Technical data sheet

Mecoline IS RDX 5241 F

Radiation cross-linkable PVDF flame retardant compound

■ Compound class
Insulation / sheathing

■ Compound category
RDX

■ Flame retardant
Halogenated

■ Standards
NEMA WC 27500
SAE AS 81044/9
SAE AS 81044/12
SAE AS 81044/11

■ Operating temperature [C°]
-50 to 150

■ Oil resistance level
★★★★★

■ Typical applications

This compound is an excellent choice for manufacturing insulated hook-up wires in military and aerospace industries (airframe wire) and component conductors for NEMA WC 27500 cables

Marine, Aerospace, Defence

Offshore, Shipboard

■ Features

- Flame retardant
- Low smoke
- Oil resistant
- Abrasion resistant
- High temperature resistant
- Flexible at low temperatures

PHYSICAL PROPERTIES

■ Physical properties	Unit	Typical value	Test method
Density*	g/cm³	**1.75**	DIN EN ISO 1183-1A
Melt Flow Index (150°C; 21,6kg)	g/10 min	**12**	DIN EN ISO 1133
Hardness*	Shore D	**73**	DIN ISO 48-4

MECHANICAL PROPERTIES

■ Before crosslinking **	Unit	Typical value	Test method
Tensile strength	N/mm²	**>35**	IEC 60811-501
Elongation at break	%	**>300**	IEC 60811-501
■ After crosslinking * **	**Unit**	**Typical value**	**Test method**
Tensile strength (70-80kGy)	N/mm²	**>30**	IEC 60811-501
Elongation at break (70-80kGy)	%	**>150**	IEC 60811-501
■ After ageing in air oven 168h at 200°C* **	**Unit**	**Typical value**	**Test method**
Elongation at break	%	**>125**	ASTM D 638

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THERMAL PROPERTIES***

■ Low temperature tests	Unit	Typical value	Test method
Low temperature flexibility -55°C	-	**No cracks**	ASTM D 2671 C
■ Heat tests	**Unit**	**Typical value**	**Test method**
Heat shock 4h at 250°C	-	**No cracks**	ASTM D 2671

ELECTRICAL PROPERTIES*

■ Major electrical properties	Unit	Typical value	Test method
Volume resistivity	Ω cm	**>10^{11}**	ASTM D 257
Dielectric strength	kV/mm	**>15**	DIN EN 60243-1

BURNING PROPERTIES*

■ Main burning properties	Unit	Typical value	Test method
LOI	%	**42**	ASTM D 2863 A
Burning rate	-	**V-0**	UL 94

* pressed plaques

** extruded tapes
*** cross-linked plaques

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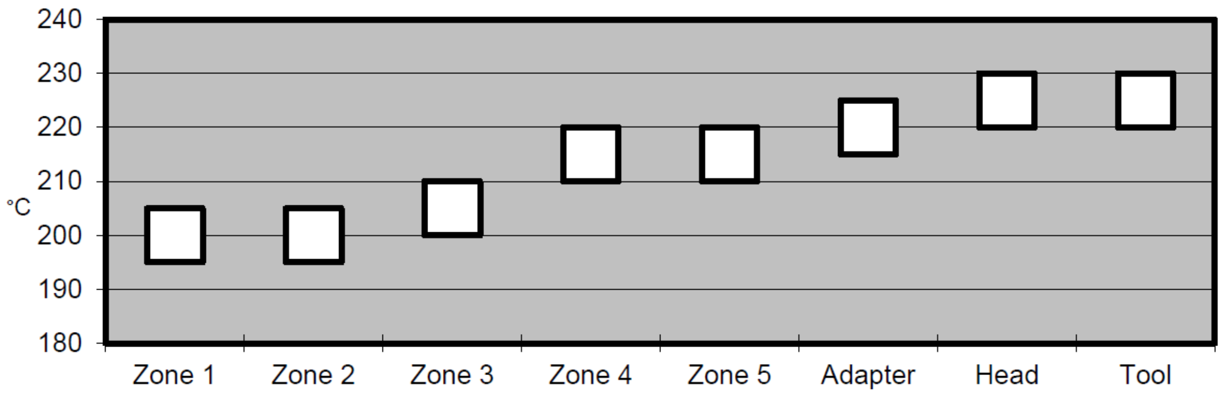
PROCESSING GUIDE

