

NWI CATALOG

★ *Made in the USA*



PRODUCTS

Wire + Cable
Retractiles
Assemblies
Connectors
Harnesses



SERVICES

Contract Manufacturing
Injection Molding + Overmolding
Original Design Manufacturing
Original Equipment Manufacturing

www.northwire.com

Why NWI?

Quotes in 24 Hours or Less

Same Day Custom Products

Any Volume

Rapid Prototyping

Personalized Service Excellence



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Product Categories

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84	UL 2250 Instrumentation Tray Cable
88	UL 13 Power-Limited Tray Cable
90	UL 1277 Tray Cable
92	UL 1569 Metal-Clad Cable
94	UL 2277 Flexible Motor Supply Cable Wind Turbine Tray Cable
96	CSA C22.2 No. 239 Control and Instrumentation Cables CSA 22.2 No. 230 Tray Cables
98	UL 1309 CSA 245 Marine Shipboard Cable
100	UL 1426 Electrical Cables for Boats
102	UL 2571 Irrigation Feeder, Control and Signal Cables
104	UL 444 CSA 214 Communications Cable
106	UL 758 Appliance Wiring Material UL 1581 UL 2556 Test Protocols
118	Hybrid and Electric Vehicle Cables
120	UL 62 Flexible Cords and Cables
124	UL 66 Fixture Wire
126	UL 83 CSA 75 Thermoplastic-Insulated Wires and Cables
128	UL 1063 Machine Tool Wires and Cables
130	UL 44 Thermoset-Insulated Wires and Cables
132	UL AWM STYLE 21048 CSA AWM C22.2 No. 210
134	 ASSEMBLIES

➤ We complement your business with custom quality products and on time delivery so you can focus on your core business.



Meeting your demands.

Katina E. Kravik
– CEO and Owner



➔ WE APPRECIATE YOUR BUSINESS. Our entire Team is committed to providing a level of **customer care** that matches our industry leading quality standards, rapid response manufacturing and on time delivery. For more than 4 decades, we've focused on meeting your most demanding challenges. Our Team takes great pride in being your full service **innovative solutions** provider. Here to serve you with extended customer service hours, meetings in person, facility tours, and more, whatever your needs – any volume. Let us know what we can do for you today.

Customers demand robust **product innovation**. Our engineering initiatives in research and development and new product development generated 563 new engineering designs and developed 77 new materials in the past 2 years. With almost 1,200 years of tenured expertise, our Team delivers to your requirements. Contact us today for your custom engineered solution.

Today's business challenges require that you demand more from your **strategic partnerships**. That's why we offer quotes in 24 hours or less, same day custom products, any volume, rapid prototyping and service excellence. As your premier partner for the design and manufacture of custom technical wire, cable and retractiles, we're pleased to meet your needs for assemblies, connectors and harnesses.

Focused on manufacturing expertise for more than 40 years, **we complement your business with custom quality products and on time delivery so you can focus on your core business**. To fully optimize your business, we understand that there are times when you need to free your resources or balance capacity demands. Now you can depend on us to be your manufacturing expert for all of your contract manufacturing needs.

CUSTOMERS

Customer Testimonials

Testimonial:

Background: First-time customer, international manufacturer of interconnect technology

Name: Duncan Rowe **Company:** Connector Technology Ltd.

Quote: "I'd like to take this opportunity to compliment and thank you all for your very pleasant and efficient service... In our twenty odd years of importing electronic connectors and cables, our recent experience with Northwire, Inc. was second to none. We experienced very rare, high levels of service and attention to detail. The process from initial enquiry to receipt of the goods was faultless. Quotes, drawings and final delivery were on time, as promised, despite numerous specification changes and requests for comparison quotes... We believe Northwire, Inc. has established a wonderful culture of customer service and we look forward to all future dealings with them."

Testimonial:

Background: Multi-billion dollar international manufacturer of sophisticated equipment for harsh environments

Title: Engineer

Quote: "Just wanted to say thank you for the service that you and Northwire do for us. The trust that we have in our vendors is crucial for us especially when there is the chance of our customers name coming into play."

Testimonial:

Background: First-time customer, publicly traded, leading design and manufacturer, of surgical systems

Title: Supplier Quality Assurance

Quote: "...word is out about Northwire's capabilities and others are asking for quotes on some of their projects."



Testimonial:

Background: Assembler of harness and specialty accessories for hazardous locations and extreme temperature applications

Title: Buyer

Quote: "Thank you for a great service, it's always appreciated."

Testimonial:

Background: Leading international supplier of components for power systems

Title: Buyer

Quote: "[We] have been doing business with Northwire since 1991. During this time, Northwire has provided us with excellent customer service, timely and reliable information and quality products. They have met our expectations in regards to communication and quality. I do not hesitate to recommend Northwire as a supplier."

Testimonial:

Background: Celebrated expert in her field of innovative spa treatments

Title: CEO

Quote: "Appreciate the good service and attention to detail."

Testimonial:

Background: Specialty supplier of flexible, robotic and automation wire and cable products

Title: National Sales Manager

Quote: "Thanks also for the "Blue Sparkle" sample of cable, as I mentioned I have been in the industry for 30 years starting as a QC inspector...inspecting Northwire cable, and have never seen anything like that. Things have come a long way."



Testimonial:

Background: 25-year industry veteran, manufacturer of connectivity solutions

Title: Purchasing

Quote: We exceeded customer's expectations when our NWI Express Design-to-Deliver in 5 Days or Fewer delivery made it to the customer in 4 days, the customer responded, "You have just become my very best friend."

NWI EXPRESS
5 Days Design to Deliver

Velocity



Value



TWIST LOCK

1" MAX

35°

SOLDER TO CUSTOMER CONNECT

PREMOLD AROUND PINS

DUSTIN

{ Millions Of OEM Direct Solutions }

Made in the USA for more than 4 decades, Northwire's driven to deliver more value with velocity in **diverse applications** for life sciences, energy, government, industrial, machine vision, lighting, underwater and beyond.

As your **premier partner** for the design and manufacture of custom technical wire, cable and retractiles, we're pleased to meet your needs for assemblies, connectors, harnesses and contract manufacturing.

Northwire's committed to delivering products you need, to meet **your requirements**, in the manner you prefer – Catalog, Online and Custom Solutions.



> Catalog

Select from more than 500 Products, Use the Tool Box and Explore our Contract Manufacturing Services.

> Online

Shop Online, Live Chat, Find Technical Resources, Conversion Charts and much, much more. **northwire.com**

> Custom Solutions

Contact us today and our **expert design team** will guide you through the selection of more than 7,000 standard products. With millions of custom options available, rely on our subject matter experts to navigate complex domestic and international standards, agency compliance, environmental regulations and electrical, mechanical, ergonomic, aesthetic, harsh duty and end-user requirements.



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Company Overview

{About Us}

➔ FOUNDED IN 1972, NORTHWIRE-NWI LAB360 is a privately held, woman-owned small business. **We are your premier partner for the design and manufacture of custom technical wire and cable, retractiles, assemblies, connectors, harnesses and contract manufacturing for diverse applications in life sciences, energy, government, industrial and more.** NWI Lab360 leverages professional certifications in Six Sigma®, Lean, Project Management and the American Society for Quality to optimize design, manufacturing and quality to achieve the highest quality and shortest lead times for any volume.

Northwire is ISO 13485:2003 and ISO 9001:2008 certified and is engaged in professional company-wide certifications. Our quality control laboratory is qualified by CSA International to ISO 17025. This laboratory subjects our products to tests that surpass real-world conditions, including the extremes of bending, flexing, flame, impact, crush, oil and temperature resistance and more. ITAR registered, Northwire's CAGE Code is 7V821. Northwire also maintains various UL, CSA, cUL, CE, NFPA, IEEE, SAE, MSHA, ABS and many more approvals and works closely with strategic supply chain partners to offer FDA and USP approved and RoHS2 and REACH compliant and food grade materials.



Quotes in 24 Hours or Less

{Customer Offerings}

Committed to providing you with the highest level of service excellence, Northwire invites you to attend a **Lunch and Learn!** Simply call or click, and tell us what you and your staff would like presented. We'll come to your facility to meet your Lunch and Learn requests ranging from new product information, green technologies, next generation assemblies and everything in between. Ask customer care to schedule your Lunch and Learn today – *at your facility or ours.*



Melissa – Customer Care

Speaking of facilities, are you interested in touring our factories?

Always tour ready, we invite you to schedule a **Factory Tour** and experience climate controlled, state of the art manufacturing. We know you are busy and may not have time in your schedule to personally visit, so trust the 20-year veteran producer of the international hit show on the Discovery Channel, "How It's Made" when he said, "This is the cleanest facility I have ever seen."

Watch Northwire on Discovery Channel's "How It's Made."

– available at www.northwire.com/videos



Our Team appreciates his accolades and the thousands of referrals we have received over the years, and want to take this opportunity to say **THANK YOU**. **Did you know that Northwire has a Referral Program?** As a sign of our genuine appreciation of your referrals and loyalty, we'd like to send you a gift or make a donation to a charity of your choice. Talk with customer care to learn more about our referral program and the rewards of partnering with Northwire.

Want more information about Northwire and NWI Lab360? Sign up today for the **eCurrent newsletter** and receive up-to-date news featuring new products, meet our team, current copper updates and much more! Published digitally twice a month, available in English and Spanish, conveniently delivered to your email address.

{Program Offerings}

Leveraging our manufacturing expertise for more than 4 decades, Northwire's focused on creating strategic partnerships. We complement your business with quality products and on-time delivery so you can focus on your core strengths. To fully optimize your business, we understand you must demand more from your strategic partner. Take a few moments and explore our program offerings, then call or click and tell us how we can serve you.



Product Delivery

NWI EXPRESS
5 Days Design to Deliver

Quick.

Need custom products super fast? NWI EXPRESS offers custom solutions from **Design-to-Deliver in 5 Days or Fewer!** Contact our experienced design and service team for your immediate needs.

NWI DIRECT
In Stock. Buy Now!

Convenient.

Order Factory-Direct wire, cable, retractiles and assemblies **online at www.northwire.com for fast delivery** from NWI DIRECT. Select from more than 500 products for same-day shipment. Simply place your order with a credit card or PayPal. Live Chat with Customer Care during extended service hours for assistance, or customize your needs with one of our design engineers today.



Ordering and delivery made easy

Custom Inventory Management and Electronic Data Interchange

Concise.

