

HIGH-TEMPERATURE WIRE

Cables can be installed in environments with harsh conditions and high ambient temperatures, but selecting the right cables for the correct environmental conditions is essential to ensure the cable's expected life span will not be affected. The use of wire and cable products outside their designed temperature range can result in premature and often expensive failures in service.

UNDERSTANDING HIGH-TEMPERATURE WIRE

High-temperature wire is often defined as a wire with a temperature rating of 125°C or higher, although high-temperature can also refer to temperature ratings as low as 90°C. High-temperature cables can either be single-conductor or multiconductor. These products commonly consist of a conductor (usually annealed, tinned copper, copper-plated or nickel-coated copper) and insulation. High-temperature wires may also have an additional jacket consisting of a fiberglass braid or K-fiber material.

Two key components to ensure high-temperature wires are suitable for the application are the wire's temperature rating and ampacity. Temperature ratings can be defined as the maximum continuous temperature that a wire can withstand during its lifetime. If a cable's temperature rating is not suitable for the environment and ambient temperature, the expected lifespan of the cable could be affected.

The ampacity is the maximum current an insulated conductor can safely carry without exceeding its insulation and jacket temperature limitations. If the cable is undersized, the heat produced by circuit load may exceed the cable's temperature rating and the cable may be compromised. For more information, please see [Anixter's Wire Wisdom Wire and Cable Ampacity Rating](#).

HIGH-TEMPERATURE CABLE STANDARDS

High-temperature wire can be classified as Appliance Wiring Material (AWM) meeting UL 758 Appliance Wiring Materials. Even though AWM wires are not considered to be "UL Listed" products, they are Recognized Components that can be used in UL Listed products. If a high-temperature wire is to be considered a UL Recognized Component, the wire follows the guidelines that are detailed by UL 758 through a UL style page. This style page lists specifications on gauge size range, insulation material, temperature rating and voltage rating. Some UL AWM styles can be dual listed with Canadian standards, such as UL AWM 3284 and CSA CL1254. For more information, please see [Anixter's Wire Wisdom Understanding and Identifying UL AWM Styles](#).

In addition to high-temperature cables meeting AWM requirements, high-temperature products can also meet and be UL Listed to the UL 83A Fluoropolymer *Insulated Wire* standard. UL 83A provides requirements on the cable's construction and test performance for high-temperature listed products. Performance tests include long-term aging of insulation and insulation resistance testing.

THE DIFFERENT STYLES OF HIGH-TEMPERATURE WIRE

Due to the wide range of temperature ratings and applications available for high-temperature wire, there are many different agency approvals available. High-temperature wires can be UL Recognized per UL 758, UL Listed per UL 83A or meet CSA standards.

Table 1 provides some common high-temperature wire types that meet various UL AWM Styles per UL 758 and/or CSA standards.

Trade Name	Description	Temperature	Voltage	Size	UL Styles, CSA Standards
EPDM	Ethylene propylene diene monomer	125°C to 150°C	600 V	18 AWG to 4/0 AWG	UL 3284, UL 3374; CSA 1254
SRK	Silicone rubber with a K-fiber jacket	200°C	600 V	18 AWG to 4/0 AWG	UL 3071, UL 3074, UL 3075, UL 3125, UL 3126; CSA SEW-2 3410
TGGT	PTFE/glass	250°C	600 V	24 AWG to 4/0 AWG	UL 5256, UL 5196
EPDM	Ethylene propylene diene monomer	125°C to 150°C	600 V	18 AWG to 4/0 AWG	UL 3284, UL 3374; CSA 1254

Table 1 – Common UL Style High-temperature Wire Types

In addition to the AWM high-temperature wires, Table 2 provides examples of UL Listed high-temperature wires per UL 83A.

UL Listed Name	Description	Temperature	Conductor Metal	Size	Voltage
FEP	Fluorinated ethylene propylene	90°C (200°C special applications)	Soft-annealed copper	14 AWG to 2 AWG	600 V
PFA	Perfluoroalkoxy	90°C (200°C special applications)	Soft-annealed copper	14 AWG to 4/0 AWG	600 V
TFE	Tetrafluoroethylene	250°C	Nickel-coated copper or nickel-base alloy	14 AWG to 4/0 AWG	600 V
ZW	Ethylene Tetrafluoroethylene	90°C (150°C special applications)	Soft-annealed copper	14 AWG to 2 AWG	600 V

Table 2 – UL Listed High-temperature Wire Types

APPLICATIONS OF HIGH-TEMPERATURE WIRE

As mentioned above, high-temperature wire can be found in environments with elevated temperatures and harsh conditions. These applications commonly include motor leads and internal wiring of appliances, such as refrigeration equipment, heat pumps, clothes dryers, lighting fixtures, commercial and industrial ovens, room cooler units and electrical ranges. High-temperature wire can also be found in steel mills, glass plants and chemical plants.

Table 3 provides common applications where high-temperature wires are commonly installed. Depending on the application, further information such as UL listings, cable size and other environmental conditions may be required to select the correct product.

High-Temperature Application	°C	°F	Wire Trade/Listed Name
Apparatus and Motor Lead Wire	150	302	SRG
	200	392	SRK, FEP
	250	482	TGGT, TKGT
	450	842	MG
Appliance and Fixture Wire	150	302	SRML, SF-2, SEW-2
	250	482	TGGT, TKGT, TFE
	450	842	MG, MGT
Control Cable	200	392	SRGK, SRGT, SRK
	250	482	TKGT, TKGK
Heating Cable	200	392	PFA
	450	842	MG
Instrumentation Cable	250	482	TKGT, TKGK
Power Cable	200	392	SRGK, SRGT, SRK, FEP, TFE, PFA
	250	482	TKGT

Table 3 – High-temperature Wire Applications

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