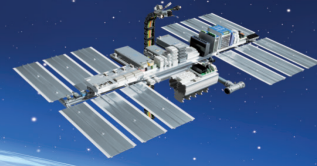


# Efficiency in Automation

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## How NFPA 79 2018 Edition Affects VFD Cables

There may be different perspectives on what a VFD cable construction should look like, but the common consensus is that VFD applications do not require just any power cable but rather a cable specifically designed for this application.

There are multiple industry standards for VFD cable and as a result you will find many different designs in the market. Many manufacturers have shifted their focus to the insulation material, and indeed, the dielectric of the insulation plays a key part in designing a VFD cable that works properly.

You may ask yourself what can happen if it doesn't work? Well, for starters, it can cause your VFD to malfunction or create high cable charging currents wasting energy due to heat dissipation.

In some cases, a bad VFD cable can cause complete system failure and ultimately premature cable breakdown at which point it becomes a safety hazard.

Therefore, VFD cable has been receiving more attention lately and several entities are working on improvements and new standards. One important standard is the "NFPA 79 Electrical Standard for Industrial Machinery" which is updated every 3 years by the National Fire Protection Agency (NFPA). The new version for 2018 is currently being finalized and includes a significant change for VFD cable to be used on machinery within an NFPA 79 environment.

Article "4.3.2.8 Circuits Supplied From Power Conversion Equipment" in the NFPA 79 2018 Edition states:

*"Electrical conductors and equipment supplied by power conversion equipment as part of adjustable speed drive systems and servo drive systems shall be listed flexible motor supply cable marked RHH, RHW, RHW-2, XHH, XHHW, or XHHW-2" \**

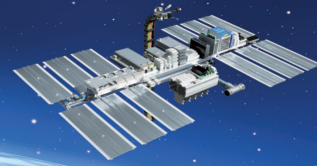
\* Source: NFPA.ORG NFPA79 2018 archived revision information.

It could be easy to overlook this information, as the new article appears in Chapter 4 "General operating conditions" and not in Chapter 12 "Conductors, Cables and Flexible Cords" where one would usually find cable related information. However, since the issue is caused by the power conversion inside a variable speed drive (aka VFD, VSD etc.) and not necessarily by the cable, Chapter 4 may be the appropriate location.

This language is most likely aiming to increase safety by reducing the use of thermoplastic wiring material that is not capable to withstand the output voltages and currents from a VFD utilizing pulse width modification. Thermoplastic insulation, such as PVC/Nylon, can create problems, for example, in moist environments or in longer cable runs from VFD to motor. The dielectric properties of PVC cause high cable capacitance leading to high charging currents; the low voltage breakthrough resistance can lead to corona discharge and the potential for shorting out the cable. Additionally, thermoplastic PVC can melt and be deformed when exposed to heat generated by short circuits.

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## How can you make sure to comply with this article 4.3.2.8?

Simply check the cable print legend or specification sheet for the correct nomenclature. If the cable is a UL listed type cable, there should be information about the insulation available. Look for the designations “RHH, RHW, RHW-2, XHH, XHHW, or XHHW-2” or XLPE.

Make sure to specify the insulation types “RHH, RHW, RHW-2, XHH, XHHW, or XHHW-2” to be used. These are common designations in the USA and all of them refer to Thermoset material per UL 44.

## What do these designations mean?

XLPE	Cross Linked Polyethylene is a thermoset insulation material
RHH	Rubber High Heat resistant
RHW	Rubber Heat and Water resistant
RHW-2	Rubber Heat and Water resistant 90°C dry and 90°C wet locations
XHH	Crosslinked (Polyethylene) High Heat resistant
XHHW	Crosslinked (Polyethylene) High Heat and Water resistant
XHHW-2	Crosslinked (Polyethylene) High Heat and Water resistant 90°C dry and 90°C wet locations

Informational note: Even though the “R” stands for “Rubber”, the designation includes other thermoset materials such as XLPE, SBR, CPE and others.

## What should be avoided?

THHN	Thermoplastic High Heat resistant, Nylon coated
T...	Any designation beginning with T is Thermoplastic and should be avoided
Material not disclosed	Special care should be taken with undisclosed materials and cables that are not listed, including cables that are only rated type AWM (appliance wiring material per UL 758).

## How does it affect me if I use LUTZE DRIVEFLEX® Cables?

If you use LUTZE DRIVEFLEX® VFD cables you don't have to worry. All products within the DRIVEFLEX® series are made with XLPE insulation of type XHHW-2 or RHW-2 depending on model. This means that LUTZE DRIVEFLEX® cables are already compliant with the requirements in article 4.3.2.8 NFPA 79 2018 Edition.

Please contact LUTZE for further information at 1-800-447-2371.

Please also read our publication “Best insulation material for VFD cable” for more information.

*Editorial note: The article number was corrected in this version. A prior version stated the article number incorrectly as 4.4.2.8.*



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