Are you interested in exploring a Custom Inventory Management solution that meets your unique needs? Contact us today and together we can create a custom program tailored specifically for you. Pick up your phone and learn about the benefits of Electronic Data Interchange. Save time and money through the electronic transmission of data between organizations and ensure accuracy. *Find out today.*



Kanban Programs

Efficient.

Working collaboratively, we'll create a flexible Kanban or custom stocking program designed specifically to meet your requirements. **Contact us to bring more efficiency and value to your business.**



Quality Management System

Proven Quality.

➔ NORTHWIRE IS ISO 13485:2003 AND ISO 9001:2008 CERTIFIED and is engaged in professional company-wide certifications in Six Sigma®, Lean, Project Management and American Society for Quality. Our quality control laboratory is qualified by CSA International to ISO 17025. This laboratory subjects products to tests that surpass real-world conditions, including the extremes of bending, flexing, flame, impact, crush, cut, abrasion, oil, chemical, UV, temperature resistance and more. Testing is conducted by third parties and are certified to meet the standards of UL, CSA, cUL, CE, MSHA, NFPA, ANSI, ABS, IEEE, SAE and more. We work closely with strategic supply chain partners to offer USP and FDA approved, RoHS2 and REACH compliant and food grade materials.

Check out Extreme Engineering Challenge videos on our website:

www.northwire.com/videos



The Underwater Retractable Cable Challenge

Witness a speed boat pull a water skier from a retractile cable in "Underwater Challenge"



K9 Crush Test

Watch a German Shepherd Police Dog attack man and cable in "K9 Crush Test"



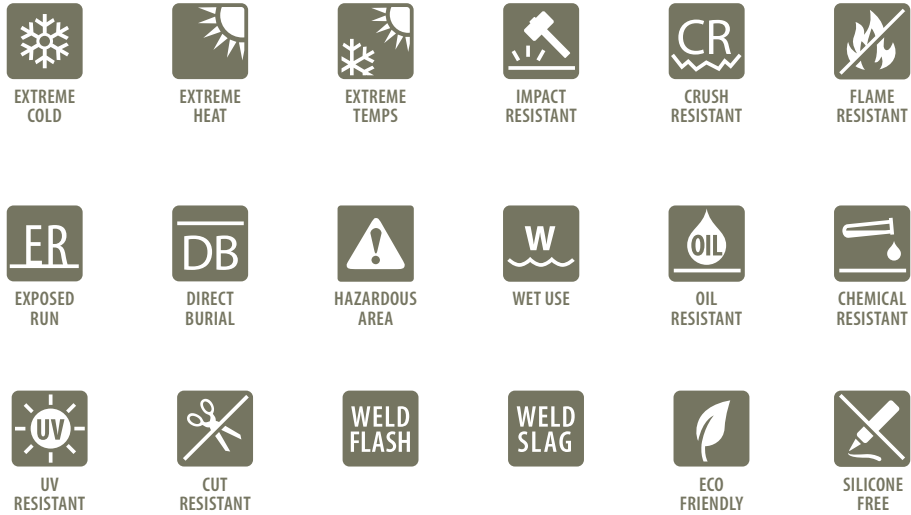
The Football 10K Pull

Find out what happens when two football teams face off in a tug-of-war against a custom stainless steel connector in "10,000 Pounds of Pull"

WANTED: EXTREME ENGINEERING CHALLENGES
– Send Us Your Most Demanding Applications!

Field proven test results

Extreme Engineering



Flex



Agency, Third Party Testing and Professional Certifications



Materials

Extreme Engineering Applications Demand Robust Material Performance.

➔ NORTHWIRE'S PRODUCTS ARE GUARANTEED TO PERFORM in dynamic conditions with temperatures ranging from -200°C to 260°C (-328°F to 500°F). Durable materials, subject to direct burial, exposed run and hazardous areas, to name a few, are required. Our materials are tested to meet the requirements of water and chemical resistance, wash down environments and multiple sterilization methods and cycles including gamma, ETO, autoclavable – *and much, much more.*

Optimize Your Offering with Premier Cable and Connector Material Selections.

Grades

- FDA approved
- Food grade
- Medical grade
- USP Class VI approved

Copper: 36 - 2 AWG

- Plating
 - High Strength Alloys
 - Nickel
 - Silver
 - Tin
- Stranding
 - Bunched
 - Concentric / Unilay
 - Rope Lay
 - Unilay
 - and more...

Breather Tubes

- Nylon
- PE (Polyethylene)
- PUR (Polyurethane)
- PVC (Polyvinyl chloride)

Fillers

- PP (Polypropylene)
- PES (Polyester)
- Nylon
- Cotton
- Paper

Shielding

- Aluminum Foil Tape
- Aluminized Polyester Tape
- Braid
 - Basket Weave
 - Spiral
 - Serve
- Tinned copper
- Stainless Steel

Strength Members

- Aramid Fiber
- Carbon Fibers
- Flame Resistant Meta-Aramid Fiber
- Galvanized Carbon Steel
- Glass Fibers
- Glass Reinforced Plastic

Tapes / Wraps

- FEP (Fluorinated Ethylene Propylene)
- Foam PP (Polypropylene)
- Paper
- PES (Polyester)
- PTFE (Polytetrafluoroethylene)
- Spun Nylon

Water Blocking

- Conductors
- Fillers
- Tapes

Extrusion and Molding Materials

- Fluoropolymers
 - ECTFE (Ethylene Chlorotrifluoroethylene)
 - ETFE (Ethylene Tetrafluoroethylene)
 - FEP (Fluorinated Ethylene Propylene)
 - PFA (Perfluoroalkoxy)
 - PVDF (Polyvinylidene Fluoride)
- PE (Polyethylene)
 - Foam XLPE (Cross-Link)
 - HDPE (High Density)
 - LDPE (Low Density)
 - LLDPE (Linear Low Density)
 - MDPE (Medium Density)
 - XLPE (Cross-Link)
- PES (Polyester)
- PP (Polypropylene)
 - Foam
 - FRPP (Flame Resistant)
- PUR (Polyurethane)
- PVC (Polyvinyl chloride)
 - Flexible
 - Semi-Conductive
 - SR (Semi-Rigid)

- TPE (Thermoplastic Elastomer)
- TPR (Thermoplastic Rubber)

Connectors

- Amp
- Amphenol
- Deutsch
- FCI
- Hirose
- Intercontec
- ITT/Cannon
- JST
- Kobiconn
- LEMO
- Molex
- Norcomp
- Pass and Seymour
- Pomona
- Tyco

Terminations

- Conformal coatings
- Epoxy
- Hand Crimp
- Insulation Displacement
- Pneumatic Crimp
- Potting
- Solder

Concerned about chemical substances?

NWI offers materials free of:

- PVC
- Latex
- Silicone
- BPA
- ADM
- Heavy Metals
- PFOA
- PFOS

Check out Inside
Business report for
our Green Technologies
– available at www.northwire.com/videos

Environmentally Friendly

➔ NWI'S INDUSTRY LEADING GREEN CHEMISTRY and **environmentally preferred purchasing** program of raw materials and compounds complies with global initiatives that include REACH, RoHS2, IEC, LSZH and HFFR. Our **PVC free** options do not contain bromines, chlorines, phthalates or DEHP. Select from compounds with characteristics that are non-toxic, irritant free, zero bio-burden, FDA, USP and food grade compliant.

Our products come in many colors, but in essence each one is green. That's because we have demonstrated a strong **commitment to sustainability** throughout our more than 40 year history and are recognized as an industry leader in PVC free product offerings. Our company philosophy is grounded in longevity with an emphasis on customers, team members and strategic supply chain partners for life, and a longstanding commitment to community support. Our dedication to the life of the planet and all its inhabitants is evident throughout every aspect of NWI's operation.

NWI continually explores new ways to realize a strong environmental commitment in each of its facilities to **reduce our environmental footprint**. To save energy, we have integrated state-of-the-art lighting in our production facilities with motion sensing lighting in all offices. Every facility meets Clean Air Act standards and passes third party approval tests for compliance with state indoor-air quality requirements. In addition,



NWI implements WEEE (waste electrical and electronic equipment) standards, and our future building expansion plan incorporates measures to gain LEED certification credits.

NWI employs Lean manufacturing and 5S programs to organize its team members and work flow for **maximum efficiency**, improved productivity and waste reduction. NWI's facilities operate at optimal levels to reduce energy consumption and minimize the number of startups and shutdowns. Our process water is tested and treated to control bacteria and pyrogen levels—both to meet our customers' needs and to provide a healthy working environment.

Our focus on a green future is evident in the innovative products NWI manufactures for applications that **serve green markets** such as: electric vehicles, solar, wind generation, low voltage lighting, wastewater treatment, in situ monitoring, leak detection and water quality testing. This same ingenuity was used to develop cable for a product that helped save whales trapped under the ice in Alaska.

At NWI, we **think globally, act locally** and **save significantly**. A majority of NWI team members live in close proximity to our facilities and offices, which helps support our efforts to reduce fuel consumption. And whenever possible, our services, products and equipment are purchased regionally, to reduce transportation waste.

NWI has a long history of environmental responsibility. It shows in the many measures we are taking today to **preserve** and **protect** our planet's resources. Looking to the **future**, we will continue to seek ways to improve sustainability even more. Our dedication to this principle is your assurance that regardless of the Northwire products you purchase—and despite the color—they will always be as green as we can possibly make them.

Standards

Innovative Solutions Meeting Your Demands.

➔ NWI IS YOUR SOURCE FOR CUTTING EDGE TECHNOLOGY. Contact our engineers to optimize your existing design and leverage our experts to aid your best in class solutions utilizing next generation materials and manufacturing techniques. With more than 40 years of design and manufacturing experience, you can rely on our subject matter experts to navigate complex domestic and international standards, agency compliance, environmental regulations and electrical, mechanical, ergonomic, aesthetic, harsh duty and end-user requirements.

