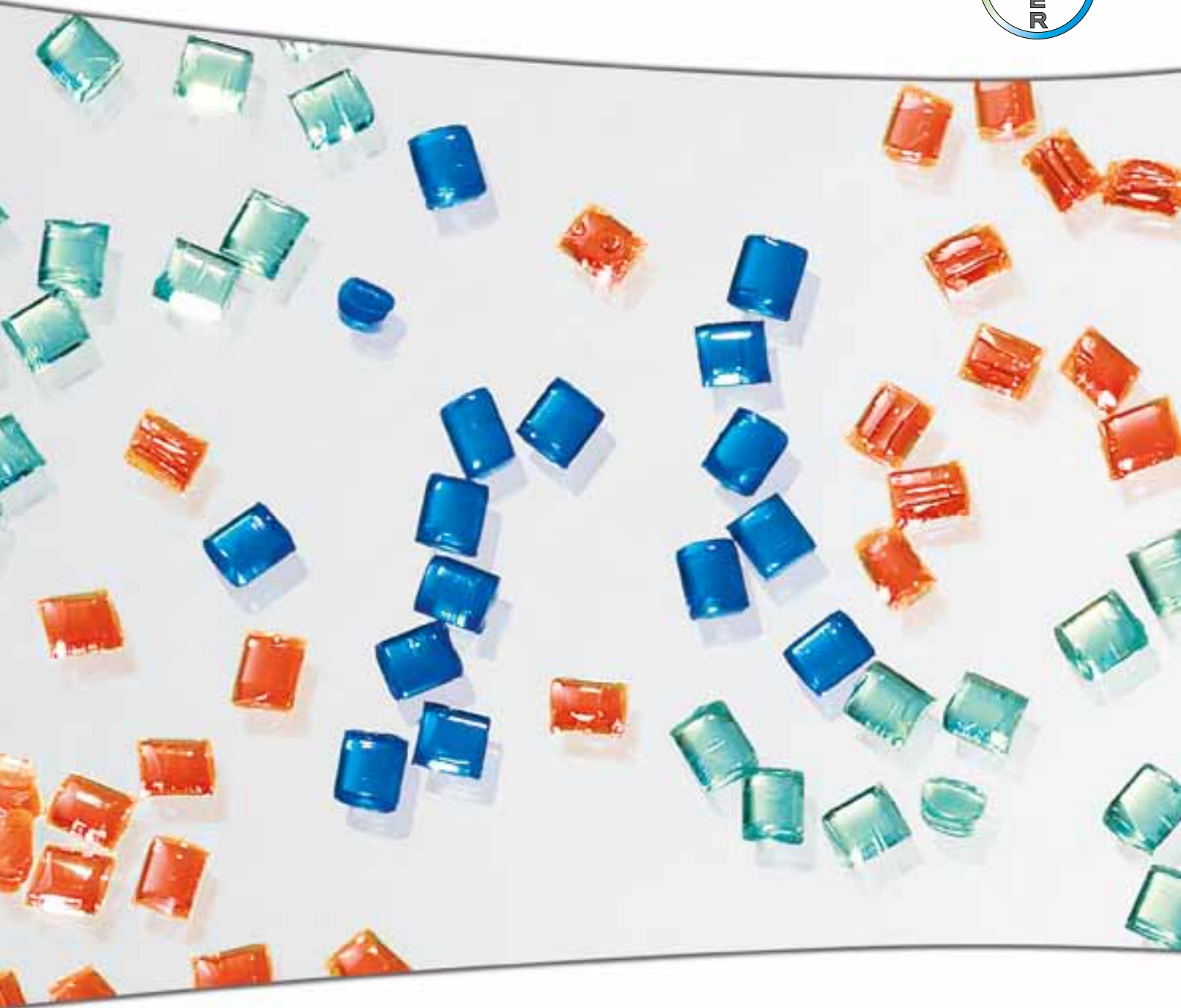




Engineering Thermoplastics

Products and Grades



MAKROLON®



APEC®



BAYBLEND®



MAKROBLEND®



The right material – the key to successful design engineering

Wide range of products

We are one of the world's leading manufacturers of engineering thermoplastics.

We want your molding to have a high degree of reliability, be fit for purpose and economical to manufacture. We offer you an extensive range of materials with high-quality basic and specialty grades customized to the requirements of each individual application. If you need a new grade of material for an innovative application, we will develop it with you.

Available worldwide

We manufacture in all the world's major markets. Our materials are supplied to a consistently high standard of quality all over the world and our customer services are always close at hand. We provide assistance in selecting the material best suited to the application, in design engineering and tool construction, in material and component testing, in matters of logistics and ultimately in production start-up too.

In all colors

We offer our products in customized colors and provide an extensive range of coloring services. In our Color Competence and Design Centers (CCDC), which are spread across the world and linked together, we match shades for you and even produce colored granule samples in small quantities.



 **MAKROLON®**

Polycarbonate

04–09

 **APEC®**

Copolycarbonate

10–11

 **BAYBLEND®**

**Blends of polycarbonate and
ABS or rubber modified SAN**

12–15

 **MAKROBLEND®**

**Blends of polycarbonate
and PBT or PET**

16–17





Makrolon® is the brand name for our polycarbonate. Compared with other thermoplastics, this amorphous material has a unique set of properties. Its special features are its high transparency, heat resistance, toughness and dimensional stability, a high creep modulus and good electrical insulation properties. Glass fiber reinforced Makrolon® has particularly high stiffness and is therefore very dimensionally stable.

Products in the range

■ **General purpose grades**

■ **Food contact grades**

■ **Flame retardant grades**

■ **Impact modified grades**

■ **PC/PTFE grade**

■ **Glass fiber (milled fiber) reinforced grades**

■ **Glass fiber (normal fiber) reinforced grades**

■ **Grades for**

Optical storage media, Optical lenses, Light guides, Automotive lighting, Automotive glazing, Blow molding, Extrusion, Medical devices**, Structural foam

Characteristic features

Color

Clear and transparent like glass

Toughness

Without notching, no failure; high notched impact strength

Dimensional accuracy and stability

Exceptionally high, since it undergoes no change in dimensions due to water absorption and post shrinkage; high creep modulus, high heat resistance, isotropic behavior

Heat resistance

Glass transition temperature up to 148 °C

Flame retardance

Flammability classification up to UL 94V0/1.5 mm and UL 94-5VA/3.0 mm; maximum temperature in glow wire test up to 960 °C

Electrical insulation

Good: volume resistivity 10^{14} Ohm · m, dielectric strength up to 36 kV/mm (1 mm wall thickness)

Processing and fabrication

Processing the raw material

Injection molding, extrusion, extrusion blow molding, injection blow molding and rotomolding

Secondary processing

Thermoforming, e.g. by bending and stamping; cold forming, e.g. by high-pressure molding and folding

Machining

Sawing, drilling, turning, milling, planing, filing, tapping, die-cutting and cutting

Joining

Screwing, bonding and welding

Finishing

Painting, printing, high-vacuum metallizing and laser marking

Main areas of application

Automotive

Construction

Electrical engineering/electronics

Domestic

Lighting engineering

Medical devices**

Optical

Optical storage media

Safety items

Packaging

** See disclaimer, page 18.

For more information: www.plastics.bayer.com



■ General purpose grades

Low viscosity

2205

Global grade; MVR (300 °C/1.2 kg) 34 cm³/10 min; general purpose; low viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2207

Global grade; MVR (300 °C/1.2 kg) 34 cm³/10 min; general purpose; low viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2405

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; general purpose; low viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2407

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; general purpose; low viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

Medium viscosity

2605

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; general purpose; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2607

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; general purpose; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2805

Global grade; MVR (300 °C/1.2 kg) 9 cm³/10 min; general purpose; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2807

Global grade; MVR (300 °C/1.2 kg) 9 cm³/10 min; general purpose; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

High viscosity

3105

Global grade; MVR (300 °C/1.2 kg) 6 cm³/10 min; general purpose; high viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

3107

Global grade; MVR (300 °C/1.2 kg) 6 cm³/10 min; general purpose; high viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors





■ Food contact grades

Low viscosity

2256

Global grade; MVR (300 °C/1.2 kg) 34 cm³/10 min; food contact quality; low viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2456

