

Hypalon® is the DuPont® trademark for chlorosulfonated polyethylene (CSPE) synthetic rubber. It was a common high-performance material used as insulation and jacket material for various wires and cables. Its thermal, mechanical and electrical characteristics offered many benefits for specialized and unique applications.

HISTORY OF HYPALON

Hypalon was born when polymer chemistry efforts to produce a material superior to natural (polyisoprene) and butyl rubber resulted in the very useful CSPE synthetic rubber. In 1951, DuPont began to market CSPE under the Hypalon name, referring to the group of sulfur and peroxide cured elastomers created from chlorinated polyethylene (CPE) and CSPE. [1] These polymers are manufactured to produce an elastomer with a completely saturated backbone and side groups suitable for different methods of vulcanization. **Figure 1** shows the basic structure of the polyethylene chain that the chlorine and sulfur atoms modify to form cross-linked CSPE molecules.

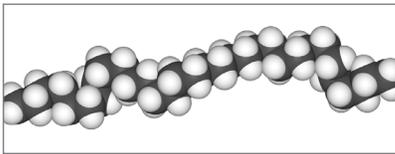


Figure 1 Structure of base Polyethylene chain

PROPERTIES

CSPE has many advantages over commonly used polymers such as polyvinyl chloride (PVC) and polyethylene (PE). One of the primary differences is that it's manufactured as a thermoset material capable of surviving thermally stressful and high-temperature environments that many common polymers would fail in. This makes it an excellent material in applications where overloaded circuits might otherwise damage plastic insulation or jacketing materials. Another inherent strength of Hypalon is its UV stability. When properly manufactured, it can withstand extended exposure to direct sunlight with limited degradation of its electrical and mechanical properties. In fact, it was very popular as a single-layer covering to protect flat roofs from the elements.

In addition to its unique UV stability, Hypalon is known for its ruggedness. Although many thermoplastic materials can be made to be very rugged, properly formulated CSPE combines the flexibility of rubber with extreme ruggedness. This makes it an ideal material for severe environments such as extra heavy-duty cord and even mining applications. Some formulations of Hypalon were so tough that they were used for gaskets and seals that experience extreme pressures during their service life.

Finally CSPE-based materials are more chemically inert than many other materials used in wire and cable. Because of this, they can be expected to survive in applications where caustic chemical exposure is probable, while many other common materials would fail in a matter of years, days or even minutes.

DISCONTINUATION

Hypalon had specific formulation requirements that are now either legally restricted or avoided as a part of good design practice. Even though thermoset CSPE materials won't melt in high-temperature environments, they will eventually ignite and burn. The gases produced during combustion of CSPE have varying levels of toxicity. Such toxic gases have been the subject of scrutiny in some segments of the industry. In addition, Hypalon often contains additives made from lead or lead compounds, a material well known for its dangers and restrictions.

The environmental pressures, high manufacturing costs, hazardous nature of manufacturing the product, as well as commercial pressures all probably contributed to DuPont's decision to discontinue the production of their Hypalon products. With much consideration, they announced the discontinuation of Hypalon production at the end of June 2009.^[2]

SO WHAT ARE THE ALTERNATIVES?

Even though DuPont discontinued Hypalon, CSPE is still available from several reputable sources. It's also important to point out that there are compounds that perform similarly to CSPE without some of the drawbacks, and many large users have already transitioned without skipping a beat. Over the last several decades, there have been innovations in other materials that can now provide performance on par with CSPE. In fact, users that specify Hypalon in their products will realize very little impact aside from updating their specifications. Manufacturers have taken one of two paths to resolution: 1) they are switching to other suppliers of CSPE materials that don't use the trade name Hypalon; or 2) they are switching to other materials such as thermoset CPE, which offers performance characteristics very similar to those offered by CSPE. Most manufacturers have worked out their transition plans in a way that users of CSPE products will generally not be able to identify any difference in terms of performance, feel or product ratings regardless of the resolution path chosen by the manufacturers.

^[1] DuPont Hypalon® 40S Data Sheet, Rev. 3, Nov. 2002

^[2] Dupontelastomers.com Press Release, May 7, 2009



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