	%	DIN EN ISO 3251
Water content	$\leq 0,1$	%	DIN 51 777-1

APPLICATION AND PROPERTIES:

VaraMol PU 450 are suitable for use in the formulation of solvent free two-component coatings, sealings and adhesives. These are mainly used on concrete and asphalt floors and steel surfaces. After crosslinking and curing of VaraMol PU 450 with MDI, the resultant coatings are tough and flexible, hard-wearing and chemical-resistance. VaraMol PU 450 is recommended also for applications like; automotive PU underbody coatings, electrical casting applications and also for automotive refinishing and plastic coatings e.g. in combination with VaraPol E 1870.

Generally speaking, VaraMol PU 450 has good compatibility with the solvents listed. However, the solutions have to be tested for their storage stability. VaraMol PU 450 can be thinned with esters, ketones, ether esters and aromatic hydrocarbons. Prolonged storage of a solution with low binder content may result in turbidity and sedimentation. Only PUR grade solvents should be used (< 0.05 % water).



SELF-LEVELING 2-COMPONENT POLYURETHANE FLOORING SYSTEM

Component 1			
1	VaraMol PU 450	45,5	VARENA
2	Silosiv paste P 3	9,0	Grace
3	Barytes EWO	38,5	Sachleben
4	Kronos 2360	5,5	Kronos
5	Bayferrox 318 M	0,5	Covestro
6	WorléeAdd 6236 / silicon defoamer	1,0	Worlée
	THORFOAM PD 123 / silicon defoamer		VARENA
		100,00	
Component 2			
7	Desmodur VL	20,6	Covestro

Crosslinking NCO/OH 1.05

Working time at 23 °C approximately 30 minutes

Mechanical properties after 12 hours at 80 °C

DIN		
Shore A Hardness	ISO 7619-1 SHE	93
Shore D Hardness	ISO 7619-1 SHE	55
Tensile Strength in N/mm ²	53504	10,2
Elongation %	53504	58,0
Tear Strength in N/mm	ISO 34-1	9,7
Tear Strength Graves in N/mm	ISO 34-1	38,3
Abrasion Resistance, Taber Abraser wheel H 18, 1000 cycles, load 1000 g	EN ISO 5470	1,4





INNOVATIVE TECHNOLOGIES FOR RESINS & ADDITIVES
DR. IRANKHAHI CHEMICAL COMPANY