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; food contact quality; low viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

Medium viscosity

2656

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; food contact quality; medium viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2856

Global grade; MVR (300 °C/1.2 kg) 9 cm³/10 min; food contact quality; medium viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

1248

Formerly Makrolon KU1-1248; MVR (300 °C/1.2 kg) 7 cm³/10 min; food contact quality; medium viscosity; impact modified; injection molding – melt temperature 280–320 °C; available in light colors only

High viscosity

3156

Global grade; MVR (300 °C/1.2 kg) 6 cm³/10 min; food contact quality; high viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; extrusion; available in transparent, translucent and opaque colors

High viscosity, branched

WB1239

Global grade; MVR (300 °C/1.2 kg) 2 cm³/10 min; blow molding; high viscosity; branched; food contact quality; extrusion blow molding; injection stretch blow molding; available in transparent colors only; water bottles



■ Flame retardant grades

Low viscosity

2467

Global grade; formerly Makrolon DP1-1870; MVR (300 °C/1.2 kg) 19 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-2/1.5 mm and 3.0 mm; low viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

6265X

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; flame retardant; UL 94V-0/1.5 mm; low viscosity; easy release; injection molding – melt temperature 280–320 °C; available in opaque colors only

6267X

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; flame retardant; UL 94V-0/1.5 mm; low viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in opaque colors only

Medium viscosity

2665

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-2/1.5 mm and 3.0 mm; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2667

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-2/1.5 mm and 3.0 mm; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2865

Global grade; MVR (300 °C/1.2 kg) 10 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-2/1.5 mm and 3.0 mm; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

2867

MVR (300 °C/1.2 kg) 10 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-2/1.5 mm and 3.0 mm; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

6555

Global grade; MVR (300 °C/1.2 kg) 10 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-0/3.0 mm; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

6557

Global grade; MVR (300 °C/1.2 kg) 10 cm³/10 min; chlorine- and bromine-free flame retardancy; UL 94V-0/3.0 mm; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent, translucent and opaque colors

6485

Global grade; MVR (300 °C/1.2 kg) 10 cm³/10 min; flame retardant; UL 94V-0/1.5 mm and 5VA/3.0 mm; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in opaque colors only

6487

Global grade; MVR (300 °C/1.2 kg) 10 cm³/10 min; flame retardant; UL 94V-0/1.5 mm and 5VA/3.0 mm; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in opaque colors only

High viscosity, branched

6717

Global grade; formerly Makrolon DP1-1853; MVR (300 °C/1.2 kg) 3 cm³/10 min; flame retardant; UL 94V-0/2.0 mm; high viscosity; branched; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; extrusion; available in transparent, translucent and opaque colors

Impact modified grades

Low viscosity

1260

Global grade; MVR (300 °C/1.2 kg) 33 cm³/10 min; impact modified; low viscosity; easy release; injection molding – melt temperature 280–320 °C; available in light colors only

Medium viscosity

1837

Global grade; formerly Makrolon DP1-1837; MVR (300 °C/1.2 kg) 11 cm³/10 min; impact modified; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in opaque colors only

1248

Formerly Makrolon KU1-1248; MVR (300 °C/1.2 kg) 7 cm³/10 min; food contact quality; medium viscosity; impact modified; injection molding – melt temperature 280–320 °C; available in light colors only

PC/PTFE grade

1954

Formerly Makrolon DP1-1954; MVR (300 °C/1.2 kg) 18 cm³/10 min; low viscosity; UV stabilized; improved friction characteristics; injection molding – melt temperature 280–320 °C; available in opaque colors only; housings- and operating parts; sliding elements

Glass fiber (milled fiber) reinforced grades

20 % glass fiber reinforced

8025

MVR (300 °C/1.2 kg) 6 cm³/10 min; 20 % glass fiber reinforced; milled fiber; high viscosity; easy release; injection molding – melt temperature 310–330 °C; extrusion; available in opaque colors only; precision parts

30 % glass fiber reinforced

8035

MVR (300 °C/1.2 kg) 4 cm³/10 min; 30 % glass fiber reinforced; milled fiber; high viscosity; easy release; injection molding – melt temperature 310–330 °C; extrusion; available in opaque colors only; precision parts

Glass fiber (normal fiber) reinforced grades

10 % Glass fiber reinforced

9415

Global grade; MVR (300 °C/1.2 kg) 6 cm³/10 min; 10 % glass fiber reinforced; chlorine- and bromine-free flame retardancy; UL 94V-0/1.5 mm and 5VA/3.0 mm; high viscosity; easy release; injection molding – melt temperature 310–330 °C; available in opaque colors only

9417

Global grade; MVR (300 °C/1.2 kg) 6 cm³/10 min; 10 % glass fiber reinforced; chlorine- and bromine-free flame retardancy; UL 94V-0/1.5 mm and 5VA/3.0 mm; high viscosity; UV stabilized; easy release; injection molding – melt temperature 310–330 °C; available in opaque colors only

15 % Glass fiber reinforced

GF8002

MVR 9 cm³/10 min; 15 % glass fiber reinforced; medium viscosity; easy release; injection molding – melt temperature 310–330 °C; available in opaque colors only

1095

MVR 6 cm³/10 min; 15 % glass fiber reinforced; high viscosity; easy release; injection molding – melt temperature 310–330 °C; available in opaque colors only

20 % Glass fiber reinforced

9125

MVR (300 °C/1.2 kg) 8 cm³/10 min; 20 % glass fiber reinforced; chlorine- and bromine-free flame retardancy; UL 94V-0/1.5 mm; medium viscosity; easy release; injection molding – melt temperature 310–330 °C; available in opaque colors only

9425

Global grade; MVR (300 °C/1.2 kg) 5 cm³/10 min; 20 % glass fiber reinforced; chlorine- and bromine-free flame retardancy; UL 94V-0/1.5 mm and 5VA/3.0 mm; high viscosity; easy release; injection molding – melt temperature 310–330 °C; extrusion; available in opaque colors only





35 % glass fiber reinforced

8345

MVR (300 °C/1.2 kg) 3 cm³/10 min; 35 % glass fiber reinforced; high viscosity; easy release; injection molding – melt temperature 310–330 °C; extrusion; available in opaque colors only

■ Grades for

Optical storage media

OD2015

Global grade; MVR (250 °C/2.16 kg) 17 cm³/10 min; optical storage media; suitable for all formats; high purity; injection molding – melt temperature 300–350 °C; available in color code 000000 only



Optical lenses

LQ2647

MVR (300 °C/1.2 kg) 12 cm³/10 min; optical lens; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in clear tints only; safety glasses

LQ3187

MVR (300 °C/1.2 kg) 6 cm³/10 min; optical lens; high viscosity; UV stabilized; UV 400 cut off; easy release; injection molding – melt temperature 280–320 °C; available in clear tints only; safety glasses; sun glasses



Light guides

LED2245

Global grade; formerly Makrolon DP1-1857; MVR (300 °C/1.2 kg) 34 cm³/10 min; light guides; PC with highest transmission; low viscosity; easy release; injection molding – melt temperature 280–320 °C; available in color code 000000 only



Automotive lighting

AL2447

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; automotive lighting; low viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in clear transparent colors and in various signal colors; headlamp lenses for automotive forward lighting



AL2647

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; automotive lighting; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in clear transparent colors and in various signal colors; headlamp lenses for automotive forward lighting

Automotive glazing

AG2677

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; medium viscosity; UV stabilized; easy release; injection molding – melt temperature 280–320 °C; available in transparent colors only; automotive glazing; roof modules

Blow molding

WB1239

Global grade; MVR (300 °C/1.2 kg) 2 cm³/10 min; blow molding; high viscosity; branched; food contact quality; extrusion blow molding; injection stretch blow molding; available in transparent colors only; water bottles

Extrusion

ET3113

Global grade; formerly Makrolon 3103 MAS157; MVR (300 °C/1.2 kg) 6 cm³/10 min; extrusion; high viscosity; UV stabilized; available in transparent colors only; solid sheet; corrugated sheet

ET3117

Global grade; formerly Makrolon DP1-1883; MVR (300 °C/1.2 kg) 6 cm³/10 min; extrusion; high viscosity; UV stabilized; easy release; available in color code 550115 only; multi wall sheet/profiles; corrugated sheet

