

Product Information **Ultramid®**

A3X2G5

07/2024

PA66-GF25 FR (52)



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Product description

Glass fibre reinforced injection moulding grade with improved flame retardance based on red phosphorus, giving outstanding mechanical and electrical properties for components requiring high stiffness. The products can also be offered as BMBcert™ and/or Cycled™. Due to the Massbalance approach the product properties do not change

Physical form and storage

The product is supplied in the form of granules with a bulk density of approx. 0.7 g/cm³. Standard packs are bag and bulk container (octagonal IBC=intermediate bulk container made from corrugated board with a liner bag). Other packaging materials and shipping in road or rail silo wagons are possible by agreement. The containers should only be opened immediately before processing or drying. To ensure that the delivered product absorbs as little moisture as possible, the containers should be stored in dry rooms and always carefully closed again after partial quantities have been withdrawn. In principle, the product can be stored for a long period of time. Containers stored in cold rooms should be equalized to ambient temperature before opening in order to avoid condensation on the granules. Regardless of the storage conditions, the product should be pre-dried according to our recommendations and the machine should preferably be loaded using a closed conveyor system.

Product safety

In case processing is done under conditions as recommended (cf. processing data sheet) melts are thermally stable and do not generate hazards by molecular degradation or the evolution of gases and vapors. Like all thermoplastic polymers the product decomposes on exposure to excessive thermal load, e.g. when it is overheated or as a result of cleaning by burning off. Further information is available from the safety data sheet.

Safety instructions

Provide suitable exhaust ventilation at the drying process and in the area surrounding the melt outlet of processing machines.
Closed containers should only be opened in well-ventilated areas.
Ensure thorough ventilation of stores and work areas.

When incorrectly processing an unpleasant odour can be produced, especially when the recommended processing parameters are exceeded.

Check
- Moisture content of pellets
- Melt temperature
- Residence time

When there is a strong odour, immediately check processing parameters, ventilate the area well and recheck moisture content of material. If necessary stop processing and redry the material.

Any short stoppages in production, it is recommended that you inject material into the mould not purge an air shot. Any molten material drooling from the machine nozzle or hot runner nozzles can self-ignite when in open atmosphere. It is therefore advisable to dispose of purgings etc into water containers.

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. In order to check the availability of products please contact us or our sales agency.

Product Information

Typical values for uncoloured product at 23 °C ¹⁾	Test method	Unit	Values ²⁾
Properties			
Polymer abbreviation	-	-	PA66-GF25 FR (52)
Density	ISO 1183	kg/m ³	1370
Viscosity number (0.5% in 96% H ₂ SO ₄)	ISO 307, 1157, 1628	cm ³ /g	140
Water absorption, saturation in water at 23°C	similar to ISO 62	%	5.7 - 6.3
Moisture absorption, equilibrium 23°C/50% r.h.	similar to ISO 62	%	1.4 - 1.7
Processing			
Melting temperature, DSC	ISO 11357-1/-3	°C	260
MVR 275 °C/5 kg	ISO 1133	cm ³ /10min	30
Melt temperature, injection moulding/extrusion	-	°C	280 - 300
Mould temperature, injection moulding	-	°C	60 - 90
Moulding shrinkage, constrained ³⁾	-	%	0.5
Molding shrinkage (parallel)	ISO 294-4	%	0.45
Molding shrinkage (normal)	ISO 294-4	%	1.15
Flammability (UL yellow card see attachment)			
Glow Wire Flammability Index, GWFI at d = 0.8 mm thickness	IEC 60695-2-12	°C	960
Oxygen index	ISO 4589-1/-2	%	27
Specific optical smoke density	EN ISO 5659-2: 2007	-	217
Toxicity of smoke CIT NLP acc. to CEN/TS 45545-2	NF X70-100-1/-2	-	0.42
Mechanical properties			
dry / cond.			
Tensile modulus	ISO 527-1/-2	MPa	8000 / 6000
Stress at break	ISO 527-1/-2	MPa	140 / 100
Strain at break	ISO 527-1/-2	%	3.5 / 7
Tensile creep modulus, 1000 h, strain ≤ 0.5%, 23°C	ISO 899-1	MPa	* / 3500
Flexural modulus	ISO 178	MPa	7100 / -
Charpy unnotched impact strength (23°C)	ISO 179/1eU	kJ/m ²	65 / 70
Charpy unnotched impact strength (-30°C)	ISO 179/1eU	kJ/m ²	60 / 65
Charpy notched impact strength (23°C)	ISO 179/1eA	kJ/m ²	13 / 17
Izod notched impact strength (23°C)	ISO 180/A	kJ/m ²	12 / 17
Thermal properties			
Deflection temp. under load 1.8 MPa (HDT A)	ISO 75-1/-2	°C	240
Deflection temp. under load 0.45 MPa (HDT B)	ISO 75-1/-2	°C	250
Max. service temperature (short cycle operation)	-	°C	220
Temperature index at 50% loss of tensile strength after 5000 h	IEC 60216	°C	157
Temperature index at 50% loss of tensile strength after 20000 h	IEC 60216	°C	139
Coefficient of linear thermal expansion, longitudinal (23-80)°C	ISO 11359-1/-2	E-6/K	30
Coefficient of linear thermal expansion, transverse (23-80)°C	ISO 11359-1/-2	E-6/K	102
Thermal conductivity	DIN 52612-1	W/(m K)	0.33
Specific heat capacity	-	J/(kg*K)	1500
Electrical properties			
dry / cond.			
Relative permittivity (1 MHz)	IEC 62631-2-1	-	3.7 / 5
Dissipation factor (1 MHz)	IEC 62631-2-1	E-4	200 / 1000
Volume resistivity	IEC 62631-3-1	Ohm*m	1E13 / 1E10
Surface resistivity	IEC 62631-3-2	Ohm	- / 1E13
Comparative tracking index, CTI, test liquid A	IEC 60112	-	550
Electric strength K20/K20, (60*60*1 mm ³)	IEC 60243-1	kV/mm	33 / 30

