



BASF material solutions for charging systems

BASF
We create chemistry

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BASF material solutions for charging systems

BASF offers a wide range of material solutions
for charging infrastructure

Mobile charging systems



Wall box



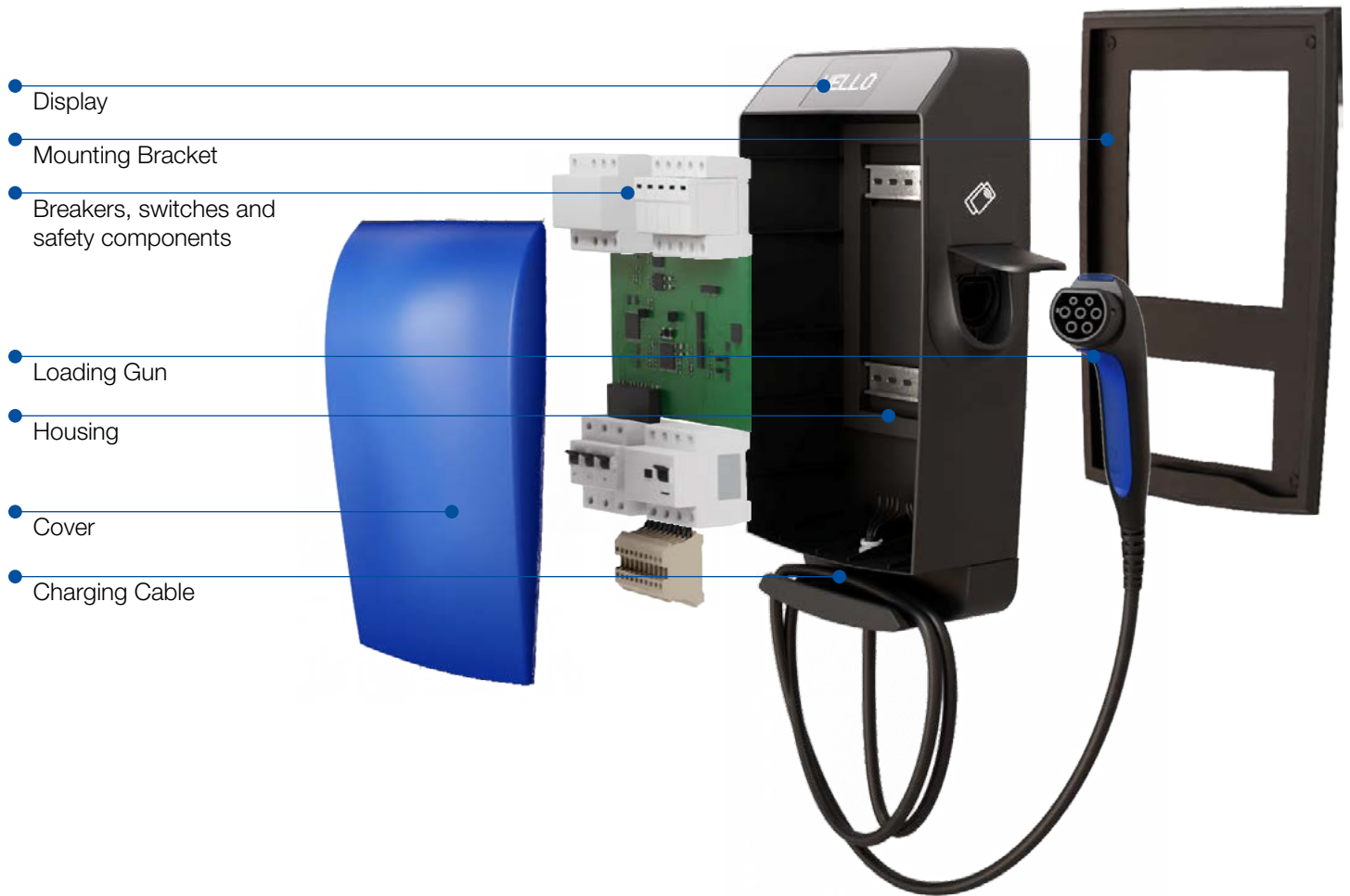
**Ultramid[®], Ultradur[®], Ultrason[®] and
Elastollan[®] Portfolios**

Different requirements are based on the individual
function of the part within the wall box.