Environmental



REACH

EPA

Agency, Third Party Testing and Professional Certifications



ANSI®

CSA®



CE®

NEC®



IEEE®



ISO®

DOL



IEC®



EPA



OSHA

MSHA®



USCG

TIA®/EIA®



FDA

U.S. Pharmacopeia

ASQ®

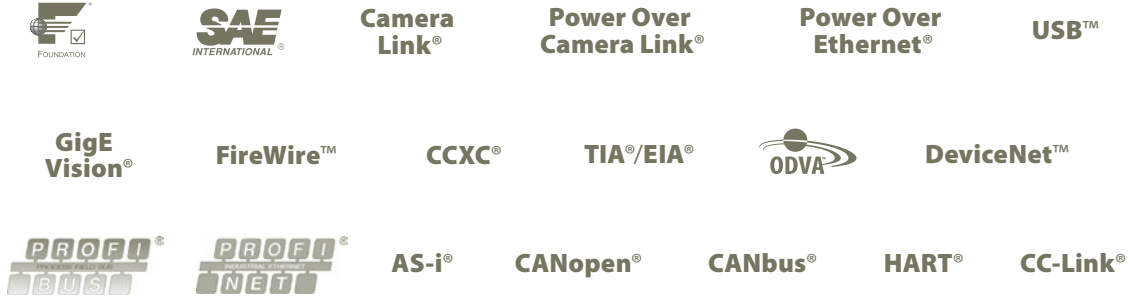
AWS®

PMI®

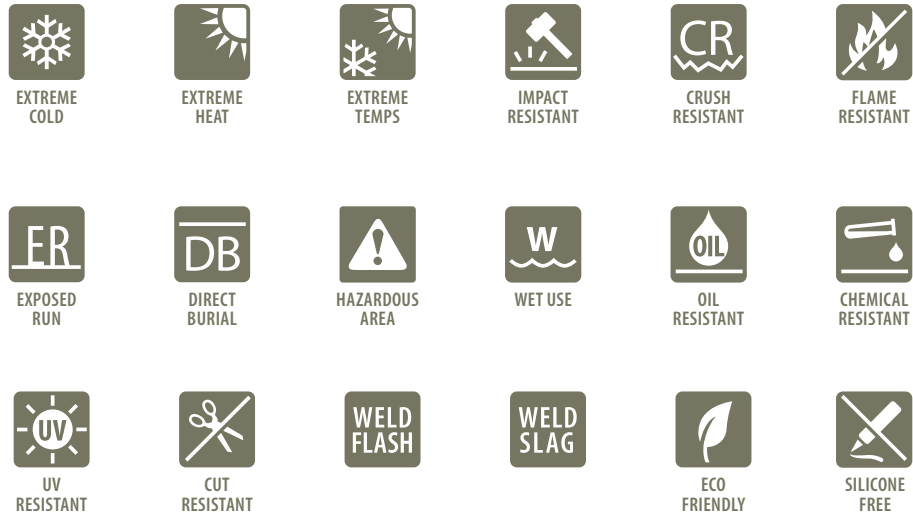
SME®

SMEI®

Product



Extreme Engineering



Flex



Get your products with standard lead times of 10 to 15 days or 5 days or fewer with NWI EXPRESS!

NWI EXPRESS
5 Days Design to Deliver

With an enterprise comprised of 2 regional locations, 200,000 sq/ft of manufacturing and engineering services, combined with more than 40 years of experience building custom products in the US, our team looks forward to delivering your specifications from *Concept to Completion*.

Talk directly to an expert

800.468.1516

+1 715.294.2121



Linda – Design Engineer



Locations

Shorten your supply chain with worldwide OEM direct sales, products and services. Rapid response solutions from our 2 convenient regional locations featuring 200,000 sq/ft of state-of-the-art manufacturing and engineering services.

New Mexico

Optimally sited just north of the US and Mexico border, our Santa Teresa, **New Mexico** manufacturing facility just outside El Paso, Texas, **rapidly responds to customers** in the Maquiladora and Borderplex Regions in the Southwest US, Mexico and South America.

Wisconsin

Featuring 115,000 square feet of state of the art, **climate controlled manufacturing**, our North American Headquarters are ideally situated within an hour's drive of the Twin Cities of Minneapolis and St. Paul, in Osceola, **Wisconsin**. With the fastest nationwide delivery, we expedite to Canada, Alaska and the rest of the world.



Same day shipment

Contact us.
We're here for you!

Contact Us



Connect with us!

USA 800.468.1516

+ 1 715.294.2121

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Wisconsin

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Engineering & Sales**

110 Prospect Way
Osceola, WI 54020

Phone 715.294.2121

Fax 715.294.3727



New Mexico

**Manufacturing,
Engineering & Sales**

11 Earhardt Way
Santa Teresa, NM 88008

Phone 575.874.2000

Fax 575.874.1555

Our Product Family is Constantly Evolving.

Product Families

{ Wire, Cable + Retractable }

{ Assemblies, Connectors + Harnesses }

{ Contract Manufacturing Services }

- Lab360 Powered by NWI

Contact us to learn more!

Product Families

Our Team leverages professional certifications in Six Sigma®, Lean, Project Management and the American Society for Quality to optimize design, manufacturing and quality to achieve the highest quality and shortest lead times – for any volume.

➔ NORTHWIRE'S QUALITY MANAGEMENT SYSTEM, third party testing and certifications ensure that each and every product requirement meets Agency Compliance standards, including various UL, CSA, cUL, IEEE, SAE, MSHA, ABS approvals and more. In addition, we work closely with strategic supply chain partners to offer USP and FDA-approved, RoHS2 and REACH compliant and food grade materials.

Designed and built to meet your exact requirements, NWI's state of the art manufacturing and climate controlled facilities produce 100% of our products – from standard applications to engineering extremes. Our manufacturing capabilities include extrusion, braiding, cabling, injection molding, assemblies, connectors, harnesses and contract manufacturing.



{Wire, Cable + Retractable}

For your convenience, you can shop by approval, application or industry and select from hundreds of products in our catalog or on-line. If you prefer, call or click to contact us for all of your custom requirements. So, whatever your preference, NWI is here to serve you for all of your needs from 36 AWG – 2 AWG up to 2,000V.

{Assemblies, Connectors + Harnesses}

Driven by the performance of our technical cable, Northwire's Machine Vision Endurance products, now available in a catalog for the first time, will save you money. Leveraging the next generation of design and simulation capabilities that were used to engineer the innovative design and superior functionality of our Endurance assemblies, you'll collaborate with our designers in SolidWorks 3D for complex designs, mold designs and tooling. We'll improve communication, increase technical abilities and optimize design through Finite Element Analysis, Mold Flow Modeling and Extrusion Flow Modeling. Our disciplined use of these engineering applications ensure that your custom assemblies, connectors and harnesses are perfectly suited to meet your exact requirements.

Our Capabilities

Design

- SolidWorks 3D parametric modeling
- SolidWorks 3D parametric simulation and design validation
- AutoCAD 2D drafting
- SolidWorks 3D, Plastic Mold Flow Modeling
- Injection Molding
- SolidWorks 3D, Finite Element Analysis

Injection Molding Equipment

- Pyramid 10 ton shuttle table
- Gluco 10 ton shuttle table, 2 ounce shot, vertical injection, vertical clamp
- Toshiba, 190 ton clamp, 16 ounce shot, horizontal injection, horizontal clamp

Assembly

- Schleuniger, computer controlled cut and strip cable machine
- Artos, computer controlled cut and strip machine
- AM All-around jacket strippers
- Schleuniger Insulation strippers
- Label printers
- Shrink tube printers
- Molex K-presses
- AMP K-presses
- Cirris programmable electrical testers

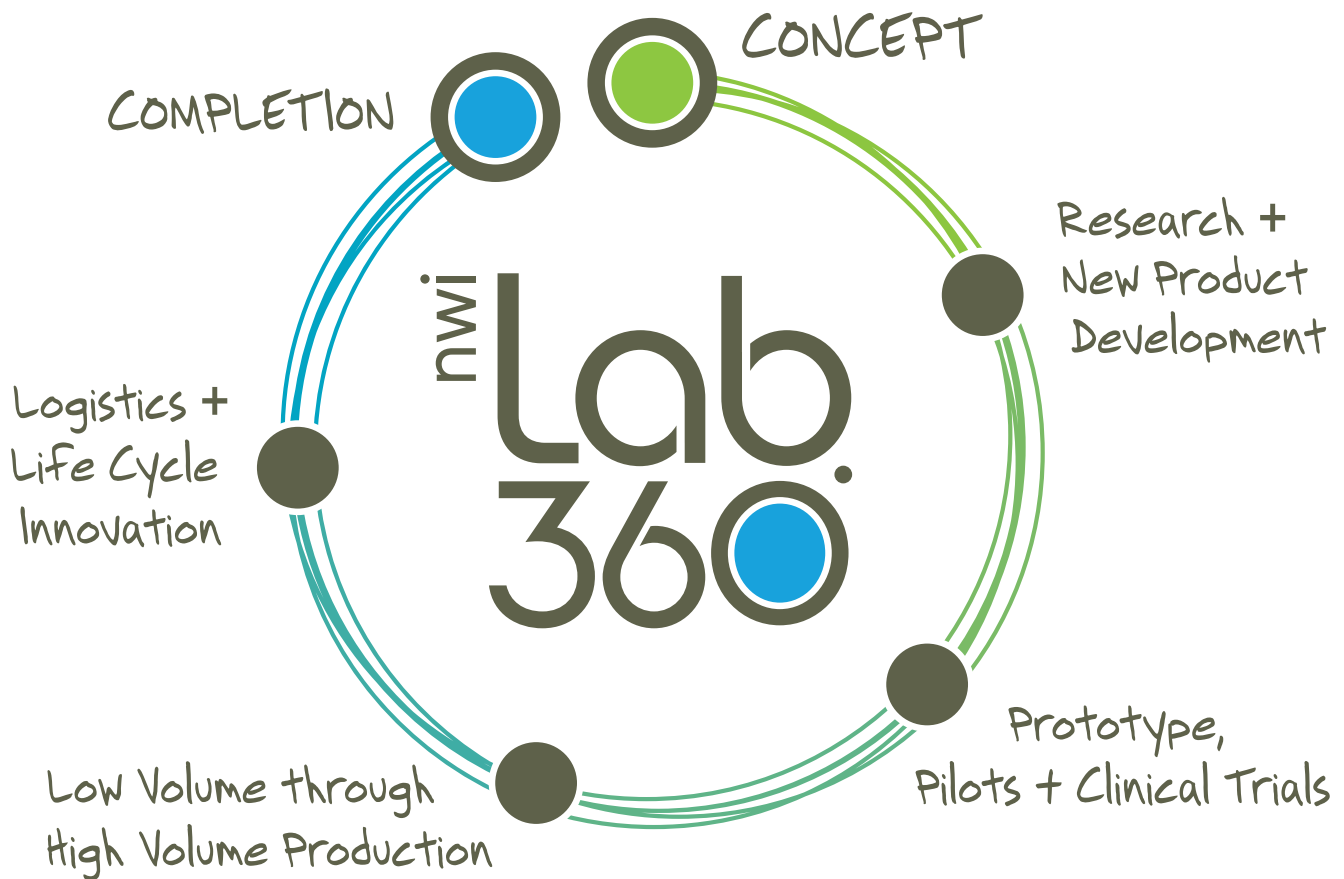
{Contract Manufacturing}

Made in the USA for more than 4 decades, NWI is focused on manufacturing expertise. We complement your business with quality products and on-time delivery so you can focus on your core strengths. To fully optimize your business, we understand you must demand more from your strategic partner. When you need to free up your resources or balance capacity demands, now you can depend on your manufacturing expert for all of your contract manufacturing needs. And now, for added efficiency and convenience, we are pleased to introduce NWI Lab360, *your one-stop full service contract manufacturing provider.*

Need an innovative solution or custom design from manufacturing professionals? From Concept to Completion, NWI Lab360 is your contract manufacturer for Research and New Product Development, Pilots and Clinical Trials, Low Volume through High Volume Production, Logistics and Life Cycle Innovation. **Send your idea to Lab360 today!**



Our Disciplined Engineering Process:



Your idea. Done.