ET3127

Global grade; formerly Makrolon 1243 MAS157; MVR (300 °C/1.2 kg) 6 cm³/10 min; extrusion; high viscosity; branched; UV stabilized; easy release; available in color code 550111 only; multi wall sheet/profiles

ET3227

Formerly Makrolon 1143 MAS157; MVR (300 °C/1.2 kg) 3 cm³/10 min; extrusion; high viscosity; branched; UV stabilized; easy release; available in color code 550122 only; multi wall sheet/profiles

ET UV110

Global grade; PC/UV absorber concentrate; high viscosity; easy release; special grade for the coextrusion of Makrolon ET base resins; available in color code 550054 only; solid sheet; multi wall sheet/profiles

ET UV130

Global grade; PC/UV absorber concentrate; high viscosity; easy release; special grade for the coextrusion of Makrolon ET base resins; available in color code 550054 only; solid sheet; multi wall sheet/profiles

ET UV510

Global grade; PC/UV absorber concentrate; high viscosity; easy release; very low plate-out; special grade for the coextrusion of Makrolon ET base resins; available in color code 550054 only; solid sheet; multi wall sheet/profiles

ET UV530

Global grade; PC/UV absorber concentrate; high viscosity; easy release; very low plate-out; special grade for the coextrusion of Makrolon ET base resins; available in color code 550054 only; solid sheet; multi wall sheet/profiles

Medical devices**
2258

Global grade; MVR (300 °C/1.2 kg) 34 cm³/10 min; medical devices; suitable for ETO and steam sterilization at 121 °C; biocompatible according to many ISO 10993-1 test requirements; low viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent and opaque colors

2458

Global grade; MVR (300 °C/1.2 kg) 19 cm³/10 min; medical devices; suitable for ETO and steam sterilization at 121 °C; biocompatible according to many ISO 10993-1 test requirements; low viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent and opaque colors

2558

Global grade; MVR (300 °C/1.2 kg) 14 cm³/10 min; medical devices; suitable for ETO and steam sterilization at 121 °C; biocompatible according to many ISO 10993-1 test requirements; medium viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent and opaque colors

2658

Global grade; MVR (300 °C/1.2 kg) 12 cm³/10 min; medical devices; suitable for ETO and steam sterilization at 121 °C; biocompatible according to many ISO 10993-1 test requirements; medium viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent and opaque colors

2858

Global grade; MVR (300 °C/1.2 kg) 9 cm³/10 min; medical devices; suitable for ETO and steam sterilization at 121 °C; biocompatible according to many ISO 10993-1 test requirements; medium viscosity; easy release; good hydrolysis resistance; injection molding – melt temperature 280–320 °C; available in transparent and opaque colors

Rx2430

MVR (300 °C/1.2 kg) 19 cm³/10 min; medical devices; suitable for sterilization with high-energy radiation; biocompatible according to many ISO 10993-1 test requirements; low viscosity; injection molding – melt temperature 280–320 °C; available in color code 451118 only; transparent parts for medical devices

Rx2530

Global grade; MVR (300 °C/1.2 kg) 15 cm³/10 min; medical devices; suitable for sterilization with high-energy radiation; biocompatible according to many ISO 10993-1 test requirements; medium viscosity; injection molding – melt temperature 280–320 °C; available in color code 451118 only; transparent parts for medical devices

Rx2635

MVR (300 °C/1.2 kg) 12 cm³/10 min; medical devices; suitable for sterilization with high-energy radiation; biocompatible according to many ISO 10993-1 test requirements; medium viscosity; easy release; injection molding – melt temperature 280–320 °C; available in color code 451118 only; transparent parts for medical devices

Rx1805

Global grade; MVR (300 °C/1.2 kg) 6 cm³/10 min; medical devices; high lipid resistance; suitable for sterilization with high-energy radiation; biocompatible according to many ISO 10993-1 test requirements; high viscosity; injection molding – melt temperature 280–320 °C; available in color code 451118 only; transparent parts for medical devices

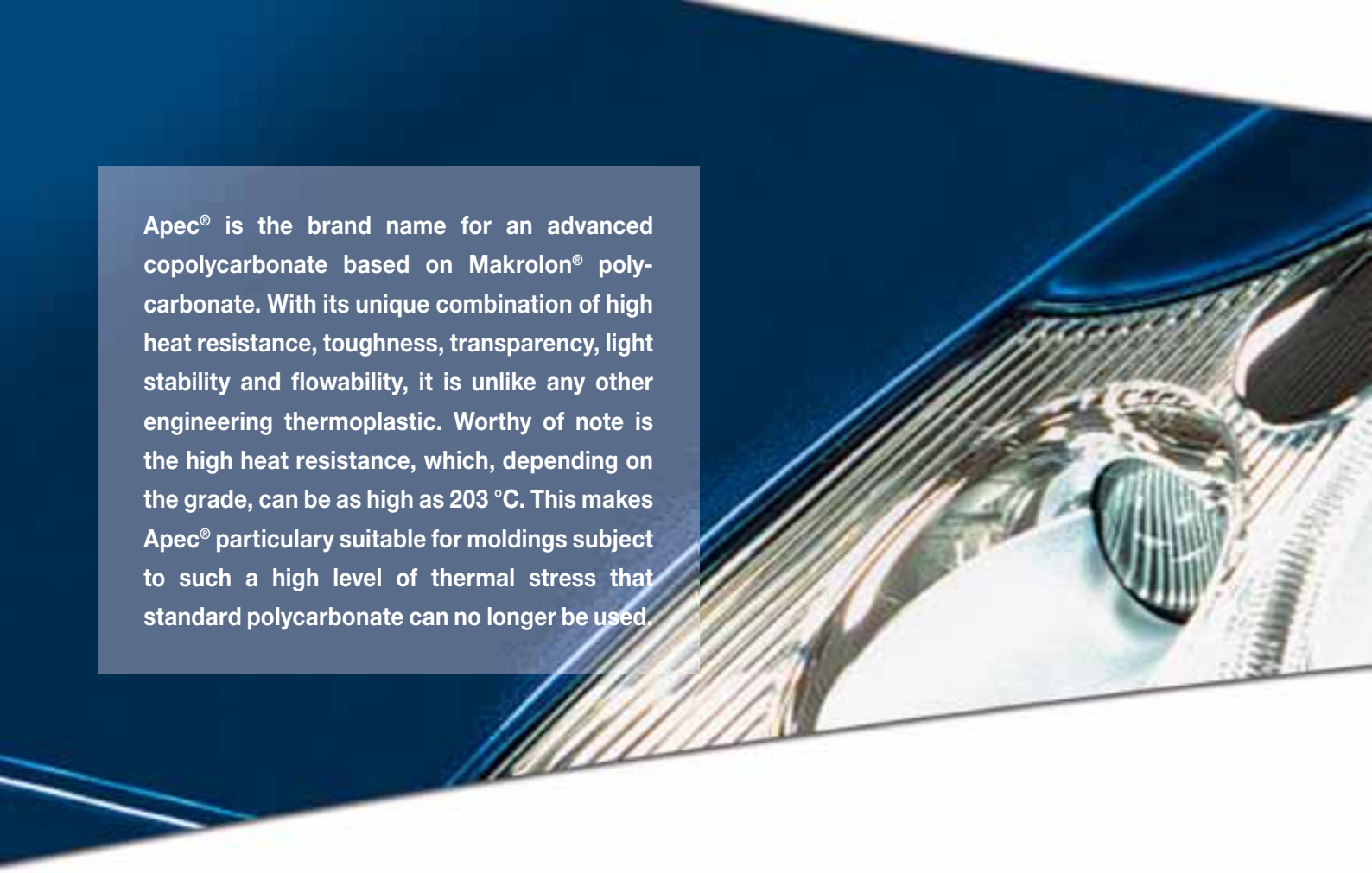
Structural foam
SF800 Z

MVR (300 °C/1.2 kg) 8.5 cm³/10 min; structural foam; 5 % glass fiber reinforced; milled fiber; chlorine- and bromine-free flame retardancy; medium viscosity; easy release; injection molding; available in natural (opaque) and opaque colors; in combination with an appropriate blowing agent for the production of structural foam moldings

SF805

MVR (300 °C/1.2 kg) 7 cm³/10 min; structural foam; 5 % glass fiber reinforced; chlorine- and bromine-free flame retardancy; high viscosity; easy release; injection molding; available in natural (opaque) and opaque colors; in combination with an appropriate blowing agent for the production of structural foam moldings





Apec® is the brand name for an advanced copolycarbonate based on Makrolon® polycarbonate. With its unique combination of high heat resistance, toughness, transparency, light stability and flowability, it is unlike any other engineering thermoplastic. Worthy of note is the high heat resistance, which, depending on the grade, can be as high as 203 °C. This makes Apec® particularly suitable for moldings subject to such a high level of thermal stress that standard polycarbonate can no longer be used.

