

A new engineered plastic material for firefighter face shields

## EUROPLEX® PPSU

### A sheet material distinguished by its unique combination of properties:

- EUROPLEX® PPSU is inherently flame-retardant (self-extinguishing without added flame retardant). Its rating of UL94:V0 at 0.8 mm thickness stands for very good fire behavior.
- High heat distortion temperature, up to 190°C in permanent service.
- Excellent mechanical properties over a wide temperature range – even at low temperatures. Face shields manufactured from this material are virtually unbreakable.
- EUROPLEX® PPSU exhibits extraordinary chemical resistance for an amorphous material.



### EUROPLEX® PPSU engineered plastic sheets are the better alternative for manufacturing firefighter helmet face shields!

EUROPLEX® sheets, based on the engineered polymer polyphenyl sulphone (PPSU), are employed worldwide more and more frequently to manufacture visors for the protection of fire workers during dangerous firefighting and lifesaving activities. EUROPLEX® PPSU as a new innovative material for this special application was tested by leading helmet and visor manufacturers and obtained all necessary approvals in accordance with the ongoing standard **EN 443:2008** for helmets for firefighting in buildings and other structures and the integrated standard **EN 14458:2004** for personal eye equipment – face shields and visors for use with firefighters and high performance industrial safety helmets used by firefighters, ambulance and emergency services. The amber-tinted visors manufactured with EUROPLEX® PPSU can be coated to provide an anti-scratch or anti-fog surface layer. They can also be supplied with a gold coating for applications that require increased IR radiation protection.

### EUROPLEX® PPSU is the new innovative standard material for firefighter helmet visors!

EUROPLEX® PPSU sheets are available in transparent and opaque colors in thicknesses of 0.5 to 6.0 mm. In addition to visor applications they are also used for sterilizable surgical instrument trays.



## Characteristics of EUROPLEX® PPSU

Product properties	EUROPLEX® PPSU	Unit	Standard
Density	1.29	g/cm <sup>3</sup>	ISO 1183
Vicat softening temperature	222	°C	ISO 306/B50
Max. permanent service temperature	190	°C	
Modulus of elasticity	2350	MPa	ISO 527
Tensile strength	70 – 80	MPa	ISO 527
Izod notched impact strength (3.0 mm)	60 – 70	kJ/m <sup>2</sup>	ISO 180/1A

### Processing instructions for thermoforming:

Before thermoforming, EUROPLEX® PPSU sheets must be dried in an air-circulation oven. The sheets are to be positioned in such a way that air can circulate freely between and around them. They should not be stacked, so as not to prolong drying unnecessarily. The temperature of the oven must be controlled. The following drying time and temperature is recommended: five hours per 1 mm sheet thickness at 175°C (+/-5°C). This recommendation was established based on storage under normal conditions (23°C, 50% rel. humidity). If the sheets are stored in particularly damp rooms, drying periods may have to be extended by up to 50%. To permit problems – free thermoforming, machines must be equipped as follows: heating from above and below; the output of the individual upper radiators should be adjustable. It should be possible to support the heated sheets automatically by means of air. Area output approx. 43–54 kW/m<sup>2</sup> (heating potential for sheets up to approx. 300°C), at minimum 22 kW/m<sup>2</sup>. Metal molds must be heatable (175°C). The forming temperature range of EUROPLEX® PPSU sheets lies between 270 and 285°C, with the optimum forming temperature being approx. 275°C. This provides good mold reproduction, preservation of the surface texture and minimal sagging. Due to the narrow range of the forming

sagging. Due to the narrow range of the forming temperature, it must be possible to control the sheet temperature throughout the heating phase. Suitable for this are radiation pyrometers, which in some thermoforming machines are firmly installed in the center of the upper heaters.

In general, the edges of the sheets should be heated to a higher temperature than the central areas, especially if these are flat. The thermoformed parts shrink when cooling down to room temperature. Shrinkage of EUROPLEX® PPSU is uniform, predictable and must be taken into account when designing molds so that a finished part has the required dimensions. Since various mold materials have different coefficients of linear thermal expansion, shrinkage values of EUROPLEX® PPSU have been determined as the difference between the dimensions of the mold at operating temperature and the dimensions of the part after cooling for at least 24 hours and conditioning under standard conditions. Shrinkage of EUROPLEX® PPSU moldings, measured according to this method, is about 0.8 – 1 %. Additional processing instructions are available upon request.

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