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58	INDUSTRIAL
58	ITC PLTC
60	Variable Frequency Drive
62	UNDERWATER
66	ARCHITECTURAL LIGHTING
68	RETAIL
70	LOAD CELL
72	SIGNAL, CONTROL + COMMUNICATION
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74	DataCELL® J1939 J1128
76	DataCELL® Field CANopen® ODVA™ DeviceNet™ Cable
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102	UL 2571 Irrigation Feeder, Control and Signal Cables
104	UL 444 CSA 214 Communications Cable
106	UL 758 Appliance Wiring Material UL 1581 UL 2556 Test Protocols
118	Hybrid and Electric Vehicle Cables
120	UL 62 Flexible Cords and Cables
124	UL 66 Fixture Wire
126	UL 83 CSA 75 Thermoplastic-Insulated Wires and Cables
128	UL 1063 Machine Tool Wires and Cables
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132	UL AWM STYLE 21048 CSA AWM C22.2 No. 210
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Product Categories

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Custom, Hybrid + Composite

Custom Technical Cable Engineered to Your Specifications.

NWI leads the industry in fast turnaround, with delivery of bulk cable and retractile cable from Design-to-Deliver in 5 Days or Fewer with no minimum order length or quantity requirements. NWI offers free design and rapid prototyping services to encourage customers to explore innovative solutions.

Numerous Options for Maximum Performance.

To exceed your expectations and conform to your exact specifications, NWI offers a wide range of cable options:

Grades

- FDA approved
- Food grade
- Medical grade
- USP Class VI approved

Copper: 36 - 2 AWG

- Plating
 - High Strength Alloys
 - Nickel
 - Silver
 - Tin
- Stranding
 - Bunched
 - Concentric / Unilay
 - Rope Lay
 - Unilay
 - and more...

Breather Tubes

- Nylon
- PE (Polyethylene)
- PUR (Polyurethane)
- PVC (Polyvinyl chloride)

Fillers

- PP (Polypropylene)
- PES (Polyester)
- Nylon
- Cotton
- Paper

Shielding

- Aluminum Foil Tape
- Aluminized Polyester Tape
- Braid
 - Basket Weave
 - Spiral
 - Serve
- Tinned copper
- Stainless Steel

Strength Members

- Aramid Fiber
- Carbon Fibers
- Flame Resistant Meta-Aramid Fiber
- Galvanized Carbon Steel
- Glass Fibers
- Glass Reinforced Plastic

Tapes / Wraps

- FEP (Fluorinated Ethylene Propylene)
- Foam PP (Polypropylene)
- Paper
- PES (Polyester)
- PTFE (Polytetrafluoroethylene)
- Spun Nylon

Water Blocking

- Conductors
- Fillers
- Tapes

Extrusion and Molding Materials

- Fluoropolymers
 - ECTFE (Ethylene Chlorotrifluoroethylene)
 - ETFE (Ethylene Tetrafluoroethylene)
 - FEP (Fluorinated Ethylene Propylene)
 - PFA (Perfluoroalkoxy)
 - PVDF (Polyvinylidene Fluoride)
- PE (Polyethylene)
 - Foam XLPE (Cross-Link)
 - HDPE (High Density)
 - LDPE (Low Density)
 - LLDPE (Linear Low Density)
 - MDPE (Medium Density)
 - XLPE (Cross-Link)
- PES (Polyester)
- PP (Polypropylene)
 - Foam
 - FRPP (Flame Resistant)
- PUR (Polyurethane)

- PVC (Polyvinyl Chloride)
 - Flexible
 - Semi-Conductive
 - SR (Semi-Rigid)
- TPE (Thermoplastic Elastomer)
- TPR (Thermoplastic Rubber)

Connectors

- Amp
- Amphenol
- Deutsch
- FCI
- Hirose
- Intercontec
- ITT/Cannon
- JST
- Kobiconn
- LEMO
- Molex
- Norcomp
- Pass and Seymour
- Pomona
- Tyco

Terminations

- Conformal coatings
- Epoxy
- Hand Crimp
- Insulation Displacement
- Pneumatic Crimp
- Potting
- Solder



Cable Strength

Cable must be designed to minimize strain on the conductors to maintain power and signal performance. Adding a strength member to the cable construction is frequently the easiest and most effective way to accomplish this objective.

Strength Members

Materials

Synthetic and natural fibers are the most common, including:

- Aramid Fiber
- Carbon Fibers
- Flame Resistant Meta-Aramid Fiber
- Galvanized Carbon Steel
- Glass Fibers
- Glass Reinforced Plastic

These fibers offer effective strength to weight ratios; they are light and flexible. Other materials used for strength and support include galvanized carbon steel, carbon fibers, glass fibers and glass reinforced plastics.

Orientation

The strength members are commonly placed as a center member in a round cable and as an integral (embedded in the plastic) support member in flat constructions. Strength members can be placed throughout a round cable including outside the cable core assembly in a braid, helical or longitudinal application. A jacket is typically applied over the outside strength members.

Design Considerations

In addition to strength, flexibility, torsional balance (tendency of the cable to untwist or turn under load), cable weight, additional payload, dynamic loads, flame resistance, internal and external abrasion resistance, and temperature performance need to be considered, depending upon the application.

Mechanical Strength

- Aramid fiber materials
- Individual galvanized or stainless steel cable
- Stainless steel braiding

Tubes

- PVC, Nylon, PE and PUR breather and vent tubes

Breather tubes can be incorporated into cables:

- To allow submersed cavities, sensors and transmitters to "breathe" to the atmosphere.
- Transport inert gases in closed systems.

The breather tube is designed for durability when subjected to cold bend and mechanical tests typically specified for the cable.

The breather tubes must not be kinked. Therefore, the minimum bend radius is 10X the cable outer diameter.

Shielding

- Aluminum foil tape, braiding with tinned copper
- Stainless steel, bronze and other materials

Frequency Spectrum

- Braid or spiral/served, 30 KHz to 30,000 KHz
- Aluminum polyester tape, 25,000 KHz to 300,000 KHz

Braiding Styles

- Basket weave
- Drain wire
- Spiral
- Served



Water Blocking

- Water-blocking features can be provided in conductors, tape or fillers to prevent water migration if a cable jacket is damaged.

Jacket Material

- USP Class VI jacket materials
- Medical-grade polyurethanes
- TPEs, PVCs, Polyesters and Fluoropolymers

Custom Composite and Hybrid Options

- Subassemblies
- Electrical and fiber-optic
- Coaxial—video, high-speed data and power

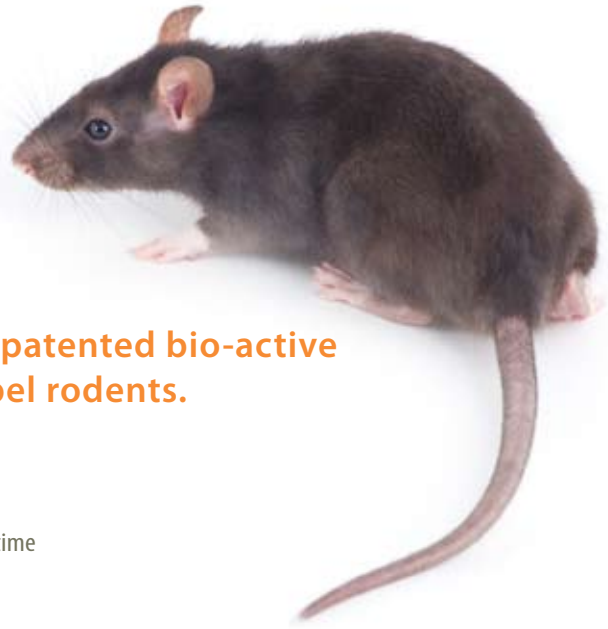
Medical Coaxial Cables

- Durable design
- 36 AWG to 24 AWG
- 1.77 dielectric or lower
- Fluoropolymer jacket
- Shield options for EMI/EMF requirements
- Foil and braid shielding
- 100% shielding coverage available

Animal Repellent

ANTI-RODENT ADDITIVES:

got rodents?



Environmentally-friendly, patented bio-active ingredients effectively repel rodents.

Safe for humans and all other animals, anti-rodent additives help you avoid:

- Safety issues
- Productivity downtime
- Equipment damage
- Loss of revenue

Rodent damage is a significant issue, according to the additive manufacturer CTECH CORPORATION:

“...forty percent of mammal species found on earth are rodents.

The bright colours and texture of polymer, the aromatic odour of polymeric products and the plasticizers used are all responsible for animals being attracted towards plastic goods. In addition, Rodentia, an order of mammals also known as rodents, is characterized by two continuously growing incisors in the upper and lower jaws which are kept short by gnawing. Thus to satisfy their own need, they hamper our living.”

Reports on extensive testing from the manufacturer demonstrate that rodent aversion technology is “designed to keep the rodents away effectively and not kill the rodents or harm any other animal.”

Talk with one of our engineers or customer care for more information about this environmentally-friendly solution to a growing problem.

40%
“Forty percent of mammal species found on earth are rodents... and they are attracted to plastics!”

– CTECH CORPORATION

Fluoropolymers

When Your Application Requires 100% Reliability.

