Material properties

Polymeric materials used in cables for ships and offshore topside installations

For 25 years Draka Norsk Kabel has been facing the same challenge :

The increasing severe performance criteria demands from our ship and offshore customers.

Elastomers are the major part of our cable construction.
The insulation, bedding and sheathing have been developed through intensive research and development to meet the offshore and ship industry's specific and stringent requirements.

This information is not intended to give you details of the elastomers in use.
For correct selection and application of materials our technical representatives will be pleased to provide you with more complete information.

EP - rubber (EPDM)
EPDM is a hydrocarbon rubber that combines electrical performance suitable for fire resistant offshore cables with mechanical toughness and resistance to ozone, UV light and heat.
It's wet electrical properties are unique.

Applications : Wire insulation
Bedding compounds

Flame retardant halogen-free termoset compound (EVA)
EVA, ethylene vinyl acetate, is a multi-functional elastomer,
which resists the combined deteriorating influences of heat, oil and weather.
(In accordance with IEC 60092-359 type SHF2). For offshore applications, EVA can be compounded to produce high quality cable sheathing with low smoke and flame propagation, and with no emission of halogenous acids.

Applications : Cable sheathing on offshore oil platforms,
ships, hotels and in rooms with expensive equipment, which must not be subjected to corrosion damage.

Low smoke , Flame retardant , Halogen-free and Thermoplastic compounds , HFFR.

When PVC is not acceptable due to the problems chlorine (halogen) containing materials present in the event of a fire HFFR must be used.
(In accordance with IEC 60092-359 type SHF1).

Our HFFR materials will not propagate a fire along a cable run, drip or give off black smoke.
No acid gases will be released during a fire that can corrode and damage expensive equipment.

Applications: Cable sheating for
Rooms with IT equipment
high - rise buldings (hotels)
hospitals
Telephone exchanges
subway systems
airports and many others .

XLPE – Crosslinked Polyethylene
Polyethylene is the most used plastic material. By introducing chemical bonding between the chains in PE we get XLPE, a thermoset type of PE.
In cable insulation it is used for the excellent insulation properties , very good mechanical strength , low density and good thermal stability.

Applications : Wire insulations

Physical and chemical properties of Draka's sheathing compounds for use in offshore topside and shipboard cables

	Enhanced oil resistant EVA (SHF2)	NITRILE/PVC	PVC	HFFR (SHF1)
Mechanical properties	3 - 4	4	4	2 - 3
Weathering (O_2 -O_3)	5	4	5	4 - 3
Heat resistance	4	3	2 - 3	4
Low temperature	3	3	2	3
Hydrocarbons general	3 - 4	4	2	0
Hydrocarbons high aromatic (MUD)	3 - 4 *	4	1	0
Sea-water	3	4	4	3
Fire resistant	4	3	4	4
Oxygen Index	4(35)	3(28)	4(32)	4(35)
Smoke generation	5	2	1	5
Halogens	No	Cl	Cl	No

5 - Excellent, 4 - Very good, 3 - Good, 2 - Medium, 1 - Poor, 0 - Not recommended

* Drilling MUD is not one chemical, but a mix of different chemicals and each producer have their own composition. The sheathing material could be resistant to the aromatics in the MUD, but be affected by uther chemicals like corrosion inhibitors. Each MUD must therefore be tested for compatibility with the cable sheathing. The test method for this MUD test is descriebed in NEK 606: 2004 Third edition.

SHF1 versus SHF2

The table below addresses only some main characteristics differences. For complete information see IEC60092-359

	SHF1	SHF2
Type of material	Halogen-free Thermoplastic	Halogen-free Elastomeric or thermosetting material
Some main characteristics		
Mechanical characteristics after immersion in hot oil (IEC 60811-2-1, clause 10)* * If oil resistance is required for a halogen-free compound, SHF 2 compound is recommended.	No requirements	100 °C for 24 hours: • ±40% maximum variation in tensile strength: • ±40% maximum variation in elongation at break
Hot set test (IEC 60811-2-1, clause 9)	No requirements	200 °C, 15 min time under load with 20 (N/mm²) mechanical stress: • 175% Maximum elongation under load • 25% Maximum permanent elongation after cooling
Pressure test at high temperature IEC 60811-3-1, subclause 8.2)	80 °C, 4-6 min under load depending on cable diameter: • 50% Maximum permissible deformation	No requirements
Heat shock test (IEC 60811-3-1, subclause 9.2)	150 °C) 1h duration:	No requirements
Ozone resistance test IEC 60811-2-1, clause 8 (Alternative test method may be used in some countries for legal reasons)	No requirements	25 ± 2°C for 24 h: • Max 0,025 to 0,030 % ozone concentration (in volume)