Products in the range

- **Easy flow grades**
- **Grades with elevated viscosity**
- **Medical grade****
- **Flame retardant grades**

Characteristic features¹⁾

Color

Naturally transparent, almost colorless, available in many colors, both opaque and transparent

Surface finish

High gloss or textured (depending on mold surface)

Stiffness

Tensile modulus: 2,400 MPa

Impact and break resistance

Charpy-impact strength (ISO 179-1eU): no failure

Heat resistance

158–203 °C (Vicat-softening temperature according to VST/B 120)

Service temperature

Short term temperature peaks for parts not subjected to high mechanical loads can be up to approx. 15 °C below the Vicat softening temperature. In case of long-term exposure to high temperatures, the Relative Temperature Index (RTI) to UL746 must be taken into account.

Dimensional accuracy and stability

Very high, no change in dimensions due to water absorption and post shrinkage, high heat resistance, isotropic behavior.

Electrical insulation

Dielectric strength up to 35 kV/mm; specific volume resistivity: 10^{15} Ohm · m

Processing and fabrication

Processing the raw material

Injection molding, extrusion, compression molding, extrusion blow molding

Secondary processing

Thermoforming, e.g. by vacuum forming

Machining

Sawing, drilling, turning, milling, tapping and die-cutting

Joining

Screwing, clamping, bonding, welding and riveting

Finishing

Painting, printing, metallizing, embossing and polishing

Main areas of application

Automotive

Headlight bezels and frames, reflectors for indicators and headlights, lenses for fog lights

Medical technology

Boxes for scalpels, filters for breathing masks, secretion collectors

Electrical engineering and electronics, lighting

Lamp housings, light diffusers, fuse boxes

Domestic appliances

Hairdryer housings with diffuser attachments

■ Easy flow grades

1695

Easy flow, easy release, softening temperature (VST/B 120) = 158 °C, MVR²⁾ = 45 cm³/10 min, headlight reflectors/bezels

1697

Easy flow, easy release, UV stabilized, softening temperature (VST/B 120) = 157 °C, MVR²⁾ = 45 cm³/10 min, brake light and indicator caps

1795

Easy flow, easy release, softening temperature (VST/B 120) = 173 °C, MVR²⁾ = 30 cm³/10 min, headlight reflectors/bezels



1797

Easy flow, easy release, UV stabilized, softening temperature (VST/B 120) = 172 °C, MVR²⁾ = 30 cm³/10 min, brake light and indicator caps

1895

Easy flow, easy release, softening temperature (VST/B 120) = 183 °C, MVR²⁾ = 18 cm³/10 min, recessed lights/reflectors, headlight reflectors/bezels

1897

Easy flow, easy release, UV stabilized, softening temperature (VST/B 120) = 182 °C, MVR²⁾ = 18 cm³/10 min, brake light and indicator caps, light diffusers, headlight covers, high-mount stop lights

2095

Easy flow, easy release, softening temperature (VST/B 120) = 203 °C, MVR²⁾ = 8 cm³/10 min, recessed lights/reflectors, blade-type fuses, headlight reflectors, bezels

2097

Easy flow, easy release, UV stabilized, softening temperature (VST/B 120) = 202 °C, MVR²⁾ = 8 cm³/10 min, light diffusers, headlight covers

Grades with elevated viscosity

1603

UV stabilized, softening temperature (VST/B 120) = 159 °C, MVR²⁾ = 25 cm³/10 min, AMECA-listing, brake light and indicator caps, headlamp covers

1703

UV stabilized, softening temperature (VST/B 120) = 171 °C, MVR²⁾ = 17 cm³/10 min, AMECA-listing, brake light and indicator caps, headlamp covers

1803

UV stabilized, softening temperature (VST/B 120) = 184 °C, MVR²⁾ = 10 cm³/10 min, AMECA-listing, brake light and indicator caps, headlamp covers

Medical grade**

1745

Easy release; suitable for superheated steam sterilization up to 143 °C as well as for pharmaceutical applications according to United States Pharmacopeia (USP) XXII Class VI; softening temperature (VST/B 120) = 170 °C; MVR²⁾ = 17 cm³/10 min, Films for medical packaging; Contact lens holders; Medical vessels; Safety valve for respiration aids; Syringe tops

Flame retardant grades

FR1892

Flame retardant: V-2/1.5 mm (UL94) and V-0/3.0 mm (UL94) softening temperature (VST/B 120) = 183 °C, MVR²⁾ = 18 cm³/10 min; visors for firemen's helmets

DP1-9354

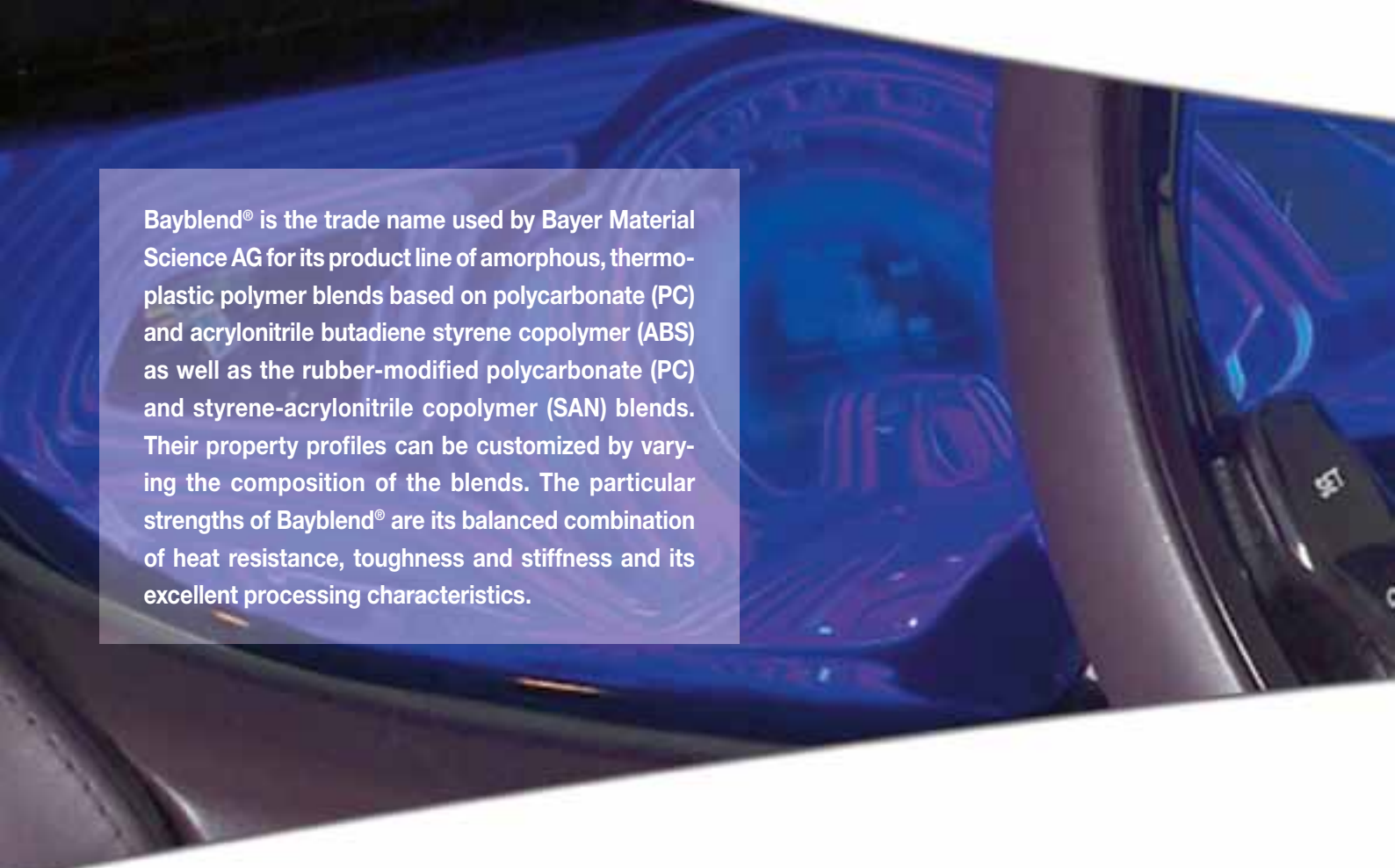
Developmental product, flame retardant: V-0/1.5 mm (UL94), V-0/3.0 mm (UL94), softening temperature (VST/B 120) = 185 °C, MVR²⁾ = 12 cm³/10 min, only available in opaque colors, halogen lamp holders, busbar holders (insulators)