Footnotes

1) If product name or properties don't state otherwise.

2) The asterisk symbol "*" signifies inapplicable properties.

3) Test box with central gating, dimensions of base (107*47*1,5) mm, processing condition: TM = 320°C (unreinforced) or 330°C (reinforced), TW = 80°C

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UL - Yellow Card

E41871

Component - Plastics

BASF SE

Performance Materials Europe, PMD/EX - H201, Ludwigshafen 67056 DE

A3X2G5(f2)(r), A3X2G5 BMB (f2)(r)

Polyamide 66 (PA66), glass reinforced "Ultramid", furnished as pellets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec (°C)	RTI Imp (°C)	RTI Str (°C)
NC, BK	0.40	HB	4	0	110	115	-
	0.60	HB	2	0	110	115	-
NC, BK, GY	0.81	V-0	0	0	120	115	130
	1.5	V-0	0	0	120	115	130
	3.0	V-0, 5VA	0	0	120	115	130

Comparative Tracking Index (CTI): 0

Inclined Plane Tracking (IPT) kV: 1

Dielectric Strength (kV/mm): 19

Volume Resistivity (10^xohm-cm): 11

High-Voltage Arc Tracking Rate (HVTR): 1

Surface Resistivity (10^xohms/square): -

Dimensional Change (%): 0

High Volt, Low Current Arc Resis (D495): 6

(f2) - Subjected to one or more of the following tests: Ultraviolet Light, Water Exposure or Immersion in accordance with UL 746C, where the acceptability for outdoor use is to be determined by UL.

(r) - Virgin and regrind up to 50% by weight inclusive have the same flammability characteristics for black (BK) colored material only, excluding UL 746C suitability for outdoor use coverage (f2) and Incline Plane Tracking

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date: 1974-10-24

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IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10, IEC 60695-11-20	Class (color)	0.40	HB, HB75 (NC, BK)
			0.60	HB, HB75 (NC, BK)
			0.81	V-0 (NC, BK, GY)
			1.5	V-0 (NC, BK, GY)
			3.0	V-0, 5VA (NC, BK, GY)
Glow-Wire Flammability (GWF1)	IEC 60695-2-12	°C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC AC Dielectric Strength (AC DS)	IEC 60243-1	kV/mm	-	-
IEC DC Dielectric Strength (DC DS)	IEC 60243-2	kV/mm	-	-
IEC Volume Resistivity (VR)	IEC 62631-3-1	10x ohm-m	-	-
IEC Surface Resistivity (SR)	IEC 62631-3-2	10x ohms	-	-

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IEC Inclined Plane Tracking (IPT)	IEC 60587	kV	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	252
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m ²	-	-
ISO Izod Impact	ISO 180	kJ/m ²	-	-
ISO Charpy Impact	ISO 179-1	kJ/m ²	-	-

UL - Yellow Card

Component - Plastics

E41871

BASF SE

Performance Materials Europe, PMD/EX - H201, Ludwigshafen 67056 DE

A3X2G5(f1), A3X2G5 BMB(f1)

