



CT09-05:CM401-2S

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 CT09-05 is mixed with a crosslinking catalyst masterbatch CM401-2S generally in the ratio 97:3.

The CT09-05:CM401-2S 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			
Density	BS 2782 Pt. 6 Mtd 620A-D	g/cm ³	1.52
Melt flow rate (21.6kg at 190°C)	AEI Method	g/10min	3
Tensile strength	IEC 60811-1-1	N/mm ²	9
Elongation at break	IEC 60811-1-1	%	230
Hot pressure at 140°C (6.0hrs k=0.6)	IEC 60811-3-1	%	35
Hot pressure at 150°C (0.5hrs k=1.0)	IEC 60811-3-1	%	35
Heat ageing behaviour after 168 hrs at 150°C			
Tensile strength	IEC 60811-1-2	% variation	+20
Elongation at break	IEC 60811-1-2	% variation	-20
Fluid resistance in n-oxalic acid solution for 168hrs at 23°C			
Tensile strength	IEC 60811-1-1	% variation	+10
Elongation at break (min 100%)	IEC 60811-1-1	%	310
Fluid resistance in n-sodium hydroxide solution for 168hrs at 23°C			
Tensile strength Variation	IEC 60811-1-1	%	-5
Elongation at break (min 100%)	IEC 60811-1-1	%	290
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
Flammability 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 to 2:1 are recommended.

Extruder temperature conditions

As a guide the following temperature profile is suggested when using the recommended extruder and screw designs. However, this profile will vary depending on extruder type, head design and output and should be chosen so that the melt temperature is not allowed to rise above 190°C. The residence time in the extruder should be below three minutes to achieve optimum extrusion quality.

Zone 1	Zone 2	Zone 3	Zone 4	Head	Die
100°C	130°C	145°C	155°C	160°C	165°C

Any initial purging of extruder should be performed without catalyst masterbatch addition to reduce risks of pre-curing.

Screw water temperature - 40-60°C if available

Recommended screen pack Spacer ring or beaker plate only

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, the smallest possible draw down ratio of approximately 1.4:1 is recommended to avoid developing internal stresses.

Crosslinking or Cure

A satisfactory cure can also be obtained either by immersion in hot water or exposure to low pressure steam at a temperature up to 75°C.

Catalyst and colour masterbatches

CM401-2S catalyst masterbatch is normally added at 3% addition rate. 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 at 60°C for 8 hours or at 80°C for 4 hours.

Storage & shelf life

A period of at least 6 months from date of manufacture can normally be expected. The following storage conditions are recommended:-

- Packaging should remain sealed
- Avoid temperature above 25°C
- Avoid storage outside and in direct sunlight
- Use within 8 hours of opening packaging (re-seal container lining completely if it is to be left for longer period)

Form and packaging

Form – pellets

Packaging – The following possibilities are available:-

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

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