** See disclaimer, page 18.

- 1) For further details see the Technical Information sheet entitled: "Overview of grades, guide values, processing"
- 2) MVR-value: measured at 330 °C and 2.16 kg.



For more information: www.plastics.bayer.com



Bayblend® is the trade name used by Bayer Material Science AG for its product line of amorphous, thermoplastic polymer blends based on polycarbonate (PC) and acrylonitrile butadiene styrene copolymer (ABS) as well as the rubber-modified polycarbonate (PC) and styrene-acrylonitrile copolymer (SAN) blends. Their property profiles can be customized by varying the composition of the blends. The particular strengths of Bayblend® are its balanced combination of heat resistance, toughness and stiffness and its excellent processing characteristics.

Products in the range

-  **Non-reinforced general purpose grades**
-  **Mineral filled general purpose grades**
-  **Glass fiber reinforced general purpose grades**
-  **General purpose grades with improved weatherability**
-  **General purpose grades for medical application****
-  **Non-reinforced flame retardant grades**
with a chlorine-, bromine- and antimony-free flame retardant package
-  **Mineral-filled flame retardant grades**
-  **Flame retardant grades for TV application**



Characteristic features

Color

Opaque, available in many opaque colors

Heat resistance

Vicat VST/B 120: standard grades: 112–142 °C, FR grades 93–136 °C

Stiffness

Tensile modulus: 2,000–2,800 MPa, mineral filled grades: 3,300–4,900 MPa, glass fiber-reinforced grades: 4,800–10,000 MPa

Toughness

High impact and notched impact strength even at low temperatures

Dimensional accuracy

High, low shrinkage, minimal warping

Flame retardance

Flame retardant grades with flammability classification to UL 94 V-0 as from 0.75 mm

Electrical insulation

Good, specific volume resistivity: 10^{14} Ohm · m, specific surface resistivity: 10^{16} Ohm



Processing and fabrication

Processing the raw material

Injection molding, extrusion, extrusion blow molding

Secondary processing

Thermoforming, e.g. by bending and stamping; cold forming, e.g. by high-pressure molding

Machining

Sawing, drilling, turning, milling, planing, grinding, tapping and die-cutting

Joining

Screwing, bonding, welding and riveting

Finishing

Painting, printing, metallizing and laser marking

Main areas of application

Automotive

Instrument panels and ventilation nozzles, instrument panel supports with add-on components, post finishers, airbag covers, metallized trim and emblems, consoles, door handles, rear spoilers

Data technology

Housings for computers, monitors, printers, photocopyers, laptops, televisions, DVD players and mobile phones

Electrical engineering and electronics

Connectors, housings for switches and battery chargers, cable ducts

Domestic, leisure, sports

Panels for dishwashers, washing machines, housings for kitchen appliances

■ Non-reinforced general purpose grades

T45 PG

(PC+ABS) blend; unreinforced; general purpose injection molding grade; Vicat/B 120 temperature = 112 °C; for electroplating applications

T50 XF

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 = 115 °C; excellent flow; good low temperature impact strength

T65 XF

(PC+ABS) blend; unreinforced; general purpose injection molding grade; Vicat/B 120 temperature = 120 °C; improved flowability compared to T65

T65 AT

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 temperature = 121 °C; improved antistatic behavior; good flow

T65 HI

(PC+ABS) blend; unreinforced; grade with improved low-temperature impact strength and chemical resistance for automotive parts; also suitable for extrusion/extrusion blow molding and electroplating applications; Vicat/B 120 temperature = 120 °C

T65 PG

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 temperature = 120 °C; easy flow; for electroplating applications

T65 SG

(PC+ABS) blend; unreinforced; general purpose injection molding grade; Vicat/B 120 temperature = 120 °C; improved flowability compared to T65; optimized for direct coating process

T85 XF

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 temperature = 130 °C; better flow than T85





T80 XG

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 temperature = 130 °C; excellent flow; optimized surface quality for metallization (steam treatment)

T80 XG BBS910

(PC+ABS) blend; unreinforced; injection molding grade; UV stabilized; Vicat/B 120 temperature = 130 °C; excellent flow; optimized surface quality

T85 SG

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 temperature = 130 °C; better flow than T85; optimized for direct coating process

T90 HT

(PC+ABS) blend; unreinforced; injection molding grade; high heat resistance; Vicat/B 120 = 135 °C; ball indentation temperature ≥ 125 °C; easy flow; suitable for supporting life components

■ Mineral filled general purpose grades

ET1100

(PC+ABS) blend; 10 % mineral filled; extrusion grade; very high heat resistance; Vicat/B 120 = 142 °C; reduced coefficient of thermal expansion; tensile modulus = 3,300 MPa

T95 MF

(PC+ABS) blend; 9 % mineral filled; injection molding grade; very high heat resistance; Vicat/B 120 = 142 °C; reduced coefficient of linear thermal expansion; tensile modulus = 3,350 MPa

T90 MF-20

Rubber modified (PC+SAN) blend; 20 % mineral filled; injection molding grade; very good flow; reduced coefficient of thermal expansion; tensile modulus = 4,900 MPa; high heat resistance; Vicat/B 120 = 130 °C

■ Glass fiber reinforced general purpose grades

T88 GF-10

Rubber modified (PC+SAN) blend; 10 % glass fiber filled; injection molding grade; optimized heat ageing and UV-stability; very good flow; tensile modulus = 4,800 MPa; high heat resistance; Vicat/B 120 = 134 °C

T88 GF-20

Rubber modified (PC+SAN) blend; 20 % glass fiber filled; injection molding grade; optimized heat ageing- and UV-stability; very good flow; tensile modulus = 7,200 MPa; high heat resistance; Vicat/B 120 = 130 °C

T88 GF-30

Rubber modified (PC+SAN) blend; 31 % glass fiber filled; injection molding grade; optimized heat ageing- and UV-stability; very good flow; tensile modulus = 10,000 MPa; high heat resistance; Vicat/B 120 = 134 °C

■ General purpose grades with improved weatherability

W85 HI

(PC+ASA) blend; unreinforced; injection molding grade with improved weather resistance; optimized heat ageing stability; excellent low temperature ductility; high heat resistance; Vicat/B 120 = 134 °C

W85 XF

(PC+ASA) blend; unreinforced; injection molding grade with improved weather resistance; optimized heat ageing stability; easy flow; high heat resistance; Vicat/B 120 = 132 °C

■ General purpose grades for medical application**

M850 XF

(PC+ABS) blend; unreinforced; injection molding grade; Vicat/B 120 temperature = 131 °C; easy flow; meet certain requirements of ISO Standard 10993-1. For further information please contact pcs-info@bayermaterialscience.com

■ Non-reinforced flame retardant grades

FR3000

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; easy-flow grade; Vicat/B 120 temperature = 97 °C; UL recognition 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant; glow wire test (GWFI): 960 °C (2.0 mm); no juicing; good light stability

FR3000 HI

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; general purpose; compared to FR3000 improved chemical resistance and stress cracking behavior; Vicat/B 120 temperature = 97 °C; UL recognition 94 V-0 at 1.5 mm