BASF offers a wide range of materials, e.g.:

- Deep gloss for surface applications
- Structural materials for frames and brackets
- Elastic materials for cables and haptic elements
- A broad portfolio of flame retardant products

WALL BOX OVERVIEW

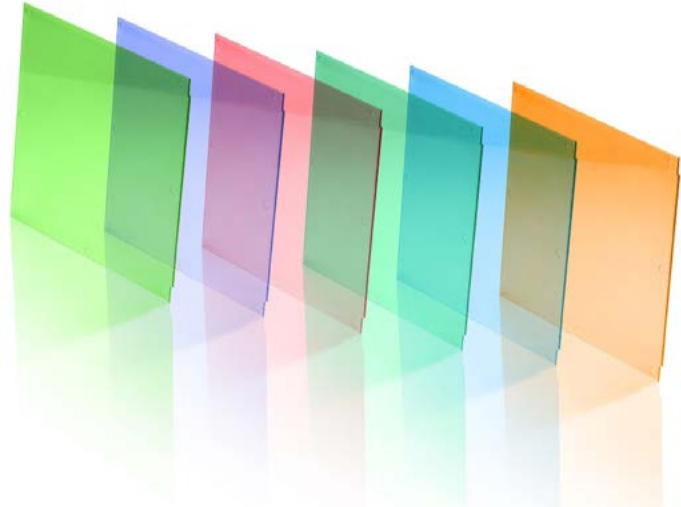
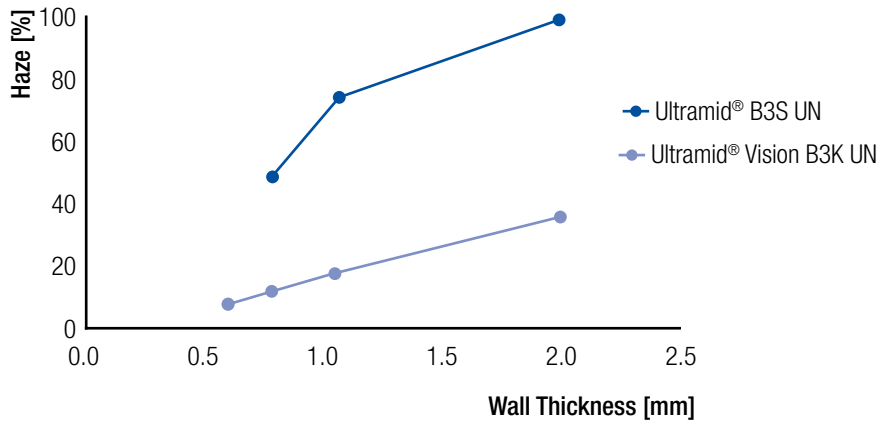


	Ultramid®	Ultradur®	Ultrason®	Elastollan®
Display	✓		✓	
Cover	✓			
Housing	✓	✓		
Mounting Bracket	✓			
Charging Cable				✓
Loading Gun	✓			✓
Breakers, Switches and Safety Components	✓			✓

DISPLAY

Ultramid® Vision

- First semi-transparent PA6 grade
- High scratch resistance
- Good chemical resistance
- UL94 V2 and UL 746C compliant



Material	Visual assessment
Ultramid® Vision	No scratch mark
Transparent PA12 copolymer	No scratch mark
Polyether sulfone	Visible scratch mark (approx. 0.25 µm)
Polycarbonate	Highly visible scratch mark (approx. 1 µm)
Copolyester	Barely visible scratch mark (approx. 0.2 µm)
SAN	Highly visible scratch mark (approx. 0.3 µm)
Polypropylene with clarifier	Highly visible scratch mark (approx. 0.5 µm)

Proven chemical resistance against:

- Sun screen (tested according to PV3964)
- Sunflower oil
- Chloroform
- Isopropanol
- Glycerin
- Cyclohexane
- Methyl ethyl ketone
- Methanol

Test	0.4 mm	0.75 mm	1.5 mm	3 mm
UL94	HB	V-2	V-2	V-2
HWI	0*	0*	0*	0*
HAI	0*	0*	0*	0*
GWFI (°C)	960	960	960	960
GWIT (°C)	960	930	900	750
CTI (V)				550 (500)

* UL746C: materials with HB / V-2 rating and HWI/HAI <2 can be used in applications requiring V-0 rating!

