

# Thermoset vs. Thermoplastic INSULATION

A few factors make Cross-link products (XHHW-2, USE-2, RWU) different than THHN-2/THWN. THHN-2/THWN uses a thinner PVC insulation, which can lead to current leakage and breakdown from chemical or environmental exposure. Crosslink products have XLPE insulation instead of PVC, which is more resistant to chemicals, ozone and abrasions. THHN-2/THWN emits a toxic smoke when burned and is less flexible at cold temperatures than XHHW-2.

	<b>THHN-2/THWN</b> <i>Thermoplastic<sup>2</sup> Insulation</i>		<b>XHHW-2</b> <i>Thermoset<sup>1</sup> Insulation</i>	
<b>VOLTAGE</b>				
<b>Voltage Rating</b>	600V		600V/1kV (dual rated)	
<b>Dielectric Withstand Test, Water</b> (14AWG - 750Kcmil)	1.5kV - 3.5kV		3.0kV - 6.0kV	
<b>Dielectric Constant</b> (Hospital Grade must be 3.5 or less)	5.0 - 6.8		3.1	
<b>INSULATION RESISTANCE (Minimum)</b>				
<b>UL Required Insulation Resistance</b>	225 - 665 MegΩ		645 - 2,875 MegΩ	
<b>Actual Insulation Resistance</b> (typical)	300 - 700 MegΩ		100,000 MegΩ	
<b>Insulation Resistance</b> (after 12 week test)	0.85 MegΩ		100,000 MegΩ	
<b>Size</b>	<b>Insulation</b>	<b>Jacket</b>	<b>Insulation</b>	<b>Jacket</b>
14-12	15 mils	4 mils	30 mils	0 mils
10	20 mils	4 mils	30 mils	0 mils
8-6	30 mils	5 mils	45 mils	0 mils
4-2	40 mils	6 mils	45 mils	0 mils
1-4/0	50 mils	7 mils	55 mils	0 mils
250-500	60 mils	8 mils	65 mils	0 mils
600-750	70 mils	9 mils	80 mils	0 mils
<b>TEMPERATURE</b>				
<b>Maximum Temperature</b>	90°C Dry, Damp or Wet		90°C Dry, Damp or Wet	
<b>Minimum Temperature<sup>2</sup></b>	-10° C		-40° C	
<b>Emergency Overload Temperature</b>	105° C		130° C	
<b>Maximum Short Circuit Temperature</b>	150° C		250° C	
<b>OTHER PROPERTIES</b>				
<b>Crush Test Minimum</b> (14AWG)	225 lbs.		1200 lbs.	
<b>Sunlight Resistance</b>	2AWG & Larger		14AWG & Larger	

<sup>1</sup>Thermoset: A material that has been vulcanized by heat or other means and is substantially infusible and insoluble.

<sup>2</sup>Thermoplastic: A material that can be softened repeatedly by heating, and that can stiffen at temperatures lower than 10°C.

- Thermoplastic not recommended for DC applications.

Resistance: Based on 1000' in water. A higher resistance is desirable.

Comparison information gathered from NEC, UL 44, UL 83, and other industry standards.