FR3005 HF

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; very easy-flow grade; Vicat/B 120 temperature = 96 °C; UL recognition 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant



FR3008 HR

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; improved chemical and very good hydrolysis resistance; HDT/A ≥ 85 °C; Vicat/B 120 temperature = 103 °C; UL recognition 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant; glow wire test (GWFI): 960 °C (2.0 mm); good light stability

FR3010

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; increased heat resistance; Vicat/B 120 temperature = 110 °C; UL recognition 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant; glow wire test (GWFI): 960 °C (2.0 mm); improved chemical resistance and stress cracking behavior; successor to FR2010

FR3010 IF

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; increased heat resistance; Vicat/B 120 temperature = 108 °C; improved flammability; UL recognition 94 5VB (1.5 mm); antimony-, chlorine- and bromine-free flame retardant; glow wire test (GWFI): 960 °C (2.0 mm); improved flow compared to FR3010

FR3011

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; good flow; high heat resistance; Vicat/B 120 temperature = 118 °C; UL recognition 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant; glow wire test (GWFI): 960 °C (2.0 mm); good light stability

FR3015

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; Vicat/B 120 = 118 °C; UL 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant

FR3030

(PC+ABS) blend; unreinforced; flame-retardant; extrusion grade; Vicat/B 120 temperature = 115 °C; good extrusion and vacuum-forming behavior; UL recognition 94 V-0 (1.5 mm); halogen-free according to DIN VDE 0472,815; glow wire temperature (GWFI): 960 °C at 1.0 mm

FR3040

(PC+ABS) blend; unreinforced; flame-retardant; for thin-wall applications; injection molding grade; Vicat/B 120 = 108 °C; HDT/A ≥ 85 °C; very good burning behavior in small wall thicknesses (UL recognition 94 V-0 at 0.75 mm and above and V-1 at 0.6 mm); antimony-, chlorine- and bromine-free flame retardant

FR3050

(PC+ABS) blend; unreinforced; flame-retardant; high heat resistant injection molding grade; improved chemical resistance and stress cracking behavior compared to KU2-1514; ball indentation temperature ≥ 125 °C; Vicat/B 120 temperature = 136 °C; UL recognition 94 V-1 at 1.0 mm; antimony-, chlorine- and bromine-free flame retardant; suitable for supporting life components

KU2-1514

(PC+ABS) blend; unreinforced; flame-retardant; high heat resistant injection molding grade; ball indentation temperature ≥ 125 °C; Vicat/B 120 temperature = 136 °C; UL recognition 94 V-0 at 1.5 mm; antimony-, chlorine- and bromine-free flame retardant; suitable for supporting life components

KU2-1514 BBS073

(PC+ABS) blend; unreinforced; flame-retardant; high heat resistant injection molding grade; improved chemical resistance and stress cracking behavior compared to KU2-1514; ball indentation temperature ≥ 125 °C; Vicat/B 120 temperature = 136 °C; UL recognition 94 V-0 at 1.5 mm; antimony-, chlorine- and bromine-free flame retardant; suitable for supporting life components.

■ Mineral filled flame retardant grades

FR3020

(PC+ABS) blend; 5 % mineral filled; flame retardant; for thin-wall applications; injection molding; Vicat/B 120 = 103 °C; HDT/A ≥ 85 °C; very good UL recognition in small wall thicknesses (V-0 at 0.75 mm); antimony-, chlorine- and bromine-free flame retardant

FR3021

(PC+ABS) blend; 15 % mineral filled; flame retardant; injection molding grade; increased stiffness; tensile modulus = 4,800 MPa; Vicat/B 120 temperature = 98 °C; UL recognition 94 V-0 (1.5 mm); antimony-, chlorine- and bromine-free flame retardant; glow wire test (GWFI): 960 °C (2.0 mm)

ET3032 FR

Rubber modified PC blend; 10 % mineral filled; flame-retardant; extrusion grade; Vicat/B 120 temperature = 108 °C; good extrusion and vacuum-forming behavior; UL 94 V-0 (0.75 mm) (Bayer internal test); halogen-free according to DIN VDE 0472,815; glow wire temperature (GWFI): 960 °C at 2.0 mm

FR410 MT

Rubber modified PC blend; 10 % mineral filled; flame-retardant; extrusion grade; Vicat/B 120 = 108 °C; very good UL recognition in small wall thickness (V-0 at 0.75 mm); for railway interiors. The classifications according to the respective rail standards are communicated with email inquiry under pcs-info@bayermaterialsscience.com.

■ Flame retardant grades for TV application

FR3110 TV

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; high heat resistance; Vicat/B 120 = 108 °C; easy flow; UL recognition 94 V-0 at 1.5 mm; antimony-, chlorine- and bromine-free flame retardant

FR3120 TV

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; high heat resistance; Vicat/B 120 = 108 °C; easy flow; UL recognition 94 V-0 at 1.5 mm; antimony-, chlorine- and bromine-free flame retardant; compliant with EU-Ecolabel requirements for TV sets

FR3200 TV

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; for high gloss applications, RHCM process etc.; Vicat/B 120 = 96 °C; easy flow; UL recognition 94 V-0 at 1.2 mm; antimony-, chlorine- and bromine-free flame retardant; formerly trial product Bayblend FR TP SH001

FR3210 TV

(PC+ABS) blend; unreinforced; flame-retardant; injection molding grade; easy flow; improved surface quality; Vicat/B 120 = 93 °C; UL recognition 94 V-0 (1.2 mm); antimony-, chlorine- and bromine-free flame retardant



Makroblend® is the brand name of our polycarbonate blends based on polyethylene terephthalate or polybutylene terephthalate (PET or PBT). The benefits of Makroblend® include its high strength, even at low temperatures, its good resistance to chemicals and its reduced tendency to stress cracking. In addition, it is easily painted and absorbs only a minimal amount of moisture.

Products in the range

■ (PC+PET) blends

■ (PC+PBT) blends

■ (PC+PET post-consumer
recyclate) blends

Characteristic features

Color

Naturally light ivory in color, available in many opaque colors, light stable

Surface finish

Gloss or matt

Stiffness

High, tensile modulus: 1,800 to 6,500 MPa, depending on the grade

Toughness

High impact strength, good strength, even at low temperatures

Heat resistance

High; depending on the grade

Dimensional accuracy and stability

Good, significantly better than partially crystalline thermoplastics, absorbs only a minimum amount of moisture

Resistance to chemicals

Good, especially resistant to fuels, greases, solvents and cleaning agents

Electrical insulation

Good

Processing and fabrication

Processing the raw material

Injection molding, extrusion, rotational molding

Secondary processing

Thermoforming, e.g. one ending and stamping; cold forming, e.g. by high-pressure molding

Machining

Sawing, drilling, turning, milling, planing, grinding, tapping, die-cutting and cutting

Joining

Screwing, bonding, welding and riveting

Finishing

Painting, printing, metallizing and laser marking

Main areas of application

Automotive

Bumpers, radiator grilles, external components, bodywork components

Electrical engineering and electronics

Housings of electrical tools

Domestic, leisure, sports

Toecaps of safety shoes

■ (PC+PET) blends

DP7645

(PC+PET) blend; unreinforced; impact modified; mold release; injection molding grade; good flowability; excellent low-temperature impact strength; excellent dimensional stability; high heat resistance; automotive exterior parts

AR205

(PC+PET) blend; unreinforced; impact modified; mold release; injection molding grade; excellent flowability; good low-temperature impact strength; excellent dimensional stability; high heat resistance; automotive exterior and interior parts

UT153

(PC+PET) blend; unreinforced; impact modified; mold release; UV stabilized; injection molding grade; good flowability; excellent low-temperature impact strength; high heat resistance; good chemical resistance; exceptional dimensional stability

UT250

(PC+PET) blend; unreinforced; impact modified; mold release; injection molding grade; good flowability; good low-temperature impact strength; high heat resistance; good chemical resistance; exceptional dimensional stability



UT305

(PC+PET) blend; unreinforced; mold release; injection molding grade; good flowability; high heat resistance; good chemical resistance; excellent surface appearance; exceptional dimensional stability

UT235 M

(PC+PET) blend; 15 % mineral filled; mold release; injection molding grade; excellent flow; high heat resistance; exceptional dimensional stability; low coefficient of linear thermal expansion; tensile modulus = 4,200 MPa