DISPLAY

Ultrason® E2010

- Transparent material
- UL94 V0
- Excellent temperature resistance

Flammability		Value	Testing method
Flammability class - UL	1.5 mm, ALL	V-0	UL 94 IEC 60695-11-10, -20
	3.0 mm, NC	V-0, 5VA	UL 94

Electrical properties		Value	Testing method
Hot-wire ignition (HWI)	1.5 mm	PLC 2	UL 746A
	3.0 mm	PLC 1	
High amp arc ignition (HAI)	1.5 mm	PLC 0	UL 746A
	3.0 mm	PLC 0	

Comparative tracking index (CTI)	PLC 4	UL 746A
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Thermal properties		Value	Testing method
RTI Elec	1.5 mm	180°C	UL 746B
	3.0 mm	180°C	
RTI Imp	1.5 mm	180°C	UL 746B
	3.0 mm	180°C	
RTI Str	1.5 mm	190°C	UL 746B
	3.0 mm	190°C	

COVER

Ultramid® Deep Gloss

- High gloss (different colors)
- Surface textures possible
- Excellent scratch resistance
- High chemical and good UV resistance

High gloss colors



Surface textures



Erichsen Scratch Test:

acc. to PV3952, 10 N, needle Ø 1 mm	ΔL=0.1 (acc. to DIN 5033-4) (scratch depth: 0.87 μm)
acc. to DBL9202, 10 N, needle Ø 1 mm	O.K. (visual assessment)
acc. to GS93045-9, 5 N, needle Ø 0.75 mm	assessment index: 2A

Tested chemical resistance:

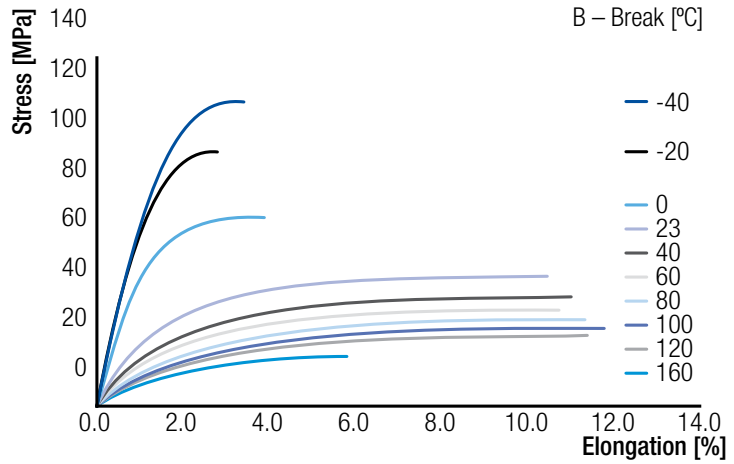
- Sunscreen
- Perspiration
- Ethyl alcohol
- Plastic cleaner
- Window cleaner
- Soapy water

Accelerated weathering test (Indoor, acc. to DIN75202)	4 Cycles (280 h)	6 Cycles (420 h)
Color change ΔE	0.3	0.7
Greyscale	4 - 5	4
Gloss 20°(Gloss units)	94.3	74.8
Gloss retention (20°)	101%	80%

HOUSING

Ultramid® B3UG4

- UL94 V2 and UL746C compliant
- High mechanical strength
- Good processability
- Hal. free



Flammability	Value	Testing method
Flammability class - UL	0.71 mm, BK	V-2
	1.5 mm, BK	V-2
	3.0 mm, BK	V-2
		UL 94 IEC 60695-11-10, -20

Electrical properties	Value	Testing method
Hot-wire ignition (HWI)	0.71 mm	PLC 3
	1.5 mm	PLC 2
	3.0 mm	PLC 1
High amp arc ignition (HAI)	0.71 mm	PLC 0
	1.5 mm	PLC 0
	3.0 mm	PLC 0
		UL 746A