Polyamide 66 (PA66), glass reinforced "Ultramid", furnished as pellets

Color	Min. Thk (mm)	Flame Class	HWI	HAI	RTI Elec (°C)	RTI Imp (°C)	RTI Str (°C)
BK	1.6	V-0	0	0	120	115	130

Comparative Tracking Index (CTI): 0

Inclined Plane Tracking (IPT) kV: 1

Dielectric Strength (kV/mm): 19

Volume Resistivity (10⁹ohm-cm): 11

High-Voltage Arc Tracking Rate (HVTR): 1

Surface Resistivity (10⁹ohms/square): -

Dimensional Change (%): 0

High Volt, Low Current Arc Resis (D495): 6

(f1) - Suitable for outdoor use with respect to exposure to Ultraviolet Light, Water Exposure and Immersion in accordance with UL 746C.

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Last Revised: 2023-11-28

IEC and ISO Test Methods

Test Name	Test Method	Units	Thk (mm)	Value
Flammability	IEC 60695-11-10	Class (color)	1.6	V-0 (BK)
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	°C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	°C	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC AC Dielectric Strength (AC DS)	IEC 60243-1	kV/mm	-	-
IEC DC Dielectric Strength (DC DS)	IEC 60243-2	kV/mm	-	-
IEC Volume Resistivity (VR)	IEC 62631-3-1	10x ohm-m	-	-
IEC Surface Resistivity (SR)	IEC 62631-3-2	10x ohms	-	-
IEC Inclined Plane Tracking (IPT)	IEC 60587	kV	-	-
IEC Ball Pressure	IEC 60695-10-2	°C	-	252
ISO Heat Deflection (1.80 MPa)	ISO 75-2	°C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m2	-	-
ISO Izod Impact	ISO 180	kJ/m2	-	-
ISO Charpy Impact	ISO 179-1	kJ/m2	-	-

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CAMPUS® Datasheet

Ultramid® A3X2G5 - PA66-GF25 FR(52)

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Product Texts

Glass fibre reinforced injection moulding grade with improved flame retardance based on red phosphorus, giving outstanding mechanical and electrical properties for components requiring high stiffness.

The products can also be offered as BMBcert™ and/or Cycled™. Due to the Massbalance approach the product properties do not change

Rheological properties	dry / cond	Unit	Test Standard
Melt volume-flow rate, MVR	30 / *	cm ³ /10min	ISO 1133
Temperature	275 / *	°C	ISO 1133
Load	5 / *	kg	ISO 1133
Molding shrinkage, parallel	0.5 / *	%	ISO 294-4, 2577
Molding shrinkage, normal	1.1 / *	%	ISO 294-4, 2577
Mechanical properties	dry / cond	Unit	Test Standard
Tensile modulus	8000 / 6000	MPa	ISO 527-1/-2
Stress at break	140 / 100	MPa	ISO 527-1/-2
Strain at break	3.5 / 7	%	ISO 527-1/-2
Tensile creep modulus, 1000h	* / 3500	MPa	ISO 899-1
Charpy impact strength, +23°C	65 / 70	kJ/m ²	ISO 179/1eU
Charpy impact strength, -30°C	60 / 65	kJ/m ²	ISO 179/1eU
Charpy notched impact strength, +23°C	13 / 17	kJ/m ²	ISO 179/1eA
Thermal properties	dry / cond	Unit	Test Standard
Melting temperature, 10°C/min	260 / *	°C	ISO 11357-1/-3
Temp. of deflection under load, 1.80 MPa	240 / *	°C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	250 / *	°C	ISO 75-1/-2
Coeff. of linear therm. expansion, parallel	30 / *	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	102 / *	E-6/K	ISO 11359-1/-2
Burning behavior at 1.5 mm nominal thickness	V-0 / *	class	IEC 60695-11-10
Thickness tested (1.5)	1.6 / *	mm	IEC 60695-11-10
Yellow Card available	Yes / *	-	-
Burning behavior at thickness h	V-0 / *	class	IEC 60695-11-10
Thickness tested (h)	0.8 / *	mm	IEC 60695-11-10
Yellow Card available	Yes / *	-	-
Burning behavior 5V at thickness h	5VA / *	class	IEC 60695-11-20
Thickness tested	3.0 / *	mm	IEC 60695-11-20
Yellow Card available	Yes / *	-	-
Oxygen index	27 / *	%	ISO 4589-1/-2
Electrical properties	dry / cond	Unit	Test Standard
Relative permittivity, 1MHz	3.7 / 5	-	IEC 62631-2-1
Dissipation factor, 1MHz	200 / 1000	E-4	IEC 62631-2-1
Volume resistivity	1E13 / 1E10	Ohm*m	IEC 62631-3-1
Surface resistivity	* / 1E13	Ohm	IEC 62631-3-2
Electric strength	33 / 30	kV/mm	IEC 60243-1
Comparative tracking index	- / 550	-	IEC 60112
Other properties	dry / cond	Unit	Test Standard
Water absorption	6 / *	%	Sim. to ISO 62
Humidity absorption	1.55 / *	%	Sim. to ISO 62

