Dow Wire & Cable is the global market and technology leader in polyolefin-based and elastomeric wire and cable materials. The company has equipped its HFDK-4201 and HFDK-4202 crosslinkable polyethylene (XLPE) insulation compounds with a very efficient antioxidant (AO) system providing excellent stability against both thermal degradation and scorch. The stabilizer allows production of extremely clean XLPE. It is compatible with PE and does not recrystallize in the end product. The result is cables without crystal contamination or sweat-out issues.

Most AOs add color to plastic when exposed to heat. The interaction of the AO and peroxide in HFDK-type XLPE generates a reddish-orange color in the molten thermoplastic material. During crosslinking, this color disappears and the material typically becomes transparent in the melt, or translucent white upon solidification.

For thick-walled cables and/or cables with higher heat exposure, a greenish-yellow color may appear. In all cases, UV light makes coloration fade.

**Color and cable appearance**

Why does HFDK-type XLPE from Dow Wire & Cable have a reddish-orange color and does it affect cable appearance?

- The peroxide induces a side reaction in the extrudate when interacting with the AO during heat exposure (compounding/extrusion/crosslinking).

- 2 to 5 ppm of non-extractable AO by-products are formed when XLPE is exposed to heat. These by-products are strong coloring agents.

- The reddish-orange color disappears when the peroxide decomposes in the continuous vulcanization tube, bleaching it to neutral or slightly greenish-yellow.

- The color is not stable and disappears when exposed to light.

**Color variation**

Different XLPE compounds exhibit different colors depending on composition. Though material coloration is often a sign that an AO is present, lack of color may be a negative sign as shown below. The barefoot low-density PE without stabilizer looks transparent but of course performs the worst.

The color of the finished cable can vary depending on its heat history. Slight differences in shade have been caused by conductor preheating settings. Or, a diffuse ring has been present in the middle of the insulation caused by quench cooling outer and inner sections with the entry heat treatment systems.

**Color and cable performance**

The coloration caused by the interaction between the AO and peroxide does not involve the polymer. The ppm level of coloring agents measured in the plastic represents a fraction of a percent of the AO, and therefore does not influence the performance of the polymer nor the AO itself. The cable life is not affected by the color.
A full range of services

Dow Wire & Cable offers more than 60 years of global industry experience. Backed by sophisticated technology and compounding facilities in Asia, Europe and the Americas, Dow Wire & Cable can efficiently leverage assets to address challenges specific to the manufacture of most types of cables. Please contact us for technology, materials, performance and service.

Innovative, technology-based solutions

Dow Wire & Cable solutions include a combination of materials from The Dow Chemical Company and its subsidiaries that exhibit mechanical strength, flexibility and aging stability. Our goal is to help provide the materials and expertise our customers and end users need to add longer life and improved performance and consistency to their systems.

Dow Wire & Cable materials are used as insulation and jacketing solutions designed to address the transmission, distribution and consumption of power, voice and data. These materials include very high standards of processability and performance, combined with a beneficial balance of properties, including excellent electrical properties and stress crack resistance and high thermal stability and toughness. You can count on Dow Wire & Cable for cleanliness, consistency, reliability, performance and quality.

Dow Wire & Cable provides solutions that are designed to address the processing and performance requirements of current and next-generation wire and cable products, along with technical support that extends from formulation through installation.

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b. use in cardiac prosthetic devices regardless of the length of time involved (cardiac prosthetic devices include, but are not limited to, pacemaker leads and devices, artificial hearts, heart valves, intra-aortic balloons and control systems and ventricular bypass-assisted devices);

c. use as a critical component in medical devices that support or sustain human life; or

d. use specifically by pregnant women or in applications designed specifically to promote or interfere with human reproduction.

Additionally, all Products intended for use in pharmaceutical applications, other than pharmaceutical packaging, must pass the then current Pharmaceutical Liability Guidelines.

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Color Indicates Presence of Antioxidants in XLPE Insulation Compounds