100



NWI fluoropolymer cables offer these outstanding performance characteristics:

- Resistance to flame, acids, solvents, chemicals and more
- Miniaturization due to superior insulation characteristics
- High impact strength and abrasion resistance
- Customization, such as special colors, constructions, high speed data capability and special electrical properties
- High/low temperatures and abusive environments
- -200°C to 260°C options available

Cable options:

- FEP
- PFA
- ETFE
- ECTFE
- PVDF

Applications:

- Aerospace
- Military
- Medical
- Corrosive environment
- Waste water

Capabilities:

- Rapid prototyping
- No minimum quantities
- Guaranteed performance
- Fast delivery

Property	Test Method	FEP	PFA	ETFE	ECTFE
PHYSICAL					
Specific Gravity	ASTM D-792	2.14-2.17	2.15	1.70	1.68
Durometer Hardness (Shore "D")	ASTM D-2240	59	60	72	72
Tensile Strength psi Min.	ASTM D-412	2700-3100	4000	6000	7000
Elongation % Min.	ASTM D-412	250-300	300	150	260
Environmental Stress Cracking	–	Good	Excellent	Good	Good
Abrasion Resistance	–	Fair	Good	Excellent	Fair
Cut-Through Resistance	–	Fair	Fair	Excellent	Excellent
Water-Resistance	–	Excellent	Excellent	Excellent	Good
THERMAL					
Maximum Operating Temperature °C	–	200	260	150	150
Brittle Temperature, 50% Non-Failure, °C	ASTM D-476	-80	-200	-80	<-76
Flame Resistance, LOI	–	95	>95	30-32	52
ELECTRICAL					
★ Dielectric Constant @ 1 MHz	ASTM D-150	2.1	2.06	2.6	2.57
★ Dissipation Factor @ 1 MHz	ASTM D-150	0.0006	0.0001	0.007	0.013
Volume Resistivity ohm-cm	ASTM D-257	>2x10 ¹⁸	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵
★ Dry Dielectric V/mil	ASTM D-149	1200	2000	1100-1300	500
★ Wet Dielectric V/mil	ASTM D-149	1000	–	1000	–

★ *Cost competitive custom options available*

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Competitively priced and designed to meet or exceed the industry standard, we manufacture products to your exact specification. Our J1939 delivers consistent, reliable performance for your sophisticated, ruggedized data network and dependability in light and heavy duty, on and off-road trucks and trailers, construction and agricultural equipment and implements.

Products

CUSTOMER SPECIFIC PRODUCT

PART NUMBER	FJ1939182-005	FAWM182-088N	FAWM183-155	FAWM182-087N	FCAB183-027N	FJ1939202-001
FEATURES						
Signal	✓	✓	✓	✓	✓	✓
Control	✓	✓	✓	✓	✓	✓
Instrumentation	-	-	-	-	-	-
ATTRIBUTES						
Low-Temperature Rating	-40°C	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C	-40°C
High-Temperature Rating	125°C	105°C	80°C	80°C	105°C	125°C
Flame Resistant	FT1	UL 1581 Section 1061, FT1	UL 1581 Section 1061, FT1	UL 1581 Section 1061, FT1	UL 1581 Section 1061, FT1	UL 1581 Section 1061, FT1
Wet Location Use	✓	✓	✓	✓	✓	✓
Oil Resistant	✓	✓	✓	✓	✓	✓
Chemical Resistant	✓	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓	✓
Weld Flash Resistant	✓	-	✓	✓	✓	✓
Weld Slag Resistant	✓	-	✓	✓	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE						
UL	-	✓	✓	✓	-	-
ANSI	-	✓	✓	✓	-	-
CSA	-	✓	✓	✓	-	-
CE	-	✓	✓	✓	-	-
NEC®	-	-	-	-	-	-
NFPA 79	-	-	-	-	-	-
RoHS2	✓	✓	✓	✓	✓	✓
REACH	✓	✓	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:
 - Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available



FEATURES:

- Signal
- Control
- Instrumentation

Designed to withstand the rigors and extreme bending requirements of your material handling equipment, select from products that were custom engineered to meet or exceed your exacting specifications.

Specifically designed for tough plant environments, our rugged ODVA DeviceNet™ cable meets or exceeds the standards. Delivers consistent, reliable performance for your sophisticated industrial networking solutions. Select from Special Thin and Custom High Flex options engineered for your next project.

FJ1939182-001	FJ1939202-002	FJ1939182-002	FAWM204-049	FAWM206-017	FPLTC224-006	FAWM164C-013	FCL224C-007
					ODVA™ DeviceNet™ Special Thin	ODVA™ DeviceNet™ Custom High Flex	ODVA™ DeviceNet™ Thin
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
-	-	-	-	-	✓	✓	✓
-40°C	-40°C	-40°C	-40°C	-40°C	-25°C	-25°C	-25°C
125°C	125°C	125°C	80°C	80°C	80°C	80°C	80°C
FT1	FT1	FT1	FT2	FT2	★	★	★
✓	✓	✓	✓	✓	-	-	-
✓	✓	✓	✓	✓	-	-	-
✓	✓	✓	✓	✓	★	★	★
✓	✓	✓	✓	✓	-	-	-
✓	✓	✓	✓	✓	-	-	-
✓	✓	✓	✓	✓	★	★	★
-	-	-	✓	✓	✓	✓	✓
-	-	-	✓	✓	✓	✓	✓
-	-	-	✓	✓	✓	✓	✓
-	-	-	✓	✓	✓	✓	✓
-	-	-	-	-	✓	✓	✓
-	-	-	-	-	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓

EXTREME ENGINEERING:



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Continued

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PART NUMBER	FJ1939182-005	FAWM182-088N	FAWM183-155	FAWM182-087N	FCAB183-027N	FJ1939202-001	FJ1939182-001		
	Type-Tough (TPR Jacket)	PVC	Type-Tough (TPR Jacket)	Type-Tough (TPR Jacket)	TPE Jacket	Type-Tough (TPR Jacket)	Type-Tough (TPR Jacket)		
INSULATED CONDUCTORS									
Conductor Count	2	2	3	2	3	2	2		
AWG (mm ²)	18 (0.824)	18 (0.824)	18 (0.824)	18 (0.824)	18 (0.824)	20 (0.519)	18 (0.824)		
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	.010 (0.254)	.010 (0.254)	.010 (0.254)	.010 (0.254)	.010 (0.254)	.008 (.203)	.010 (0.254)		
Material Type	Foam XLPE	PVC	Foam PE	PE	Foamed PE	Foam XLPE	XLPE	Foam XLPE	Foam XLPE
Wall Thickness inches (mm)	.040 (1.02)	.015 (0.381)	.045 (1.14)	.016 (.41)	.040 (1.02)	.045 (1.14)	.016 (.41)	.034 (.864)	.040 (1.02)
OVERALL CABLING									
Fillers	✓	✓	✓	✓	✓	✓	✓	✓	
Shielding	✓	✓	✓	✓	✓	✓	✓	✓	
Wraps	-	-	✓	-	✓	-	-	-	
OUTER JACKET									
Material	TPR	PVC	TPE	TPE	TPE	TPR	TPR		
Color	★ Black	★ Black	★ Black	★ Black	★ Black	★ Black	★ Black		
Overall OD inches (mm)	.415 (10.54)	.235 (5.97)	.390 (9.91)	.380 (9.65)	.390 (9.91)	.315 (8.00)	.415 (10.54)		
ELECTRICAL									
Max. Operating Voltage - UL	300V	600V	600V	600V	600V	300V	300V		
DC Resistance Max mOhms/m	50	50	50	50	50	50	50		
Impedance (Ω)	120 @ 1 Mhz ± 10%	42 (Projected Impedance) ± 10%	120 Ohms @ 1 Mhz ± 10%	120 Ohms @ 1 Mhz ± 10%	120 Ohms @ 1 Mhz ± 10%	120 @ 1 Mhz ± 10%	120 @ 1 Mhz ± 10%		
Mutual Capacitance pF/ft (pF/m)	11.7 (38.4) conductor to conductor 24.4 (80) conductor to shield	50 (Projected capacitance)	11.0 (on the pair)	11.0 conductor to conductor 110 conductor to shield (Max)	11.0 (on the pair)	11.7 (38.4) conductor to conductor 24.4 (80) conductor to shield	11.7 (38.4) conductor to conductor 24.4 (80) conductor to shield		

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FJ1939202-002	FJ1939182-002	FAWM204-049	FAWM206-017		FPLTC224-006		FAWM164C-013		FCL224C-007	
Type-Cut Resistant (TPE Jacket)	Type-Cut Resistant (TPE Jacket)				ODVA™ DeviceNet™ Special Thin		ODVA™ DeviceNet™ Custom High Flex		ODVA™ DeviceNet™ Thin	
2	2	4	6		4		4		4	
20 (0.519)	18 (0.824)	20 (0.519)	20 (0.519)		22 (0.325)		16(2) - 20(2) (1.31 - 0.5)		22 (2) -24 (2) (0.325 - 0.25)	
.008 (.203)	.010 (0.254)	.009 (0.228)	.009 (0.228)		19 strand TC		19 strand TC		19 strand TC	
Foam XLPE	Foam XLPE	Polypropylene	Polypropylene	SRPVC	Data Pair - Foam Polyethylene	Power Pair - PVC	Data Pair - Foam Polyethylene	Power Pair - PVC	Data Pair - Foam Polyethylene	Power Pair - SRPVC
.038 (9.65)	.040 (1.02)	.059 (1.50)	.059 (1.50)	.059 (1.50)	.030 (0.762)	.009 (0.228)	.030 (0.762)	.016 (0.41)	.026 (0.6604)	.012 (0.305)
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-	-	✓	✓	✓	✓	✓	✓	✓	✓	✓
TPE	TPE	PUR	PUR		PVC		TPE		PVC	
★ Black	★ Black	★ Black	★ Black		★ Gray		★ Black		★ Gray	
.305 (7.75)	.415 (10.54)	.320 (8.13)	.285 (7.24)		.300 (7.62)		.380 (9.65)		.290 (7.37)	
300V	300V	300V	300V		300V		300V		300V	
50	50	-	-		-		-		-	
120 @ 1 Mhz ± 10%	120 @ 1 Mhz ± 10%	-	-		Data Pair - 120 ± 10%		Data Pair - 120 ± 10%		Data Pair - 120 ± 10%	
11.7 (38.4) conductor to conductor 24.4 (80) conductor to shield	11.7 (38.4) conductor to conductor 24.4 (80) conductor to shield	-	-		12.0 (39.4) conductor to conductor		12.0 (39.4) conductor to conductor		12.0 (39.4) conductor to conductor	

KEY:
 - Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available

Products

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CoilBoss™

Retractable Cords for Harsh Duty.