■ **Extruder type**	Preferably use a small extruder, like 30 mm with L/D 25 – 30, to avoid long residence time and thus degradation of the polymers).
■ **Screw configuration**	Good results have been achieved on a Barrier type screw, having high flights. Also on halogen-free type, low friction screws good results have been achieved.
■ **Screw cooling**	Cooling the screw to around 80°C
■ **Extrusion dies**	If Outer Die is too small, you may get fluctuations in the OD of the wire (wavy surface). If Outer Die is too big this may result in a rough surface
■ **Die opening**	Outer Die : approx. 1 - 3% smaller than the required OD of the wire.
■ **Temperature profile extruder**	The profile shown below may vary slightly depending on extruder type, head design & output.



■ **Maximum mass temperature**	240°C
■ **Conductor pre-heating**	Pre-heating between 140°C-160°C to achieve maximum properties of elongation at break of the insulation.
■ **Wire/conductor**	Tin-coated
■ **Quenching**	Warm water in the first cooling section (80°C).
■ **Drying**	Pre-drying of Mecoline Compounds is normally not necessary provided that the compound has been stored in the original sealed bags under cool (max. 30°C) and dry conditions. Mecoline compounds used from open bags require pre-drying during 4–6 hours at 60–70°C.
■ **Recommended colour master batches**	Well dispersed PVDF master batch 0,5-1,0%. For black jacket applications, UV resistance can be obtained by adding a higher level of master batch depending on requirements and type of carbon black master batch used.

CROSSLINKING INFORMATION

■ **Recommended radiation dose**	See below
■ **Radiation information**	250kGy for the polyolefin primary insulation made from RDX 3144 plus (in a second crosslink run) 70 - 80kGy max. for the RDX 4144 based secondary insulation layer In particular overdosing PVDF (above 80-90kGy) results in radiation induced degradation and brittleness of the jacket, which will crack on bending. It is recommended to use electron beam (EB) accelerators with energies NOT higher than 800 keV. Practical tests confirmed, that Electrocurtain type EB machines at 300keV with a nitrogen purged process chamber provide the best crosslinking results regarding the yield of passes after the MIL aging tests, as the radiation impact is significantly reduced with the absence of oxygen. Nevertheless the access to a 300 keV EB accelerator with N2 purged process chamber might be very limited. A conventional EB radiation unit suitable for small wire processing will work as well satisfactorily with the above given energy limitation. In addition the product handling system (under beam handling system (UBHS) as well as pay-off and take-up) has to be adapted for such small wire regarding tension control, to avoid any stretch. Beside affecting the electrical resistance, excessive tension on the drums of the UBHS can flatten out the thin insulation on one side, thus, that the breakdown voltage will drop below spec. requirement. For the very thin wall thicknesses (like on AWG 20) crosslinking with voltages over 800keV (0.8MeV) may result in (extreme) over-heating of the insulation during radiation and therefore also effecting the results during ageing. Due to this overheating, the insulation may also start to flow resulting in a reduced wall-thickness at some spots. At the very thin wall-thicknesses a 500keV–700keV shall be sufficient and avoid temperature rising of the insulation. Please note that some radiation centres and companies having a beam do use ‘cooled drums’ (for the e-beam under-handling equipment) and/or cool the wires by spraying water on it.

STORAGE INFORMATION

■ **Form & packaging**	Pellets in sizes 3mm, Octabins (250-500 kg)
■ **Shelf life**	1 year after production

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