Ultramid® A3X2G5 - PA66-GF25 FR(52)
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Density

1370 / -

kg/m³

ISO 1183

Material specific properties

dry / cond

Unit

Test Standard

Viscosity number

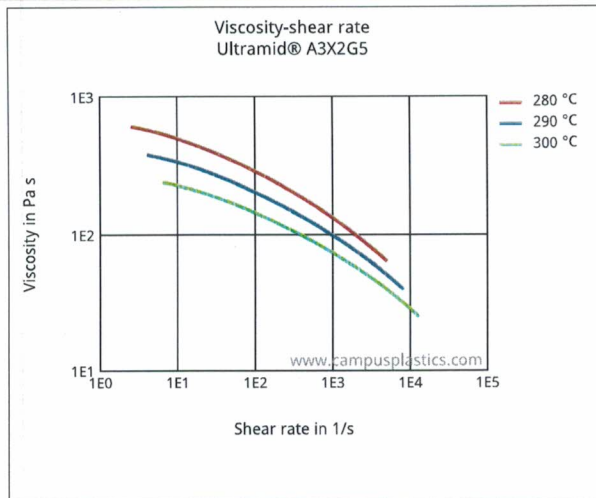
140 / *

cm³/g

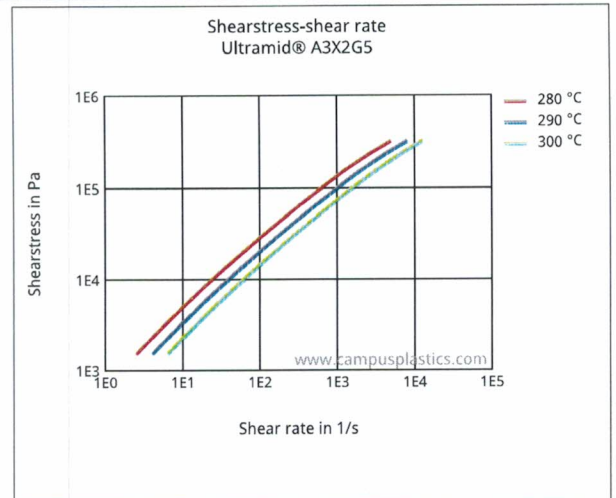
ISO 307, 1157, 1628

Diagrams

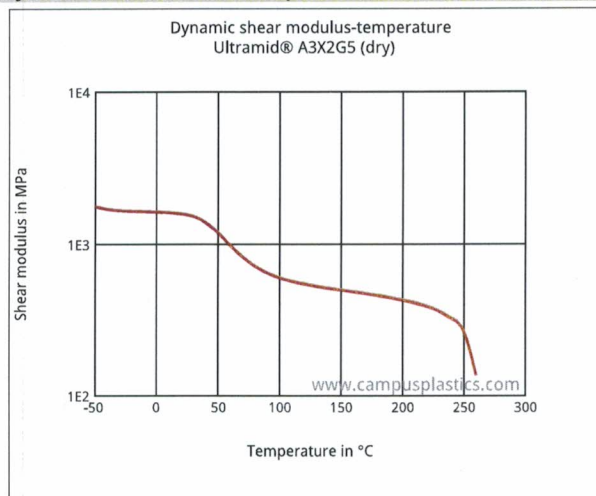
