



CT-1159:CM601

UV resistant, silane crosslinkable, halogen free, flame-retardant insulation and sheathing compound for flexible single core cables in photovoltaic (PV) systems

This is a silane crosslinkable halogen free flame-retardant polyolefin compound, curable by exposure to moist conditions. The graft component CT-1159, coloured black, is mixed with a crosslinking catalyst masterbatch CM601 generally in the ratio 95:5.

The CT-1159:CM601 system has been developed to meet requirements for cables for PV systems TUV 2 Pfg 1169/08.2007.

Test	Test method	Unit	Typical value
Physical properties and mechanical properties			
Melt Flow Rate (21.6kg @150°C)	AEI Method	g/10 minutes	20
Tensile strength	IEC 60811-1-1	N/mm ²	10
Elongation at break	IEC 60811-1-1	%	180
Density	BS 2782 Pt. 6 Mtd 620A-D	g/cm ³	1.45
Typical ageing behaviour after 7 days at 150°C			
Tensile strength	IEC 60811-1-2	% variation	+20
Elongation at break	IEC 60811-1-2	% variation	-20
Cure assessment by hot set test (forced cured at 80°C in water)			
Elongation under load (20N/cm ² at 200°C)	IEC 60811-2-1	%	75
Permanent elongation after cooling	IEC 60811-2-1	%	5
Thermo mechanical properties			
Hot Pressure (6 hours, 140°C, K=1)	IEC 60811-3-1	%	35
Fire and smoke properties			
Oxygen index	BS ISO 4589-2	%	30
Temperature index	BS ISO 4589-3	°C	250
Halogen Acid gas evolution	IEC 60754-1	%	<0.5



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Recommended processing and handling conditions

Extruder

Many modern thermoplastic extruders will process the material, although a screw designed to give good homogenisation without excessive shear (which could cause unacceptable increases in melt temperature) should be used. An extruder with an L/D ratio (length/diameter) of 15-24 and an extruder screw with a compression ratio 1.2:1 are recommended.

Extruder temperature conditions

It is important that the melt temperature is not allowed to increase above 160°C. As a guide the following temperature profile is recommended:-

Zone 1	Zone 2	Zone 3	Zone 4	Head	Die
130°C	140°C	145°C	150°C	160°C	160°C

This profile will vary slightly depending on extruder type, head design and output.

Screw water temperature 40-60°C

Recommended screen pack 50 (mesh apertures per linear inch) or 300 micron

Head and tool design

The head and tools should be so designed as to allow streamlined flow without the possibility of stagnation of material (where pre-curing could take place). To obtain the optimum in physical properties in the case of tubing tools, a draw down ratio of 1.5:1 is recommended to avoid internal stresses.

Crosslinking or Cure

A satisfactory cure can be obtained either by immersion in hot water or exposure to low pressure steam at a temperature up to 70°C. At the higher 10% addition levels of CM601 catalyst and under the correct conditions a satisfactory cure is possible at ambient temperature and humidity.

Catalyst and Colour Masterbatches

CM601 catalyst masterbatch is normally added at between 5-10%.

Addition of approved colour masterbatches, including black, up to a maximum of 1%, has no detrimental effect on the properties or crosslinking capability.

It is recommended that all masterbatches including those containing the catalyst should be thoroughly dried before use for 8 hours at 60°C or 4 hours at 80°C in a de-humidifying drier.

Storage and Shelf Life

CT-1159 normally has shelf life of at least 6 months from the date of manufacture. The storage of silane crosslinkable compounds in cool dry conditions will maximise useful shelf life. Other precautions are:-

- Packaging should remain sealed.
- Avoid temperature above 25°C.
- Avoid storage outside and in direct sunlight.
- Use within 8 hours of opening packaging.

Form and packaging

Form – pellets

Packaging – The following possibilities are available:-

- Moisture resistant sacks containing 25kg.
- Boxes with heat sealed moisture resistant liner containing approximately 125kg, 500kg or 1000kg.



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