CoilBoss Retractable Cords are designed, engineered and built to deliver unsurpassed, reliable performance in the most extreme conditions. They're guaranteed to meet severe mechanical, technical and environmental demands. Ideal for manual and automatic equipment in markets that include life sciences, energy, government and industrial – for applications in handling equipment, communication devices, surgery, solar panels, robotics, architectural lighting and more – including non-electric.



300V RETRACTILE POWER CORDAGE – JACKET UL SJEOW 90°C | CSA SJTOW 90°C

AWG/Conductors	Cable OD	Coil OD	Stranding	1' (0.30 m) Retracted/ 5' (1.52 m) Extended	2' (0.61 m) Retracted/ 10' (3.05 m) Extended
18/2	0.300" (7.62 mm)	1.21" (30.73 mm)	41x34	FCOIL182-009	FCOIL182-010
18/3	0.325" (8.26 mm)	1.26" (32.00 mm)	41x34	FCOIL183-013	FCOIL183-014
18/4	0.340" (8.64 mm)	1.29" (32.77 mm)	41x34	FCOIL184-004	FCOIL184-005
18/5	0.380" (9.65 mm)	1.52" (38.61 mm)	41x34	FCOIL185-003	FCOIL185-004
16/2	0.315" (8.00 mm)	1.24" (31.50 mm)	65x34	FCOIL162-005	FCOIL162-006
16/3	0.335" (8.51 mm)	1.28" (32.51 mm)	65x34	FCOIL163-004	FCOIL163-005
16/4	0.380" (9.65 mm)	1.52" (38.61 mm)	65x34	FCOIL164-002	FCOIL164-003
14/3	0.370" (9.40 mm)	1.50" (38.10 mm)	41x30	FCOIL143-002	FCOIL143-003
12/3	0.445" (11.30 mm)	1.81" (45.97 mm)	65x30	FCOIL123-010	FCOIL123-011
AWG/Conductors	Cable OD	Coil OD	Stranding	3' (0.91 m) Retracted/ 15' (4.57 m) Extended	4' (1.22 m) Retracted/ 20' (6.10 m) Extended
18/2	0.300" (7.62 mm)	1.21" (30.73 mm)	41x34	FCOIL182-011	FCOIL182-012
18/3	0.325" (8.26 mm)	1.26" (32.00 mm)	41x34	FCOIL183-015	FCOIL183-016
18/4	0.340" (8.64 mm)	1.29" (32.77 mm)	41x34	FCOIL184-006	FCOIL184-007
18/5	0.380" (9.65 mm)	1.52" (38.61 mm)	41x34	FCOIL185-005	FCOIL185-006
16/2	0.315" (8.00 mm)	1.24" (31.50 mm)	65x34	FCOIL162-007	FCOIL162-008
16/3	0.335" (8.51 mm)	1.28" (32.51 mm)	65x34	FCOIL163-006	FCOIL163-007
16/4	0.380" (9.65 mm)	1.52" (38.61 mm)	65x34	FCOIL164-004	FCOIL164-005
14/3	0.370" (9.40 mm)	1.50" (38.10 mm)	41x30	FCOIL143-004	FCOIL143-005
12/3	0.445" (11.30 mm)	1.81" (45.97 mm)	65x30	FCOIL123-012	FCOIL123-013
AWG/Conductors	Cable OD	Coil OD	Stranding	5' (1.52 m) Retracted/ 25' (7.62 m) Extended	6' (1.83 m) Retracted/ 30' (9.14 m) Extended
18/2	0.300" (7.62 mm)	1.21" (30.73 mm)	41x34	FCOIL182-0013	FCOIL182-014
18/3	0.325" (8.26 mm)	1.26" (32.00 mm)	41x34	FCOIL183-017	FCOIL183-018
18/4	0.340" (8.64 mm)	1.29" (32.77 mm)	41x34	FCOIL184-008	FCOIL184-009
18/5	0.380" (9.65 mm)	1.52" (38.61 mm)	41x34	FCOIL185-008	FCOIL185-008
16/2	0.315" (8.00 mm)	1.24" (31.50 mm)	65x34	FCOIL162-009	FCOIL162-010
16/3	0.335" (8.51 mm)	1.28" (32.51 mm)	65x34	FCOIL163-008	FCOIL163-009
16/4	0.380" (9.65 mm)	1.52" (38.61 mm)	65x34	FCOIL164-006	FCOIL164-007
14/3	0.370" (9.40 mm)	1.50" (38.10 mm)	41x30	FCOIL143-006	FCOIL143-007
12/3	0.445" (11.30 mm)	1.81" (45.97 mm)	65x30	FCOIL123-014	FCOIL123-015

Same Day Shipment



BENEFITS:

- Design and rapid prototyping services
- Complimentary samples
- No minimum quantity orders
- Improves wiring life spans by controlling motion and distributing flex
- Thermoplastic alloy jacket material with a temperature performance rating from -50°C cold flex to 105°C.
- Resistant to water, oil, chemicals, UV light, cuts, abrasions, detergents, solvents and more
- High-quality

- Cost-effective
- Built-to-last

APPLICATIONS:

- Custom-blend jacketing options
- Available in lengths ranging from 1 foot, retracted/5 feet, extended (0.305 to 1.524 m) to 10 feet, retracted/50 feet, extended (3.05 to 15.24 m)
- Custom tangent lengths
- Variety of coil diameters
- Cable AWG ranging from 36 to 2

- 0V to 600V
- Multiple conductors (up to 100) with composite configurations, complex shielding and highly technical designs
- Custom color matching, legends, private labeling and proprietary designs are our specialty
- Tangle-resistant design provides optimum coil memory
- UL listed SJEOW and SEOW retractile power cords available in 300V and 600V custom versions in 3 days or less

NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver



600V RETRACTILE POWER CORDAGE – JACKET UL SEOW 90°C | CSA STOW 90°C

AWG/Conductors	Cable OD	Coil OD	Stranding	1' (0.30 m) Retracted/ 5' (1.52 m) Extended	2' (0.61 m) Retracted/ 10' (3.05 m) Extended
16/2	0.370" (9.40 mm)	1.50" (38.10 mm)	65x34	FCOIL162-011	FCOIL162-012
16/3	0.395" (10.03 mm)	1.55" (39.37 mm)	65x34	FCOIL163-010	FCOIL163-011
16/4	0.420" (10.67 mm)	1.60" (40.64 mm)	65x34	FCOIL164-008	FCOIL164-009
14/3	0.535" (13.60 mm)	2.29" (58.16 mm)	41x30	FCOIL143-008	FCOIL145-009
12/3	0.610" (15.49 mm)	2.44" (61.97 mm)	65x30	FCOIL123-003	FCOIL123-004
12/4	0.660" (16.67 mm)	2.54" (64.52 mm)	65x30	FCOIL124-001	FCOIL124-002

AWG/Conductors	Cable OD	Coil OD	Stranding	3' (0.91 m) Retracted/ 15' (4.57 m) Extended	4' (1.22 m) Retracted/ 20' (6.10 m) Extended
16/2	0.370" (9.40 mm)	1.50" (38.10 mm)	65x34	FCOIL162-013	FCOIL162-012
16/3	0.395" (10.03 mm)	1.55" (39.37 mm)	65x34	FCOIL163-012	FCOIL163-011
16/4	0.420" (10.67 mm)	1.60" (40.64 mm)	65x34	FCOIL164-010	FCOIL164-009
14/3	0.535" (13.60 mm)	2.29" (58.16 mm)	41x30	FCOIL143-010	FCOIL145-009
12/3	0.610" (15.49 mm)	2.44" (61.97 mm)	65x30	FCOIL123-005	FCOIL123-004
12/4	0.660" (16.67 mm)	2.54" (64.52 mm)	65x30	FCOIL124-003	FCOIL124-002

AWG/Conductors	Cable OD	Coil OD	Stranding	5' (1.52 m) Retracted/ 25' (7.62 m) Extended	6' (1.83 m) Retracted/ 30' (9.14 m) Extended
16/2	0.370" (9.40 mm)	1.50" (38.10 mm)	65x34	FCOIL162-015	FCOIL162-016
16/3	0.395" (10.03 mm)	1.55" (39.37 mm)	65x34	FCOIL163-014	FCOIL163-015
16/4	0.420" (10.67 mm)	1.60" (40.64 mm)	65x34	FCOIL164-012	FCOIL164-013
14/3	0.535" (13.60 mm)	2.29" (58.16 mm)	41x30	FCOIL143-012	FCOIL145-013
12/3	0.610" (15.49 mm)	2.44" (61.97 mm)	65x30	FCOIL123-007	FCOIL123-008
12/4	0.660" (16.67 mm)	2.54" (64.52 mm)	65x30	FCOIL124-005	FCOIL124-006

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



EXTREME ENGINEERING:



Products

RETRACTILE



EnduroFLEX®

The Longest-Lasting Flexible Cables for Automation Systems.

Robotics, automation equipment, packaging machinery and other repetitive-motion machinery destroy conventional cabling. EnduroFLEX cables are 300V and 600V dual-rated, non-paired industrial control cables built to withstand continuous bending and twisting motion.