Viscosity-shear rate



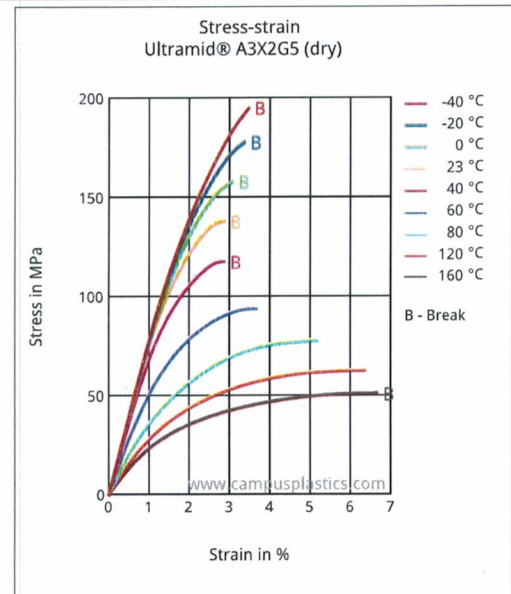
Shearstress-shear rate



Dynamic shear modulus-temperature

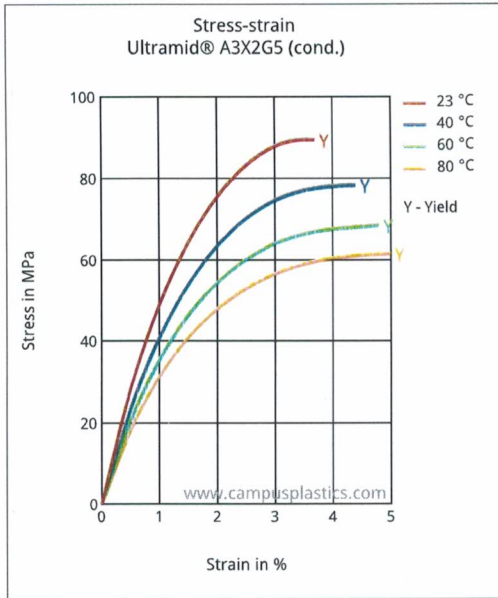


Stress-strain

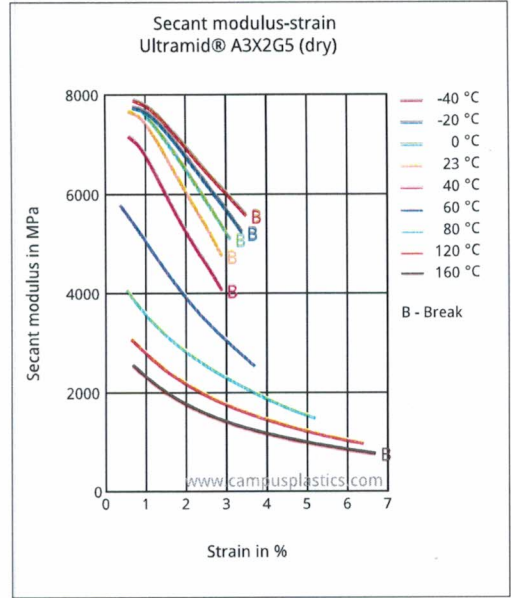


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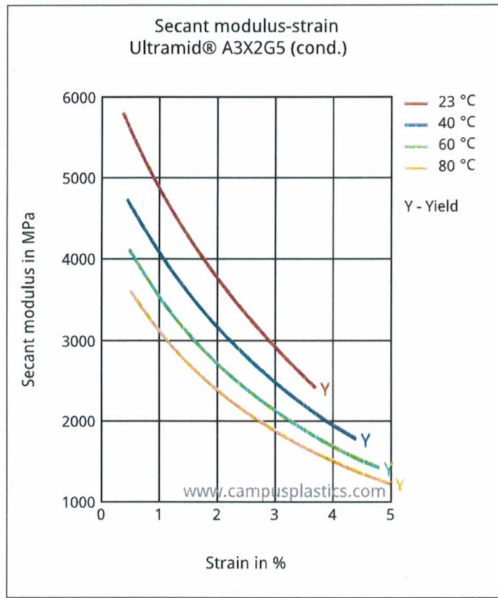
Stress-strain



