

Cables for Oil, Gas and Petrochemical Industry

Arun THOMBRE (1), Bahaa MOURAD (1)

1 DUCAB, Dubai, UAE, arun.thombre@ducab.com, bahaa.mourad@ducab.com

Cables in Oil Gas & Petrochemical (OGP) environment are designed to face the brutal attacks of chemical products consisting of acids, bases and different hydrocarbons.

As an age old practice and established design, a seamless lead sheath in the form of extruded tube is provided over laid up cable. The chemical composition of lead is based on BS EN 12548 and the alloy requirement. The most popular alloy being PB021K (earlier known as Lead alloy E). The lead sheath thickness is arrived at as per the EEMUA 133 specification in case of LV cables and IEC 60502-2 fictitious method for MV cables. The lead sheath is acceptable practice and time tested design over the years. Being metal, lead sheath also offers conducting path to share the earth fault current when required.

Some of the clients require an alternative to lead sheath design when conducting path is not essential. In order to cater to these requests, we have come up with an alternative design. The new designed cable consist of three construction elements in layers for providing complete protection as mentioned below.

- Polymer laminated AL tape applied longitudinally to provide radial barrier for various fluids
- HDPE sheath which is resistant to inorganic chemicals and
- Polyamide sheath (also known as Nylon layer) which is resistant to organic chemicals and hydrocarbons

These three layers are applied in co-extrusion process making strong bond for fighting against chemical attacks faced in OGP environment.

Polyamide is well known for providing hydrocarbon and chemical resistance. It is suitable for functioning at cable operating temperature. It exhibits good flexural modulus and offers low permeability of hydrocarbons and fuels, maintaining the main physical and chemical properties in the finished cable.

Thus the OGP industry gets wider range of choice and cable designs for application.

These cables are designed to meet,

- IEC 60332-3 flame retardant tests in cat A / B / C as per design
- Hydrocarbon resistance
- Low toxicity

A general comparison between Lead sheathed and Polyamide sheathed cable is as per the below table

No.	Parameter	Lead sheathed cable	Poly-amide sheathed cable
1	Protection against Hydrocarbons	Yes	Yes
2	Weight	Heavier	Lighter
3	Bending radius	Little larger	Smaller as compared to lead sheathed cable
4	Electrical conducting path for earth fault	Yes, available	No, not available
5	Terminations	Standard	Standard
6	Number of layers	One	Combination of three layers

This paper will examine specific comparisons based on real cable design examples for the readers to get extra details on the two types of cable designs. Cable cross sectional drawings will be incorporated for easy comparisons.