	EnduroFLEX® XM	EnduroFLEX® CRXM	EnduroFLEX® ERP	Advanced EnduroFLEX® ERP	EnduroFLEX® M	EnduroFLEX® M/S	EnduroFLEX® I
	Continuous Flex	Cut Resistant Continuous Flex	Exposed Run Power	Advanced Exposed Run Power	Non-Shielded	Shielded	Harshest
FEATURES							
Signal	✓	✓	–	✓	✓	✓	–
Control	✓	✓	–	✓	✓	✓	–
Instrumentation	✓	✓	–	✓	✓	✓	–
Power	✓	✓	✓	✓	–	–	✓
ATTRIBUTES							
Low-Temperature Rating	-50°C	-50°C	-40°C	-40°C	-40°C	-40°C	-50°C
High-Temperature Rating	105°C	90°C	90°C	105°C	105°C	105°C	105°C
Cold Bend	-50°C	-50°C	-40°C	≤ -40°C	-40°C	-40°C	-50°C
Cold Impact	–	–	✓	✓	✓	✓	–
Impact Resistant	–	–	✓	✓	–	–	–
Crush Resistant	–	–	✓	✓	–	–	–
Flame Resistant	FT1	FT1	FT4/IEEE1202, UL1685 Vertical Tray	FT4/IEEE1202	FT1	FT1	FT2
Exposed Run Rated	–	–	✓	✓	–	–	–
Direct Burial Rated	–	–	✓	–	–	–	–
Wet Location Use	✓	✓	✓	✓	✓	✓	✓
Oil Resistant	★	★	I and II	I and II	★	★	★
Chemical Resistant	✓	✓	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓	✓	✓
Cut/Abrasion Resistant (unarmored)	–	✓	–	–	–	–	–
Weld Flash Resistant	✓	✓	–	✓	–	–	✓
Weld Slag Resistant	✓	✓	–	✓	–	–	✓
FLEXIBILITY							
Torsional Flex	20 million cycles	20 million cycles	★	1 million cycles	1 million cycles	1 million cycles	1 million cycles
Rolling Flex	20 million cycles	20 million cycles	★	1 million cycles	1 million cycles	1 million cycles	1 million cycles
Variable Flex	20 million cycles	20 million cycles	★	1 million cycles	1 million cycles	1 million cycles	1 million cycles
Bend Flex	20 million cycles	20 million cycles	★	1 million cycles	1 million cycles	1 million cycles	1 million cycles
Continuous Flex	20 million cycles	20 million cycles	★	1 million cycles	1 million cycles	1 million cycles	1 million cycles
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE							
UL	✓	✓	✓	✓	✓	✓	✓
ANSI	✓	✓	✓	✓	✓	✓	✓
CSA	✓	✓	✓	✓	✓	✓	✓
cUL	–	–	–	★	–	–	–
CE	✓	✓	✓	✓	✓	✓	✓
NEC®	✓	✓	Article 400 & 407	Article 400 & 407	✓	✓	Article 400
NFPA 79	–	–	✓	–	–	–	–
RoHS2	✓	✓	✓	✓	✓	✓	✓
REACH	✓	✓	✓	✓	✓	✓	✓

Products

HIGH FLEX LIFE

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL listed, CSA certified and approved for CE Mark and ANSI, NEC®, NFPA, RoHS2 and REACH compliant options available
- High flex life reduces plant downtime, lowers maintenance costs and increases system reliability

- Exposed Run ratings reduce installation costs by eliminating conduits
- Suitable for outdoor use, rugged crush and impact resistant options available
- Select from flame resistant, water resistant, Oil I and II, chemical, sunlight resistant weld flash and weld slag options
- Composite and custom options available
- Overmold and assembly compatible
- Retractable options available

DYNAMIC RANGE OF USE

- Extreme bend performance across wide temperature range
- Diverse applications including medical, commercial and industrial
- Robotic automation for welding, military, commercial and industrial applications
- C-Track, Dancer arms, Trolleys and Machine Tools
- Material handling and Conveyor systems
- Variable Frequency Drives (VFD)
- Flexible Motor Supply Cables



NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

	EnduroFLEX® XM	EnduroFLEX® CRXM	EnduroFLEX® ERP	Advanced EnduroFLEX® ERP	EnduroFLEX® M	EnduroFLEX® M/S	EnduroFLEX® I
	Continuous Flex	Cut Resistant Continuous Flex	Exposed Run Power	Advanced Exposed Run Power	Non-Shielded	Shielded	Harshest
INSULATED CONDUCTORS							
Conductor Count	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2-6 conductors
AWG (mm2)	26 - 18 (0.14 - 0.824)	26 - 18 (0.14 - 0.824)	18 - 8 (0.824 - 8.37)	18 - 8 (0.824 - 8.37)	26 - 18 (0.14 - 0.824)	26 - 18 (0.14 - 0.824)	18 - 14 (0.824 - 2.08)
Stranding - Minimum strands or Diameter of individual strands AWG in inches (mm)	19 Strands minimum	19 Strands minimum	★	★	7 Strands minimum	7 Strands minimum	.0063 (0.160)
Material Type	Polyester	Polyester	PVC or PVC/Nylon	PVC or PVC/Nylon	PVC	PVC	TPE
Minimum Wall Thickness Inches (in)	.008 (0.203)	.008 (0.203)	Dependent on construction	Dependent on construction	.009 (0.229)	.009 (0.229)	.030 (0.762)
OVERALL CABLING							
Fillers	★	★	★	★	★	★	✓
Shielding	★	★	★	★	★	✓	-
Armoring	-	-	★	★	-	-	-
Wraps	★	★	★	★	★	★	★
Strength Members	★	★	★	★	★	★	★
OUTER JACKET							
Material	TPE	Polyurethane	TPE	TPE	PVC	PVC	TPE
Color	★	★	★	★	★	★	★
Overall OD inches (mm)	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count
ELECTRICAL							
Max. Operating Voltage - UL	Dual voltage rating 300V and 600V	Dual voltage rating 300V and 600V	600V	600V	300V	300V	300V
DC Resistance Max	Reference UL 444	Reference UL 444	Reference UL 444	Reference UL 444	Reference UL 444	Reference UL 444	Reference UL 444
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166

Products

HIGH FLEX LIFE

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available

FLEX:



EXTREME ENGINEERING:



Machine Vision Cables

Save Money. Improve MV Performance.

Surpassing 11 million flex life cycles, our high flex life solutions for signal, control and power for industrial vision systems and camera applications are your solution when reliability is paramount and accuracy is critical. Long life expectancy saves money while cable integrity improves your MV performance.

Buy our
Endurance assemblies
for optimal
performance
Page 134

	GigE Vision® (GEV 1000) Patch Cable	Power Over Ethernet™ PoE™	FireWire™ MVC-800	FireWire™ MVC-800EL (Extended Length)	USB™	Camera Link®	Power Over Camera Link® PoCL®	CCXC® Analog
FEATURES								
Signal	✓	✓	✓	✓	✓	✓	✓	✓
Control	✓	✓	✓	✓	✓	✓	✓	✓
Power	✓	✓	✓	✓	✓	✓	✓	✓
ATTRIBUTES								
Low-Temperature Rating	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C
High-Temperature Rating	80°C	80°C	80°C	80°C	80°C	80°C	80°C	80°C
Cold Bend	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C	-40°C
Flame Resistant	FT1	FT1	FT1	FT1	FT1	FT1	FT1	FT1
Wet Location Use	✓	✓	✓	✓	✓	✓	✓	✓
Oil Resistant	✓	✓	✓	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓	✓	✓	✓
Cut/Abrasion Resistant (unarmored)	✓	✓	✓	✓	✓	✓	✓	✓
Weld Flash Resistant	✓	✓	✓	✓	✓	✓	✓	✓
FLEXIBILITY								
Torsional Flex	✓	✓	✓	✓	✓	✓	✓	✓
Rolling Flex	✓	✓	✓	✓	✓	✓	✓	✓
Variable Flex	✓	✓	✓	✓	✓	✓	✓	✓
Bend Flex	✓	✓	✓	✓	✓	✓	✓	✓
Continuous Flex	✓	✓	✓	✓	✓	✓	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE								
UL	✓	✓	✓	✓	✓	✓	✓	✓
ANSI	✓	✓	✓	✓	✓	✓	✓	✓
CSA	✓	✓	✓	✓	✓	✓	✓	✓
CE	✓	✓	✓	✓	✓	✓	✓	✓
IEEE	–	–	1394b	1394b	–	–	–	–
RoHS2	✓	✓	✓	✓	✓	✓	✓	✓
REACH	★	★	★	★	★	★	★	★
AIA	✓	✓	–	–	–	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Power

BENEFITS:

- UL listed and CSA certified and approved for CE Mark
- Compliant to IEEE, NEC®, RoHS2 and REACH Standards
- Long life expectancy saves money

- Improves your machine vision performance
- Highly resistant to water, oil, UV, abrasion and weld flash
- Flame resistant
- Hybrid, composite and custom options available
- Over-mold and assembly compatible

	GigE Vision® (GEV 1000) Patch Cable	Power Over Ethernet™ PoE™	FireWire™ MVC-800	FireWire™ MVC-800EL (Extended Length)	USB™	Camera Link®	Power Over Camera Link® PoCL®	CCXC® Analog
INSULATED CONDUCTORS								
Conductor Count Configuration	8 (4 pairs)	8 (4 Pairs)	6 (2 Pairs, 2 singles)	6 (2 Pairs, 2 singles)	4 (1 Pair, 2 singles)	22 (11 shielded pairs)	24 (11 shielded pairs, 2 singles)	8 (4 coax, 4 singles)
AWG (mm²)	24 (0.25)	24 (0.25)	22 (0.325) 26 (0.14)	22 (0.325) 24 (0.25)	22 (0.325) 26 (0.14)	28 (0.08)	28 (0.08)	24 (0.25) 30 (0.05)
Stranding - Nominal Diameter of individual strands AWG in inches (mm)	.005 (0.127)	.005 (0.127)	.0058 (0.147) .004 (0.102)	.0058 (0.147) .005 (0.127)	.0058 (0.147) .004 (0.102)	.005 (0.127)	.005 (0.127)	.005 (0.127) .0025 (0.064)
Material	Polypropylene	Polypropylene	Semi-Rigid PVC Foamed Polyethylene	Semi-Rigid PVC Foamed Polyethylene	Semi-Rigid PVC Foamed Polyethylene	Foamed Polyethylene	Foamed Polyethylene Semi-Rigid PVC	Semi-Rigid PVC Foamed Polyethylene
Insulation Wall Thickness inches (mm)	.008 (0.203)	.008 (0.203)	.006 (0.152) .015 (0.381)	.006 (0.152) .023 (0.584)	.006 (0.152) .009 (0.229)	.009 (0.229)	.009 (0.229) .006 (.152)	Insulation .006 (0.152) .019 (0.483) Sub Jacket .007 (0.178)
OVERALL CABLING								
Fillers	★	★	✓	✓	★	✓	✓	✓
Shielding	✓	✓	✓	✓	✓	✓	✓	✓
Armoring	★	★	★	★	★	★	★	★
Wraps	✓	✓	✓	✓	✓	✓	✓	✓
Strength Members	★	★	★	★	★	★	★	★
OUTER JACKET								
Material	PVC	PVC	PVC	PVC	PVC	PVC	PVC	PVC
Color	Dark Green Other Options Available	Dark Green Other Options Available	Dark Green Other Options Available	Dark Green Other Options Available	Dark Green Other Options Available	Dark Green Other Options Available	Dark Green Other Options Available	Dark Green Other Options Available
Minimum Acceptable Jacket Wall Thickness inches (mm)	.020 (0.508)	.020 (0.508)	.020 (0.508)	.030 (0.762)	.030 (0.762)	.030 (0.762)	.030 (0.762)	.030 (0.762)
ELECTRICAL								
Max. Operating Voltage - UL	30V	30V	30V	30V	30V	30V	30V	30V
DC Resistance Max	Reference UL 1581	Reference UL 1581	Reference UL 1581	Reference UL 1581	Reference UL 1581	Reference UL 1581	Reference UL 1581	Reference UL 1581
DC Resistance Nominal	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166
Ampacity	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165
Impedance Ohms	100 ± 15	100 ± 15	110 ± 6	110 ± 6	90 ± 15	100 ± 10	100 ± 10	75 ± 10
Mutual Capacitance pF/ft (pF/m)	-	-	-	-	-	15.0 ± 2 49.21	15.0 ± 2 49.21	-

FLEX:



EXTREME ENGINEERING:



Products

HIGH FLEX LIFE



ecoPOWER™ | Halogen Free Flame Retardant | Low Smoke Zero Halogen

Eco-Friendly. Ultra-Powerful.