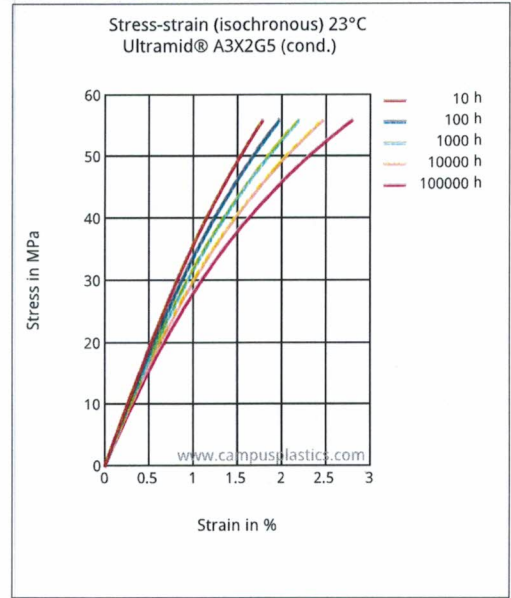
Secant modulus-strain



Secant modulus-strain

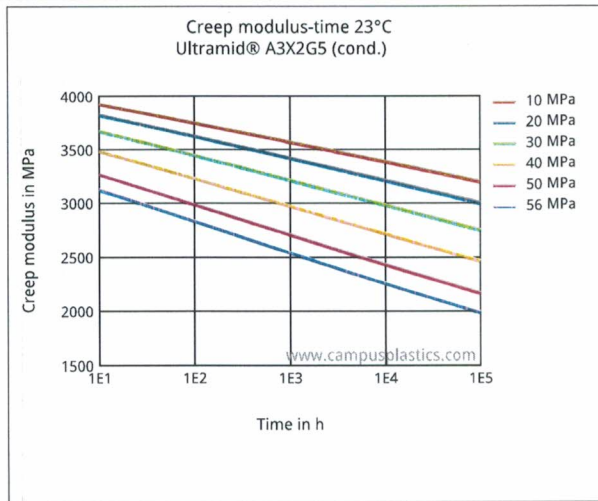


Stress-strain (isochronous) 23°C

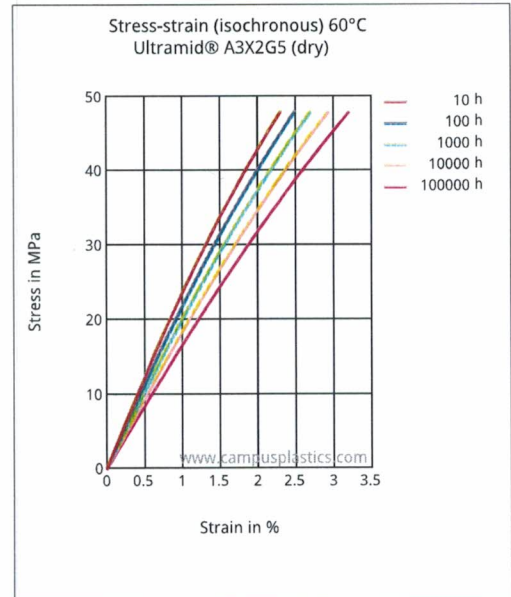


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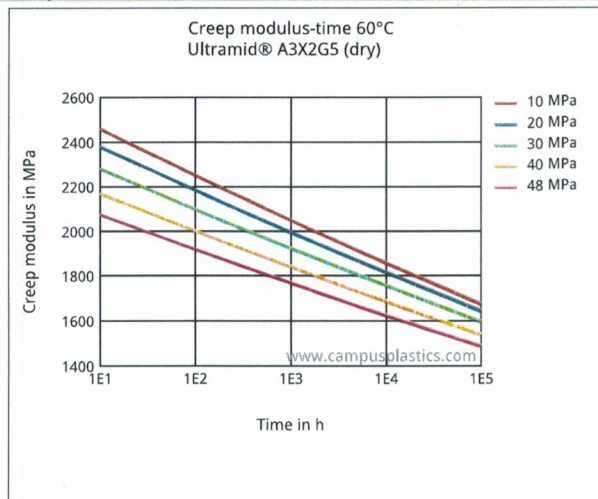
Creep modulus-time 23°C



