Terminal Industry Approvals

DFARS Symbol Agency Spec/File Number Requirement Applicable Products

- Canadian Standards Association C22.2 No.65 –
- US Defense Federal Acquisition Regulation Supplement
- European Directive 2002/95/EC Restriction on Substances
- Underwriters Laboratories, Inc. UL 486 A/B – KYNAR Ring Terminals
- American Bureau of Shipping Steel Vessel Rules
- Institute of Electrical and Electronics Engineers IEEE std 323-2003
- Berry Amendment
- Nuclear Power Stations
- AS 7928 Class I and Class II
- Approved for listing on QPL
- Special Metals

KYNAR is a registered trademark of Atofina Chemicals, Inc.

For more information or by phone: 800-777-3300 and reference TMSG07
### Insulation Descriptions

- **Fully Insulated Nylon**
- **Nylon**
- **Vinyl**

**circuit protection**

**installation, no short**

**Non-Insulated**

**networking applications**

**electrical, industrial, and materials to meet a full range of industry approved styles, sizes, and**

Panduit offers a broad selection of **Comprehensive WireTerminal Solutions**

- **Polypropylene**
- **corrosion protection**
- **KYNAR***
- **corrosion protection**
- **Heat Shrink**

are present when no dielectric barriers

- **flammability and halogen free, best**

- **Fully Insulated Premium Nylon**

are present when no dielectric barriers

- **dielectric strength**

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## Terminal Industry Approvals

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Agency</th>
<th>Spec/File Number</th>
<th>Requirement</th>
<th>Applicable Products</th>
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<td>UL</td>
<td>Underwriter’s Laboratories, Inc.</td>
<td>UL 486 A/B – E28716</td>
<td>Product tested for reliable and safe performance for general purpose use</td>
<td>Ring and Fork Terminals</td>
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<td>UL 319 – E767227</td>
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<td>ABS</td>
<td>American Bureau of Shipping</td>
<td>ABS/08-31-2006</td>
<td>Product tested for reliable and safe performance in marine and offshore environments</td>
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<td>DFARS</td>
<td>US Defense Federal Acquisition</td>
<td>Title 10 - Section 3003f. The Navy's Programmed Environmental Control System (EPICS)</td>
<td>Rate the use of various metals manufactured outside of the United States</td>
<td>All Terminals</td>
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<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
<td>IEEE std 320-2003</td>
<td>Needs criteria for use in harsh high-voltage environments in nuclear power plants</td>
<td>KYNAR® Ring Terminals</td>
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<td>US</td>
<td>US Department of Defense</td>
<td>MIL-SPEC-13059A</td>
<td>Approved for testing on GPL, Air Force Class I and Class II</td>
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<td>RoHS</td>
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<td>2002/95/EC</td>
<td>Restriction on Hazardous Substances</td>
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## Material Selection Criteria*

<table>
<thead>
<tr>
<th>Insulation Material</th>
<th>Vinyl</th>
<th>Nylons</th>
<th>Polypropylene</th>
<th>Copper</th>
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<tr>
<td><strong>Compositions</strong></td>
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<tr>
<td>Chlorinated Polyvinyl</td>
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<td>Polyolefin</td>
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<td>Polyamide</td>
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<td>Polyethylene fluoride</td>
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### Mechanical Properties

<table>
<thead>
<tr>
<th></th>
<th>Tensile Yield Strength</th>
<th>Tensile Modulus</th>
<th>Impact Resistance</th>
<th>Density</th>
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<tbody>
<tr>
<td></td>
<td>6.8 kpsi</td>
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<td>29.9 ft-lb/in</td>
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<tr>
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<td>94.0 kpsi</td>
<td>102 kpsi</td>
<td>63.0 ft-lb/in</td>
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<tr>
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<td>102 kpsi</td>
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<td>65 lb/ft³</td>
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<tr>
<td>Nickel</td>
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### Electrical Properties

<table>
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<tr>
<th></th>
<th>Electrical Resistance</th>
<th>Dielectric Strength</th>
<th>Maximum Operating Temperature</th>
<th>Minimum Operating Temperature</th>
<th>Minimum Installation Temperature</th>
<th>Fluorinility</th>
<th>Solid Temperature</th>
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### Thermal Properties

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<th>Minimum Operating Temperature</th>
<th>Minimum Installation Temperature</th>
<th>Fluorinility</th>
<th>Solid Temperature</th>
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<tr>
<td>Vinyl</td>
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<td>45°F</td>
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<tr>
<td>Polypropylene</td>
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<tr>
<td>Copper</td>
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<td>45°F</td>
<td>-62°F</td>
<td>70°C</td>
<td>650°F</td>
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<tr>
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### Chemical Resistance

<table>
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<th>Acids</th>
<th>Bases</th>
<th>Chlorinated Hydrocarbons</th>
<th>Hydrocarbons</th>
<th>Solvents</th>
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<td>Nylons</td>
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<tr>
<td>Copper</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Brass</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Iron</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nickel</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*The information above is intended to be used for comparison between choosing the appropriate terminal as most of the values are taken from raw material and not the finished part.