Comparative tracking index (CTI)	PLC 1	UL 746A
Dielectric strength	17 kV/mm	ASTM D149
High voltage arc tracking rate (HVTR)	PLC 0	UL 746A
Volume Resistivity	1.0E+10 ohms*cm	ASTM D257 IEC 60093
Arc Resistance	PLC 6	ASTM D495

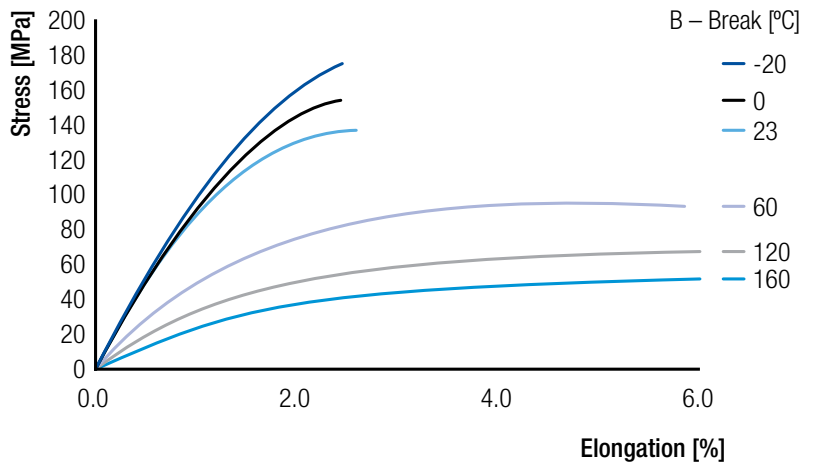
Thermal properties	Value	Testing method
RTI Elec	0.71 mm	140°C
	1.5 mm	140°C
	3.0 mm	140°C
RTI Imp	0.71 mm	125°C
	1.5 mm	125°C
	3.0 mm	125°C
RTI Str	0.71 mm	140°C
	1.5 mm	140°C
	3.0 mm	140°C
		UL 746B

Physical properties	Value	Testing method
Dimensional Change	0.00%	ASTM D1042 ISO 2796
Outdoor suitability	f1	UL 746C

HOUSING

Ultradur® B4300 G6

- UL94 HB
- High mechanical strength
- Good processability



If your wall box requires an IP gasket between housing, display and cover, we offer formed-in-place foam gasket solutions based on Elastofam® I PU Systems.

MOUNTING BRACKET

Ultramid® B3GK24

- UL94 HB
- GWFI > 650C
- Reduced warpage
- Good processability

MOUNTING BRACKET

Ultramid® B3U50G6

- UL94 V0
- Halogen free
- Suitable for unattended household appliances (IEC 60335)

Flammability	Value	Testing method
0.40 mm, ALL	HB	UL 94
0.75 mm, ALL	V-0	UL 94 IEC 60695-11-10, -20
Flammability class - UL	1.5 mm, ALL	UL 94 IEC 60695-11-10, -20
	3.0 mm, ALL	UL 94 IEC 60695-11-10, -20
0.40 mm, ALL	HB75	IEC 60695-11-10, -20

Electrical properties

Hot-wire ignition (HWI)	0.40 mm	PLC 0	UL 746A
	0.75 mm	PLC 0	
	1.5 mm	PLC 0	
	3.0 mm	PLC 0	

High amp arc ignition (HAI)	0.40 mm	PLC 0	UL 746A
	0.75 mm	PLC 0	
	1.5 mm	PLC 0	
	3.0 mm	PLC 0	

Comparative tracking index (CTI)	PLC 1	UL 746A
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Inclined-plane tracking	1.0 kV	ASTM D2303
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Thermal properties