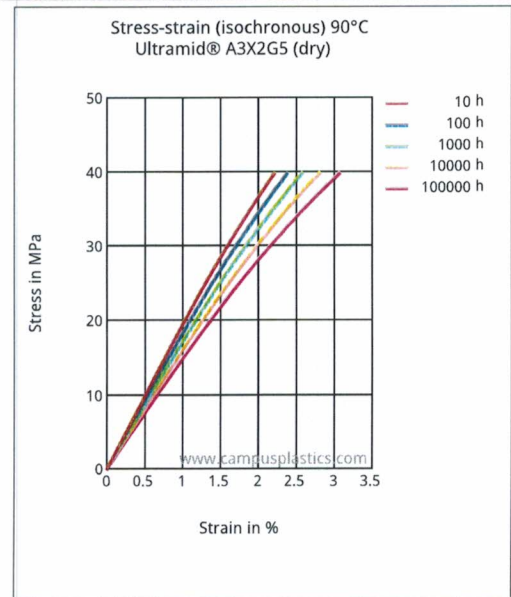
Stress-strain (isochronous) 60°C



Creep modulus-time 60°C

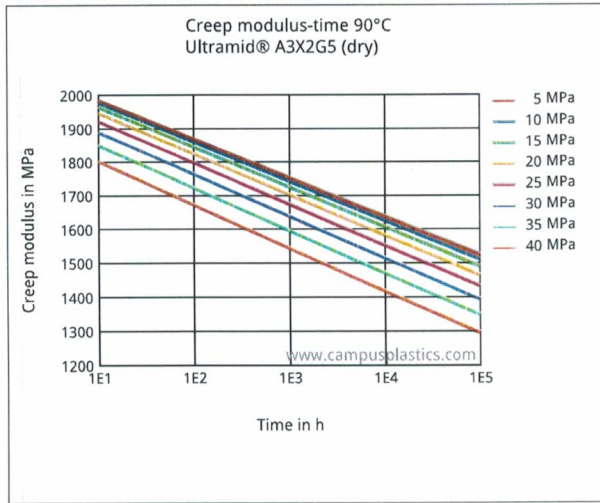


Stress-strain (isochronous) 90°C

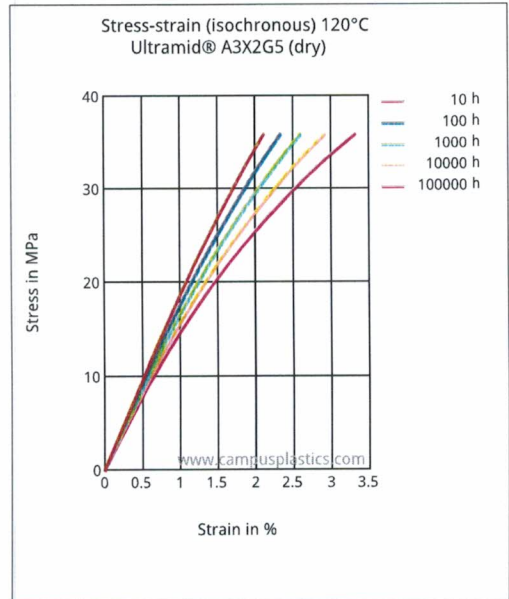


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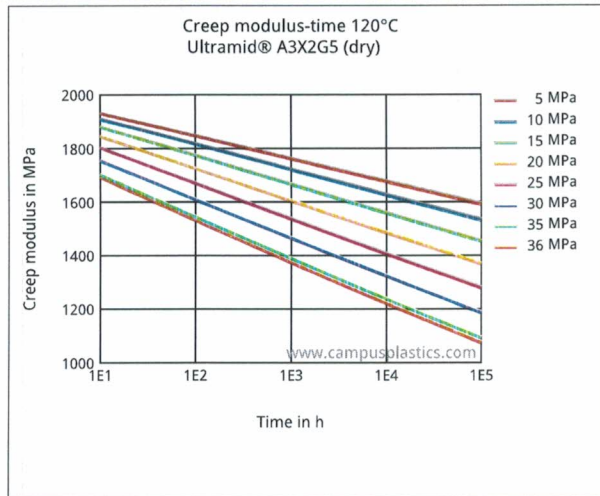
Creep modulus-time 90°C