**Key**

- Best
- Better
- Good
- Worse
- Worst

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4
## Insulation Descriptions

Electrical, industrial, and materials to meet a full range of industry approved styles, sizes, and

### Panduit Offers

A broad selection of comprehensive wire terminal solutions

#### Polypropylene

- Corrosion protection
- Flame retardant
- Halogen free
- Best when no dielectric barriers are present

#### KYNAR®

- Corrosion protection
- Resistance to radiation and moisture
- High dielectric strength

*KYNAR® is a registered trademark of Atofina Chemicals, Inc.*

#### Heat Shrink

- Non-insulated
- Short circuit protection

### Insulation Material Base Metal Plating

**Insulation**

- Polypropylene
- Nylon
- Premium Nylon
- Kynar Heat Shrink
- Polypropylene

**Base Metal**

- Copper
- Brass
- Iron
- Copper
- Tin
- Nickel

### Mechanical Properties

- **Tensile Strength**
  - 17.9 ft lb/in
  - 112.5 ft lb/in
  - 125.6 ft lb/in
  - 3.9 ft lb/in
  - 12.6 ft lb/in
  - 65.6 ft lb/in
  - 92.0 ft lb/in
  - 31.7 ft lb/in

- **Yield Strength**
  - 465 kpsi
  - 450 kpsi
  - 399 kpsi
  - 190 kpsi
  - 0.5 kpsi
  - 260 kpsi
  - 17,260 kpsi
  - 16,000 kpsi
  - 17,000 kpsi
  - 7,200 kpsi
  - 32,000 kpsi

- **Tensile Modulus**
  - 6.9 kpsi
  - 11.9 kpsi
  - 13 kpsi
  - 6.8 kpsi
  - 1.5 kpsi
  - 5.9 kpsi
  - 38 kpsi
  - 62 kpsi
  - 63 kpsi
  - 2.0 kpsi
  - 78 kpsi

### Thermal Properties

- **Maximum Operating Temperature**
  - 220°F
  - 220°F
  - 220°F
  - 300°F
  - 255°F
  - 200°F
  - 300°F
  - 300°F
  - 300°F
  - 300°F
  - 650°F

### Electrical Properties

- **Dielectric Strength**
  - 450 V/Mil
  - 550 V/Mil
  - 500 V/Mil
  - 280 V/Mil
  - 500 V/Mil
  - 580 V/Mil
  - N/A
  - N/A
  - N/A
  - N/A
  - N/A

- **Electrical Resistivity**
  - 1x10^25 nΩ m
  - 1x10^25 nΩ m
  - 5x10^21 nΩ m
  - 1x10^24 nΩ m
  - 16.78 nΩ m
  - 78 nΩ m
  - 32 nΩ m
  - 115 nΩ m
  - 69.3 nΩ m

### Mechanical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
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<td>Tensile Modulus</td>
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<td>17,000 kpsi</td>
<td>7,200 kpsi</td>
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<tr>
<td>Tensile Strength</td>
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<td>65.6 ft lb/in</td>
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<td>31.7 ft lb/in</td>
<td>94.0 ft lb/in</td>
<td>62.0 ft lb/in</td>
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### Summary

- **Mechanical Properties**
  - Tensile Yield Strength
  - Tensile Modulus
  - Density

- **Thermal Properties**
  - Maximum Operating Temperature

- **Electrical Properties**
  - Dielectric Strength
  - Electrical Resistivity

- **Material Selection Criteria**
  - The information above is intended to be used for comparison between choosing the appropriate terminal as most of the values are taken from raw material and not the finished part.

### RoHS Compliance

- Yes

### Halogen Free

- Yes

### Fire Resistance

- V0 HB V2 V0 HB HB N/A N/A N/A N/A N/A

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<tr>
<th>Property</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
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<td>Water Absorption</td>
<td>1x10^25</td>
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<td>Dielectric Breakdown</td>
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<td>N/A</td>
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</tbody>
</table>

### Notes

- The data provided is for comparison purposes and may vary based on the specific terminal type.
- Consider the environmental conditions when selecting the appropriate terminal.
- Consult the material specifications for detailed information.
**Tools To Complete Your Termination System**

**Controlled Crimp Cycle Tools** – CT-1000, CT-1020, CT-1050, CT-1370
- Controlled cycle mechanism ensures high quality, consistent terminations
- Terminal tongue locator controls both the depth and rotation position of connectors into the crimp site to optimize pressure and provide high performance and quality
- Ergonomic tool design assures operator comfort, safety, and performance
- Cushion handles provide chemical resistance and a cushioned, non-slip grip

**Hand Operated Pliers Type Crimp Tools** – CT-100A, CT-250, CT-290
- Installer controlled crimp
- Available with wire stripping and cutting features
- Phan type crimp for #20 – 10 AWG insulated and non-insulated terminal products

**Battery Powered Crimp Tools** – CT-2089 and CT-2600
- Quick crimping cycle results in fast time to crimp-terminate
- Compact, portable, and lightweight (less than 4 lbs.) construction allows simple one-handed crimp capability in space constrained areas
- The CT-2089 has interchangeable crimp dies for connectors #20 – 10 AWG
- The CT-2600 has interchangeable crimp dies for connectors #6 – 2 AWG

**Pneumatic Crimp Tool** – CT-48A-A
- Quickly crimps a variety of loose piece terminals in a variety of wire sizes for medium volume production
- Versatile interchangeable crimping heads let you switch terminal types quickly to meet changing production requirements; the tool, when used with only four crimp heads, can crimp a full range of #10 – 10 AWG insulated and non-insulated terminal products
- Portable – the small size, ease of bench mounting and quick pneumatic connection allow the tool to be moved from one work station to another or to the work itself

**Automated Crimp Tools** – Supplies, and Applicators – UC300 (DP-01), CA8, SCA-712022002 (C410)
- Provide a superior solution for quality, high volume terminations
- Minimal cycle time and most consistent quality
- Quick exchange of die sets and product loading for minimal setup times
- System leverages industry standard mini applicator mount for seamless compatibility with Automatic Wire Processing (AWP) equipment