RTI Elec	0.40 mm	140°C	UL 746B
	0.75 mm	150°C	
	1.5 mm	150°C	
	3.0 mm	150°C	

RTI Imp	0.40 mm	105°C	UL 746B
	0.75 mm	115°C	
	1.5 mm	115°C	
	3.0 mm	115°C	

Ultramid® B3EG6

- UL94 HB
- High mechanical strength
- Good processability

Thermal properties

RTI Elec	0.75 mm	120°C	UL 746B
	1.5 mm	120°C	
	3.0 mm	120°C	
	6.0 mm	120°C	

RTI Imp	1.5 mm	95.0°C	UL 746B
	3.0 mm	95.0°C	
	6.0 mm	95.0°C	

RTI Str	1.5 mm	130°C	UL 746B
	3.0 mm	130°C	
	6.0 mm	130°C	

Flammability class - UL	1.5 mm, ALL	HB	UL 94
	3.0 mm, ALL	HB	UL 94
	6.0 mm, ALL	HB	UL 94
	3.0 mm, ALL	HB40	IEC 60695-11-10, -20
	6.0 mm, ALL	HB40	IEC 60695-11-10, -20
	1.5 mm, ALL	HB75	IEC 60695-11-10, -20

CHARGING CABLE

Elastollan® 1176A10FR and 1188A10FR

- Non-halogenated FR ether grades
- Superior hydrolysis resistance
- Abrasion toughness with low conductivity
- Improved over-mold adhesion due to low filler content
- Cold temperature flexibility



For more information, go to

<https://wireandcable.basf.us/features/read/elastollan-1176a10fr-and-1188a10fr-new-solutions-for-emobility>

LOADING GUN

Haptic element – Elastollan® 1185

- Good adhesion to PA housing
- Good chemical resistance
- UV resistance

Contact carrier – Ultramid® B3U42G6

- UL94 V0
- Halogen free
- CTI 600

Housing – Ultramid® B3SR03

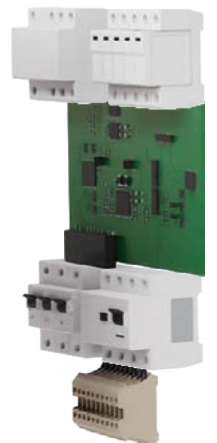
- High chemical resistance
- UL94 V2 UL f1 approved
- High toughness



BREAKERS, SWITCHES AND SAFETY COMPONENTS

Materials with UL, IEC, CCC, CSA approvals:

- Ultramid® B3UG4 → UL94 V2 (0.71mm), CTI usw.
- Ultramid® B3U42G6 → UL94 V0 (0.8mm), CTI 600
- Ultramid® C3U → UL94 V0 (0.4mm), GWIT 775
- Ultramid® A3UG5 → UL94 V0 (0.75mm)
- Ultramid® B3U30G6 → UL94 V2 (0.75mm)



PUBLIC CHARGING STATION OVERVIEW

HPC-Loading Gun



Smart Meter

Power Electronics

Tubes



Ultramid®

Ultradur®

Ultrason®

Elastollan®

HPC-Loading Gun

Smart Meter

Power Electronics

Tubes

Charging Inlet

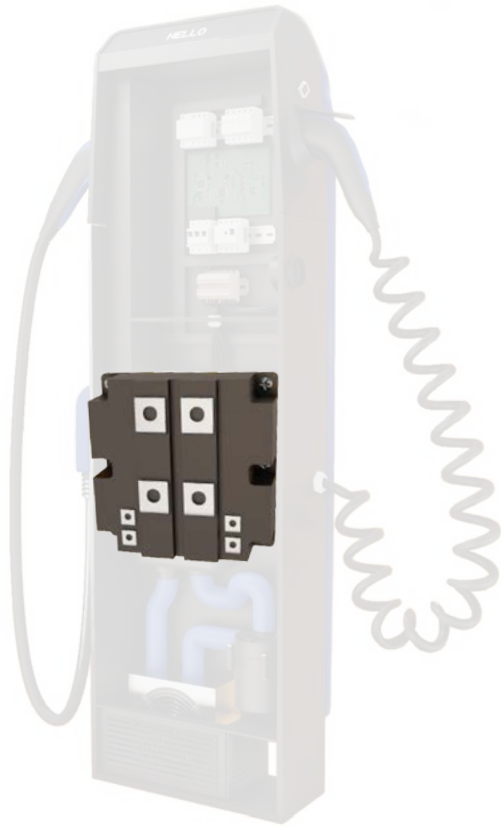
High voltage connectors for power distribution