(PC+PBT) blends

UT3905

(PC+PBT) blend; unreinforced; impact modified; mold release; injection molding grade; excellent flowability; very good low-temperature impact strength; excellent chemical resistance

UT3907

(PC+PBT) blend; unreinforced; impact modified; mold release; UV stabilized; injection molding grade; excellent flowability; very good low-temperature impact strength; excellent chemical resistance

UT6005

(PC+PBT) blend; unreinforced; impact modified; mold release; injection molding grade; good flowability; excellent low-temperature impact strength; excellent chemical resistance

UT6007

(PC+PBT) blend; unreinforced; impact modified; mold release; UV stabilized; injection molding grade; good flowability; excellent low-temperature impact strength; excellent chemical resistance

KU2-7912/4

(PC+PBT) blend; unreinforced; impact modified; mold release; injection molding grade; good flowability; excellent low-temperature impact strength; excellent chemical resistance; ideal for painted automotive exterior parts

KU2-7915

(PC+PBT) blend; unreinforced; impact modified; mold release; injection molding grade; good flowability; excellent low-temperature impact strength; excellent chemical resistance; ideal for painted applications; automotive interior and exterior parts; E/E power tools

S7916

(PBT+PC) blend; unreinforced; impact modified; mold release; injection molding grade; good flowability; excellent low-temperature impact strength; excellent chemical resistance; ideal for painted applications; interior and exterior automotive parts

KU2-7609

(PC+PBT) blend; 20 % mineral filled; impact modified; injection molding grade; good flowability; excellent chemical resistance; automotive exterior body panels

UT4045 G

(PC+PBT) blend; 20 % glass fiber reinforced; mold release; injection molding grade; good flowability; excellent chemical resistance; exceptional dimensional stability; high stiffness; tensile modulus = 6,500 MPa

EC5005 HT

(PC+PBT) blend; unreinforced; mold release; flame retarded; injection molding grade; medium viscosity; antimony-; chlorine- and bromine-free flame retardant; UL recognition 94 V-0 at 0.75 mm and 94-5VA at 3.0 mm

(PC+PET post-consumer recycle) blends

TP973*

(PC+PET) blend; unreinforced; impact modified; mold release; UV stabilized; injection molding grade; contains 30 % post-consumer recycle; automotive interior parts and consumer products

GR235 M

(PC+PET) blend; 15 % mineral filled; mold release; injection molding grade; based on recycled polymeric raw materials; good flowability; exceptional dimensional stability; low coefficient of linear thermal expansion; tensile modulus = 4,600 MPa

EC305 GR

(PC+PET) blend; unreinforced; mold release; flame retarded; injection molding grade; contains 30 % post-consumer recycle; good flowability; antimony-; chlorine- and bromine-free flame retardant; UL recognition 94 V-0 at 1.5 mm.

*See disclaimer for developmental products, page 18.
For more information: www.plastics.bayer.com



WARRANTY

General

The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale which are available upon request. All information and technical assistance is given without warranty or guarantee, and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.

Unless specified to the contrary, the property values given have been established on standardized test specimens at room temperature. The figures should be regarded as typical values only and not as binding limiting values. Please note that the properties can be affected by the design of the mold/die, the processing conditions and coloring.

With respect to health, safety and environment precautions, the relevant Material Safety Data Sheets (MSDS) and product labels must be observed prior to working with our products.

* Developmental products

This is a developmental product. Further information, including amended or supplementary data on hazards associated with its use, may be compiled in the future. For this reason, no assurances are given as to type conformity, processability, long-term performance characteristics or other production or application parameters. Therefore, the purchaser/user uses the product entirely at his own risk without having been given any warranty or guarantee and agrees that the supplier shall not be liable for any damage, of whatever nature, arising out of such use.

** Medical products

GUIDANCE ON USE OF BAYER MATERIALSCIENCE PRODUCTS IN A MEDICAL APPLICATION

1. Purpose

The purpose of this Guidance Document is to provide information regarding the use of Bayer MaterialScience ("BMS") products in a medical application.

2. Medical Application

As used in this Guidance Document, the term "Medical Application" means all applications of medical devices wherein the medical device is manufactured with a BMS Product(s) and is intended under normal use to be brought into direct contact with the patient's body (e.g., skin, body fluids or tissues, including indirect contact to blood). If the medical device has more than one part or component, the term "Medical Application" shall apply only to the part or component which is intended under normal use to be brought into direct contact with the patient's body (e.g., skin, body fluids or tissues, including indirect contact to blood) and is also manufactured with a BMS Product(s). Medical devices implanted in the human body as well as components of drug delivery devices which are intended to be in direct contact with the drug are also included.

3. BMS Products for a Medical Application

The BMS products covered by this Guidance Document are fully reacted polymeric materials, reactive raw materials, dispersions, solutions, and non-reactive raw materials sold by BMS (hereinafter "BMS Products"). As used in this Guidance Document, the term "BMS Products" does not include final end-use products (e.g., medical devices) that are made from BMS raw materials, reacted materials, dispersions, or solutions.

BMS designates certain fully reacted BMS polymeric materials (e.g. certain plastics, sheets, and films) as "Medical Grade."

Other BMS Products, such as reactive raw materials (e.g., diisocyanates and polyols), dispersions, solutions, and non-reactive raw materials (which typically are added to substrate) are not designated

as "Medical Grade" and shall not be considered candidates for a Medical Application unless BMS explicitly agrees, in writing, to sell such products for a Medical Application. Nonetheless, any determination as to whether a BMS product is appropriate for use in a Medical Application must be made solely by the purchaser of the BMS product(s) without relying upon any representations by BMS. In any event, BMS makes no representations regarding the suitability of a BMS Product for a particular Medical Application or final end-use product, as further explained in Section 4 below. Moreover, with respect to reactive raw materials (e.g., diisocyanates and polyols), dispersions, solutions, and non-reactive raw materials, BMS can make no representations regarding compliance with ISO Standard 10993-1 or other biocompatibility standards as such products must be reacted, have the solvent removed or be added to a substrate to form a solid or suitable material for an application as an article and therefore cannot be tested by themselves, or it is not appropriate to test them independent of the substrate, for meeting ISO Standard 10993-1 or other biocompatibility standards. It is the sole responsibility of the manufacturer of the final end-use product to conduct all necessary tests (including biocompatibility tests) and inspections and to evaluate the final product under actual end-use requirements.

Medical Grade

BMS Products that are designated as "Medical Grade", e.g., plastics, sheets, and films, meet certain biocompatibility test requirements of ISO Standard 10993-1: "Biological Evaluation of Medical Devices" for the categories including: (1) skin contact, (2) up to 24 hours contact with circulating blood, tissue, bone, and dentin, (3) up to 30 days contact with mucosal membranes, compromised surfaces, and blood path, indirect.

BMS Products designated as "Medical Grade" shall not be considered candidates for the following types of Medical Applications unless BMS explicitly agrees, in writing, to sell such products for such applications: (a) cosmetic, reconstructive, or reproductive implant applications; (b) any other bodily implant applications; (c) applications involving contact with or storage of human tissue, blood, or other bodily fluids, for more than 30 days; or (d) applications having more than 24 hours contact with circulating blood, tissue, bone and dentin.

The biocompatibility testing referenced above cannot assure the biocompatibility of final or intermediate products made from BMS Products or the suitability of such products for their use in a Medical Application, i.e., the test data cannot be used to conclude that any medical devices manufactured from the BMS Products meet the necessary requirements of ISO Standard 10993-1. It is the sole responsibility of the manufacturer of final end-use product to conduct all necessary tests (including biocompatibility tests) and inspections and to evaluate the final product under actual end-use requirements. The designation as "Medical Grade" does not mean that BMS or anyone else has determined that the product is suitable for use in any particular Medical Application. BMS makes no representations regarding the suitability of a BMS Product for a particular Medical Application or final end-use product. A determination that the BMS Product is suitable for use in a particular Medical Application or final end-use product can only be made by the purchaser of the BMS product who utilizes it in a Medical Application and conducts all necessary testing and evaluation to support such a determination.