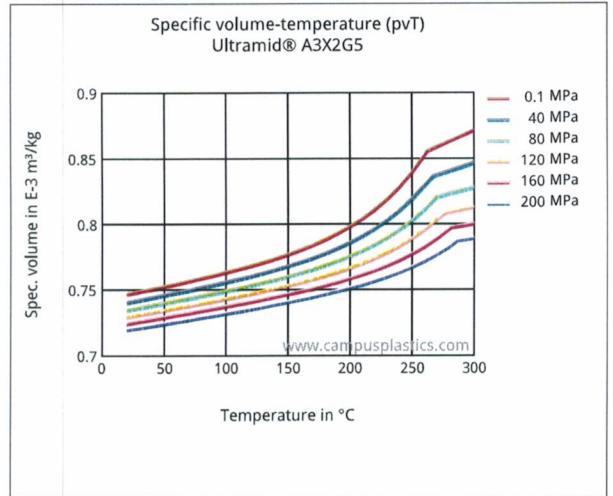
Stress-strain (isochronous) 120°C



Creep modulus-time 120°C

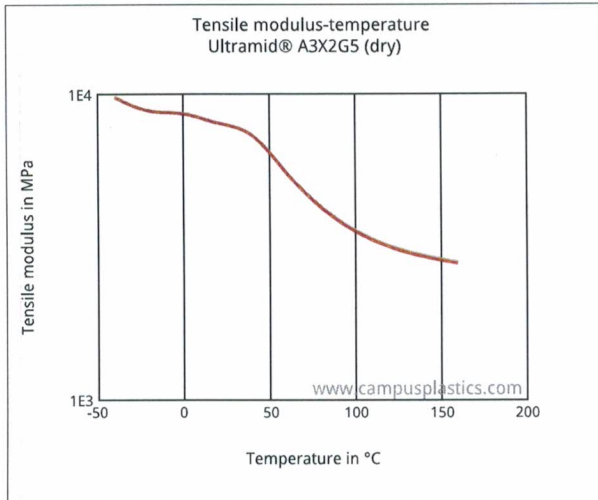


Specific volume-temperature (pvT)

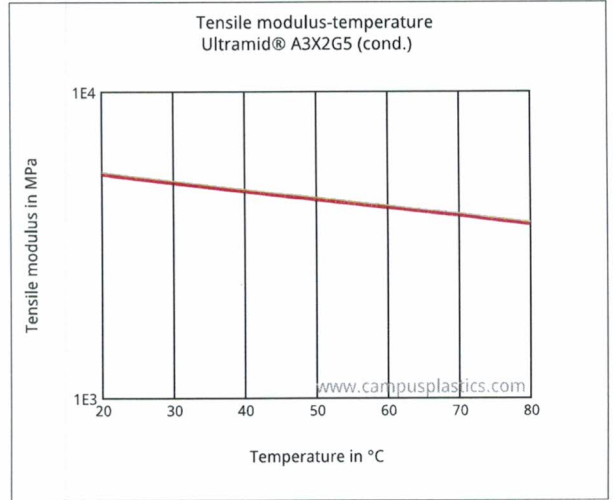


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Tensile modulus-temperature



Tensile modulus-temperature



Characteristics

Processing

Injection Molding

Delivery form

Pellets

Additives

Release agent

Other text information

Injection molding

PREPROCESSING

Pre/Post-processing, max. allowed water content: .15 %
Pre/Post-processing, Pre-drying, Temperature: 80 - 100 °C
Pre/Post-processing, Pre-drying, Time: 4 h

PROCESSING

injection molding, Melt temperature, range: 280 - 300 °C
injection molding, Melt temperature, recommended: 290 °C
injection molding, Mold temperature, range: 60 - 90 °C
injection molding, Mold temperature, recommended: 80 °C
injection molding, Dwell time, thermoplastics: 10 min

Chemical Media Resistance

Acids

- Acetic Acid (5% by mass) (23°C)
- Citric Acid solution (10% by mass) (23°C)
- Lactic Acid (10% by mass) (23°C)
- Hydrochloric Acid (36% by mass) (23°C)
- Nitric Acid (40% by mass) (23°C)
- Sulfuric Acid (38% by mass) (23°C)
- Sulfuric Acid (5% by mass) (23°C)
- Chromic Acid solution (40% by mass) (23°C)

Special Characteristics

Heat stabilized or stable to heat



Regional Availability

North America, Europe, Asia Pacific, South and Central America, Near East/Africa




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Bases

-  Sodium Hydroxide solution (35% by mass) (23°C)
-  Sodium Hydroxide solution (1% by mass) (23°C)

Alcohols

-  Isopropyl alcohol (23°C)
-  Methanol (23°C)
-  Ethanol (23°C)

Hydrocarbons

-  n-Hexane (23°C)
-  Toluene (23°C)
-  iso-Octane (23°C)



Ketones

-  Acetone (23°C)



Ethers

-  Diethyl ether (23°C)




Mineral oils

-  SAE 10W40 multigrade motor oil (23°C)
-  SAE 10W40 multigrade motor oil (130°C)






Standard Fuels

-  Diesel fuel (pref. ISO 1817 Liquid F) (23°C)
-  Diesel fuel (pref. ISO 1817 Liquid F) (>90°C)

Salt solutions

-  Sodium Chloride solution (10% by mass) (23°C)
-  Sodium Hypochlorite solution (10% by mass) (23°C)
-  Zinc Chloride solution (50% by mass) (23°C)

Other

-  Ethyl Acetate (23°C)
-  Hydrogen peroxide (23°C)
-  DOT No. 4 Brake fluid (130°C)
-  Ethylene Glycol (50% by mass) in water (108°C)
-  Water (23°C)

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH, OR THAT THE PRODUCTS, DESIGNS, DATA OR INFORMATION MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS.

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