Durable orange-colored products



PUBLIC CHARGING STATION - POWER ELECTRONICS

Ultradur® B4450G5



Key requirements

- Electric insulation of high AC and DC voltages
- Excellent insulation performance for tight contact arrays
- High CTI and RTI
- Constant dielectric strength
- Very few free ions, to avoid electrical corrosion under DC currents
- Long term thermal resistance
- Thermal conductivity if risk of hot spots exist

Corrosion

Ref. PBTGF25 FR

Ultradur® B4450 G5

Copper



Brass



Storage of metal contacts and pellets in moist heat at 70 °C for 55 days.

Deposits

Ref. PBTGF25 FR

Ultradur® B4450 G5



Storage of metal contacts and pellets in dry heat at 150 °C for 7 days.

Significantly reduced risk of corrosion and deposits

CHARGING INLET



Ultramid® B3EG6 black

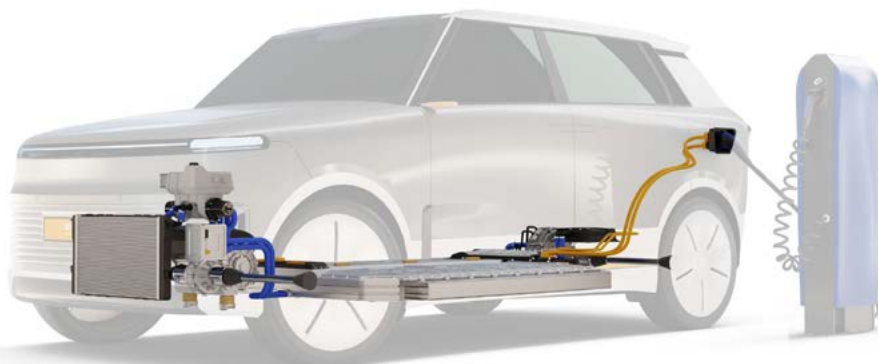
- UL94 HB

Ultramid® B3U30G6 black

- UL94 V2

Ultradur® B4450G5 black

- UL94 V0



Key requirements

- High mechanical strength
- UV resistance
- High CTI
- Dielectric strength

HIGH VOLTAGE CONNECTORS FOR POWER DISTRIBUTION