4. Appropriate Use of BMS Products

BMS has not performed clinical medical studies concerning the use of BMS Products. Moreover, BMS has neither sought nor received approval from the United States Food and Drug Administration (FDA) or other competent authorities from other regions for the use of BMS Products in a Medical Application.

BMS makes no representations or warranty regarding (and accepts no responsibility for determining) either: (a) the suitability of a BMS Product for a particular Medical Application or final end-use product or (b) the adequacy of any warning relating to a BMS Product or particular Medical Application or final end-use product. The suitability of BMS Products in a given end-use environment is dependent upon various conditions including, without limitation, chemical compatibility, method of manufacture, temperature, part design, sterilization method, residual stresses, and external loads. It is the sole responsibility of the manufacturer of the final end-use product to determine the suitability (including biocompatibility) of all raw materials and components, including any BMS Products, in order to ensure that the final product:

- meets relevant biocompatibility requirements and is otherwise safe for its end-use,
- performs or functions as intended,
- is suitable for its intended use, and
- complies with all applicable FDA and other regulatory requirements.

It also is the sole responsibility of the manufacturer of the final end-use product to conduct all necessary tests and inspections and to evaluate the final product under actual end-use requirements and to adequately advise and warn purchasers, users, and/or learned intermediaries (such as physicians) of pertinent risks and fulfill any postmarket surveillance obligations.

Any decision regarding the appropriateness of a particular medical product in a particular clinical or Medical Application should be based on the judgment of the manufacturer, seller, the competent authority, and the treating physician. BMS cannot weigh the benefits against the risks of a medical device and cannot offer a medical or legal judgment on the safety or efficacy of the use of a BMS Product in a specific Medical Application.

5. Sterilization

The sterilization method and the number of sterilization cycles a medical device can withstand will vary depending upon type/grade of product, part design, processing parameters, sterilization temperature, and chemical environment. Therefore, the manufacturer of the end-use final product must evaluate each device to determine the sterilization method and the number of permissible sterilization cycles appropriate for actual end-use requirements and must adequately advise and warn purchasers, users, and/or learned intermediaries (such as physicians) of pertinent risks and limitations and must fulfill postmarket surveillance obligations.

During sterilization, through the use of steam autoclaving or boiling water techniques, polyurethane materials may hydrolyze to their corresponding precursor diamines (for example, aromatic polyurethane based on diphenylmethane diisocyanate (MDI) may hydrolyze and produce methylene dianiline (MDA), and aromatic polyurethane based on toluene diisocyanate (TDI) may hydrolyze and produce toluene diamine (TDA)). This condition needs to be considered by the device manufacturer in defining sterilization conditions.

6. Test Data

BMS may agree to provide existing test data and other information about its Medical Grade BMS Products or to perform additional testing of BMS Products. In so doing, BMS does not assume any responsibility to determine the suitability of a BMS Product for a particular Medical Application or final end-use product or to provide adequate warnings; moreover, any agreement by BMS to provide such data and/or information does not relieve the manufacturer of its sole responsibility to properly evaluate its final end-use product under actual end-use requirements, nor does it relieve the manufacturer of any of its other responsibilities described in this Guidance Document.

7. Re-use of Medical Devices

BMS does not warrant or represent that medical devices made from a BMS Product (including a Medical Grade BMS Product) are suitable for multiple uses. If the medical device is reprocessed and/or labeled for multiple uses, it is the responsibility of the manufacturer and/or reprocessor to determine the appropriate number of permissible uses by evaluating the device under actual sterilization, cleaning, and end-use conditions and to adequately advise and warn purchasers, users, and/or learned intermediaries (such as physicians) of pertinent risks and fulfill postmarket surveillance obligations.

8. FDA Master Files

If the FDA requires proprietary information about any BMS Product as part of the 510(k) clearance or premarket application (PMA) approval process for the manufacturer's end-use final product, BMS may establish a Drug or Device Master File and grant a right of reference to it, in order to allow the FDA to review such information without disclosing BMS' proprietary information to the manufacturer.

9. Special Considerations

Only virgin Medical Grade BMS Products have been tested according to certain tests under ISO 10993-1. Any use of regrind (for example, runners from mold flow channels or trim pieces) must be evaluated by the medical device manufacturer for suitability.

Over time, polyurethane materials may hydrolyze to their corresponding precursor diamines (for example, aromatic polyurethane based on diphenylmethane diisocyanate (MDI) may hydrolyze and produce methylene dianiline (MDA), and aromatic polyurethane based on toluene diisocyanate (TDI) may hydrolyze and produce toluene diamine (TDA)). This condition needs to be considered in any end-use application.

10. Risk of Failure

There is a risk of failure and adverse consequences with all Medical Applications and medical devices, including devices implanted in the human body and devices that are in contact with body fluids or tissues. There is also a risk of failure and adverse consequences for the use of BMS products in connection with any Medical Application and medical device, including devices implanted in the human body.

11. Packaging and Labeling

The purchaser of BMS Products shall be solely responsible for, or shall procure that the manufacturer and/or reprocessor of the medical device shall be responsible for (a) the design, production, assembly, packaging and labeling of the medical device which incorporates a BMS Product and (b) assigning the purpose for which that BMS Product is to be used. For the avoidance of doubt, BMS is not the manufacturer of any of the medical devices for which the BMS Products shall be sold and shall, to the extent permitted by law, not be liable as such.

12. Disclaimer of Warranty and Prohibition on Conflicting Oral Representations

- 1) To the extent permitted by law, BMS MAKES NO REPRESENTATION, PROMISE, EXPRESS WARRANTY, IMPLIED WARRANTY OF MERCHANTABILITY, IMPLIED WARRANTY FOR A PARTICULAR PURPOSE, OR OTHER IMPLIED WARRANTY CONCERNING THE SUITABILITY OF ANY BMS PRODUCT FOR USE IN ANY SPECIFIC MEDICAL DEVICE OR OTHER PRODUCT OR FOR ANY MEDICAL APPLICATION; AND
- 2) To the extent permitted by law, BMS MAKES NO REPRESENTATION, PROMISE, EXPRESS WARRANTY, IMPLIED WARRANTY OF MERCHANTABILITY, IMPLIED WARRANTY FOR A PARTICULAR PURPOSE, OR OTHER IMPLIED WARRANTY CONCERNING THE SUITABILITY OF ANY MEDICAL DEVICE OR OTHER PRODUCT MADE, WHOLLY OR IN PART, FROM ANY BMS PRODUCT.

NO BMS REPRESENTATIVE HAS THE AUTHORITY TO MAKE ANY ORAL REPRESENTATION THAT CONFLICTS WITH ANY PORTION OF THIS GUIDANCE.

13. Responsibility to Forward This Guidance Document

If the purchaser of any Medical Grade BMS Product is not the manufacturer of the final end-use product, it is the responsibility of the purchaser to forward this Guidance Document to such manufacturer.

14. Questions

In case of questions, please contact:

Within NAFTA BMS-HSEQ-PSRA
email: bmsmedicalapplication@bayerbms.com,
phone +1 412-777-2835

Outside NAFTA BMS-IO-HSEQ-PRA
email: productsafety@bayerbms.com, phone +49 214 30 81761

This information and our technical advice – whether verbal, in writing or by way of trials – are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to verify the information currently provided – especially that contained in our safety data and technical information sheets – and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Conditions of Sale and Delivery.

Unless specified to the contrary, the values given have been established on standardized test specimens at room temperature.

The figures should be regarded as guide values only and not as binding minimum values. Please note that, under certain conditions, the properties can be affected to a considerable extent by the design of the mold/die, the processing conditions and the coloring.

Safety advice

The information given in the relevant safety data sheets must be observed when handling the recommended adhesives and solvents. The safety data sheets are provided by the supplier in each case. Further up-to-date information on the individual solvents is also available on the Internet in the GESTIS materials data base (GESTIS = Gefahrstoffinformationssystem der gewerblichen Berufsgenossenschaften; Dangerous Goods Information System of the German Employers' Accident Insurance Associations) at this internet address:

<http://www.hvbg.de/e/bia/gestis/stoffdb/index.html>



Bayer MaterialScience

Publisher:

Bayer MaterialScience AG
Business Unit Polycarbonates
51368 Leverkusen
Germany

www.materialscience.bayer.com

MS 00041263
Edition 2012-08