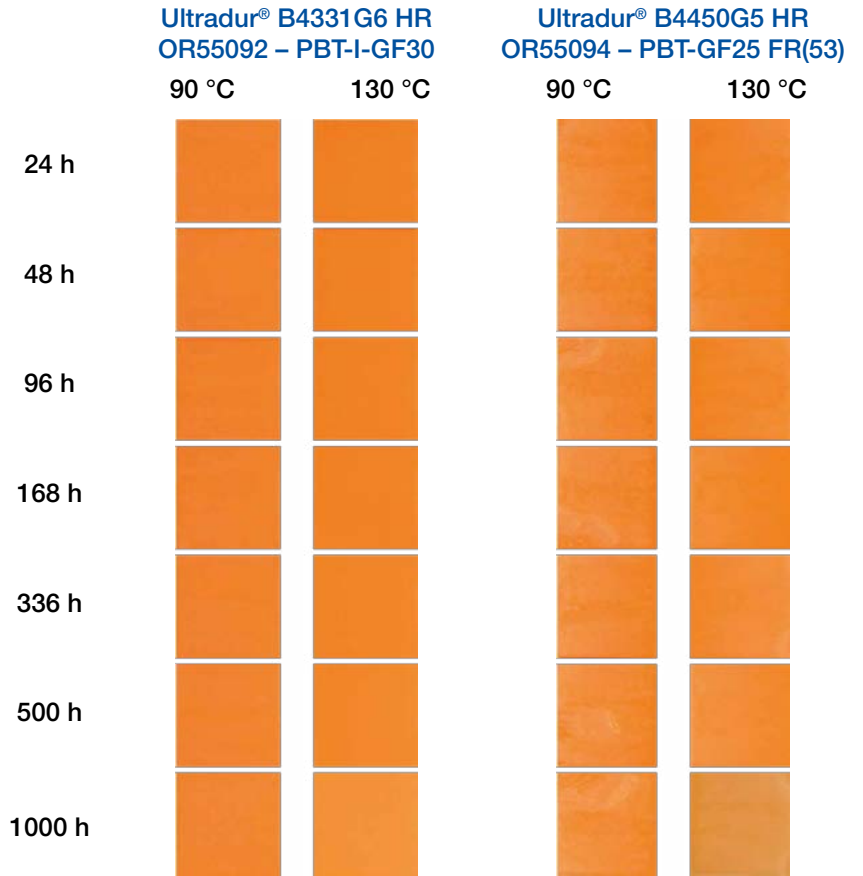
Ultradur® and Ultramid®



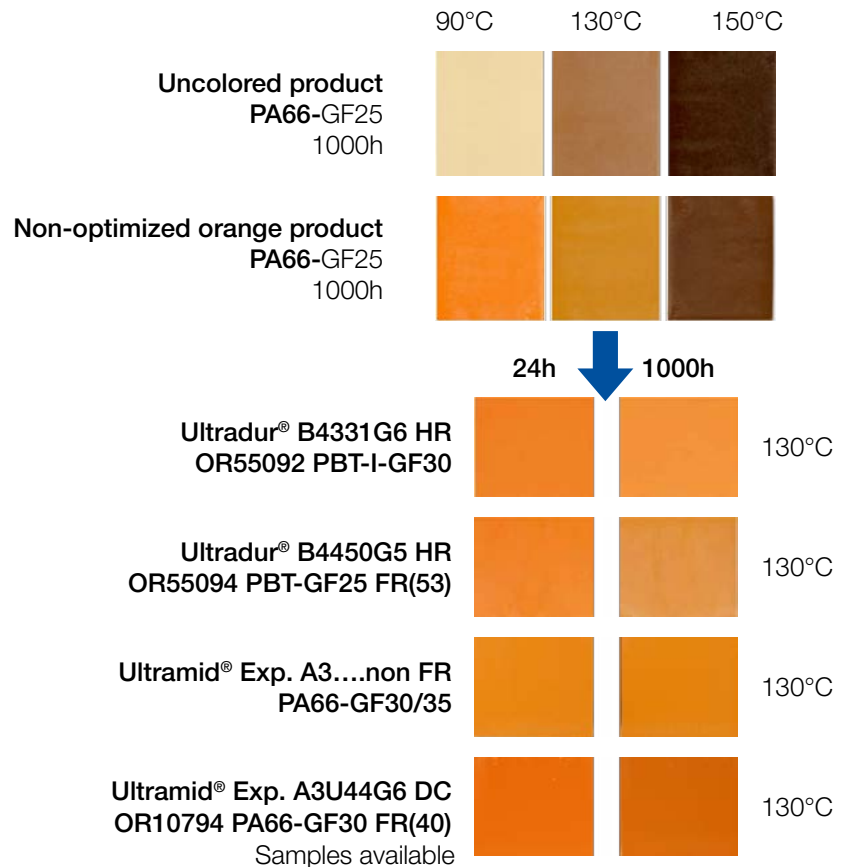
- UL94 HB and V0
- High mechanical strength
- High CTI
- Hydrolysis resistance
- Good processability
- Durable orange color

DURABLE ORANGE-COLORED PRODUCTS

Ultradur® and Ultramid®



Existing materials and new developments





To learn more about our innovative solutions, please go to:



Virtual Car:

https://plastics-rubber.basf.com/global/en/performance_polymers/industries/pp_automotive/applications/application_electronics_for_automotive/appl_emobility/virtual-car.html



eMobility solutions:

www.eMobility-plastics.basf.com



Automotive Electric and Electronic solutions:

https://plastics-rubber.basf.com/northamerica/en/performance_polymers/industries/pp_automotive/applications/application_electronics_for_automotive.html



Elastollan solutions for EV Charging Cables:

<https://wireandcable.basf.us/features/read/elastollan-1176a10fr-and-1188a10fr-new-solutions-for-emobility>



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