The industry's first UL 62 listed and CSA certified 105°C Halogen Free Flame Retardant cables, power cords and retractile cables. ecoPOWER™ options include PVC free, Halogen Free Flame Retardant and Low Smoke Zero Halogen innovative solutions that protect people and the environment from harmful emissions while meeting your demanding requirements. ecoPOWER features an environmentally aligned jacket material—an alternative to PVC jacketing—that delivers superior performance. Guaranteed to perform with unparalleled durability.

	ecoPOWER™ PVC Free & HFFR	LSZH Low Smoke Zero Halogen	HFFR Halogen Free Flame Retardant
FEATURES			
Signal	–	✓	✓
Control	★	✓	✓
Instrumentation	★	✓	✓
Power	✓	✓	✓
ATTRIBUTES			
Low-Temperature Rating	-50°C	-40°C to -60°C	-40°C to -60°C
High-Temperature Rating	105°C	90°C	90°C
Cold Bend	-50°C	-60°C	-60°C
Flame Resistant	UL1581 Section 1061, VW-1, FT2	UL1581 Section 1061, VW-1, FT1, FT2	UL1581 Section 1061, VW-1, FT1, FT2
Chemical Resistant	Household chemicals	–	–
Cut/Abrasion Resistant (unarmored)	★	★	★
FLEXIBILITY			
Torsional Flex	✓	✓	✓
Rolling Flex	✓	✓	✓
Variable Flex	✓	✓	✓
Bend Flex	✓	✓	✓
Continuous Flex	✓	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE			
UL	✓	✓	✓
ANSI	✓	✓	✓
CSA	✓	✓	✓
cUL	✓	–	–
NEC®	Article 400	–	–
RoHS2	✓	✓	✓
REACH	✓	✓	✓
PVC Free	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



* Not for use with gaseous fuel-powered, engine-driven cogeneration units.

KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL 62 listed and CSA certified
- Compliant to ANSI, NEC®, RoHS2 and REACH standards
- Free of PVC, halogen donors, phthalates, bromine, chlorine and silicone and more
- Flame resistant and household chemical resistant
- Exceptional visual and tactile aesthetics
- Superior flexibility and resistance to kinks, mars and abrasion
- Lower coefficient of friction for easier installation

- Composite and custom options
- Over-mold and assembly compatible
- Retractable applications

DYNAMIC RANGE OF USE:

- Cables, power cords and retractiles
- Medical devices
- Computer and consumer electronics
- Aerospace
- Marine shipboard
- High speed rail transportation

	ecoPOWER™ SJE PVC Free & HFFR	ecoPOWER™ SE PVC Free & HFFR	LSZH Low Smoke Zero Halogen	HFFR Halogen Free Flame Retardant
INSULATED CONDUCTORS				
Conductor Count	2-6*	2 or more	2 or more conductors	2 or more conductors
AWG (mm2)	18-10 (.824 - 5.26)	18-2 (.824 - 33.6)	22-10 (.325 - 5.26)	22-2 (.325 - 33.6)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	≤14 .0049 - .010 (.125 - .254)	≤14 .0049 - .010 (.125 - .254)	≤14 .0049 - .010 (.125 - .254)	≤14 .0049 - .010 (.125 - .254)
	≥12 .0049 - .016 (.125 - .406)	≥12 .0049 - .016 (.125 - .406)	≥12 .0049 - .016 (.125 - .406)	≥12 .0049 - .016 (.125 - .406)
Material	TPE	TPE	TPE/TPU	TPE/TPU
Color	★	★	★	★
Minimum Acceptable Jacket Wall Thickness AWG in inches (mm)	18 - 14 .030 (0.76)	Dependent on construction	Dependent on construction	Dependent on construction
	12 .045 (1.14)			
	10 .060 (1.52)			
OVERALL CABLING				
Fillers	★	★	★	★
Shielding	★	★	★	★
Armoring	★	★	★	★
Wraps	★	★	★	★
Strength Members	★	★	★	★
OUTER JACKET				
Material	TPE	TPE	TPE, TPU	TPE, TPU
Color	★	★	★	★
Minimum Acceptable Jacket Wall Thickness AWG in inches (mm)	18 - 14 .030 (0.76)	Dependent on construction	Dependent on construction	Dependent on construction
	12 .045 (1.14)			
	10 .060 (1.52)			
ELECTRICAL				
Max. Operating Voltage - UL	300V	600V	300V	600V
DC Resistance Max	Reference UL 62	Reference UL 62	Reference UL 1581	Reference UL 1581
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	See Chart A, Page 165	See Chart A, Page 165	No ampacity for signal, control and instrumentation	No ampacity for signal, control and instrumentation

* Only available for ecoPOWER™ PVC Free & HFFR

FLEX:



EXTREME ENGINEERING:



Life Science

Custom Manufactured Solutions for Tomorrow's Inventions.

NWI designs and manufactures custom-configured disposable and reusable medical-grade technical and retractile cables, assemblies and connectors that are test and field proven to meet the demands of your application. Using advanced materials and manufacturing techniques, custom solutions are engineered for rigorous electrical, mechanical, ergonomic, aesthetic and environmental conditions.



BENEFITS:

- The industry's fastest delivery of custom-configured products with no minimum quantity or length requirements
- Finite Element Analysis
- Expert design and rapid prototyping services
- Design for Six Sigma®
- ISO 13485:2003 Certified
- ISO 9001:2008 Certified
- ISO 17025 Qualified by CSA International
- Reliable, consistent, high-quality products with lot traceability
- Expert guidance to navigate national and international standards, environmental and regulatory, and agency compliance
- Proprietary designs
- Private labels

ISO 13485:2003 + ISO 9001:2008 Certified, NWI works closely with strategic supply chain partners to offer USP and FDA approved, RoHS2 and REACH compliant and food grade materials.

Custom Innovations, Proven Performance

The Fastest Track to Market

NWI understands the importance of speed during the development and approval process for medical and dental equipment and life science technology. To help you accelerate this process, our rapid-response model delivers high-quality custom products fast with no minimum order quantity or length requirements.

We ensure that your product adheres precisely to your specifications, as well as the quality, performance and safety standards that are vital to the success of your application.

Medical Device Market Expertise

You can depend on NWI for consistent, durable, cost-effective, high-quality products that are test-proven to meet the demands of challenging applications with utmost reliability. We adhere strictly to your specifications. And with our reputation for service excellence, we will deliver quickly to meet even the tightest production schedules.



Exacting Performance Characteristics

NWI's products are designed, engineered, constructed and tested with the performance characteristics you specify, including:

- USP Class VI and FDA-grade and biocompatible materials
- Low bio-burden, pyrogens count and triboelectric noise-free
- One or many sterilization cycles and methods
- Continuous motion, torsional flex, bending, ergonomic demands and long flex life
- Non-toxic and irritant-free
- Silicone-free
- Color-coding for polarization
- Tactile qualities – extreme flexibility, suppleness
- Smaller bend radius
- Finishes – high gloss, satin and matte
- Low surface friction
- Low volume, low weight
- Low noise
- High mechanical strength
- Elongation and high tensile strength
- Superior lubricity
- Resistance – temperature extremes, corrosion, chemicals, water, UV light, abrasion, scrape, cut-through, kink, torsion deformation, crush, impact and more
- Internally ruggedized
- Designs to withstand cart rollover up to 2,000 lbs. (907.18 kg)
- Miniaturization
- ElectroMagnetic Interference (EMI) protection
- Radio Frequency Interference (RFI) protection
- Composite and multiconductor constructions
- Private label, legends and custom colors
- Lot traceability

Contract manufacturing

From *Concept to Completion*, NWI engineers will engage with you through every process phase from R&D, new product development, prototype, pilot models, clinical trials, low volume through high volume production, life cycle innovation and logistics.



Life Science (CONTINUED)

Medical Device Market Expertise

NWI has decades of experience developing and implementing advanced custom solutions for leading medical device companies internationally.



Reusable medical-grade cable for applications requiring multiple sterilization cycles – GAMMA, ETO AND AUTOCLAVE.



DIAGNOSTICS

- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)
- Optometric and dental
- Positron Emission Tomography (PET)
- Radiology
- Ultrasound
- Veterinary
- Video endoscopes
- X-ray
- Hand-held instruments

PATIENT MONITORING

- Blood pressure and heart rate
- Electrocardiography (ECG or EKG)
- Electroencephalography (EEG)
- Fetal
- Medical laboratory
- Pulse oximetry
- Thermometer and pyrometer

SURGICAL/LIFE SUPPORT/THERAPEUTIC

- Electrosurgical devices
- Dialysis
- Defibrillators
- Extracorporeal Membrane Oxygenation (ECMO)
- Infusion
- Laser
- Laproscope
- Medical robotics
- Surgical power tools
- Video endoscopy
- Catheter



Eco-Friendly. Ultra-Powerful.

Ideal for medical devices, the industry's first UL listed and CSA certified 105°C Halogen Free Flame Retardant and LSZH cables, power cords and retractile cables.

Concerned about chemical substances?

NWI offers materials free of:

- PVC
- ADM
- Latex
- Heavy Metals
- Silicone
- PFOA
- BPA
- PFOS

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



CSA U.S. Pharmacopeia FDA FOOD GRADE



Non-toxic
and irritant-free
disposable cable
for single
patient use

Performance Options:

CABLE OPTIONS

- 36 - 2 AWG
- Copper stranding options
 - 36 - 2 AWG (7, 19 strands or higher)
 - 18 - 16 AWG (19 strands or higher)
 - 14 - 2 AWG (41 strands or higher)
- Up to 2" (50.8 mm) O.D.
- 0V to 2000V
- -200°C to 260°C
- UL listed, CSA certified and approved for CE Mark
- RoHS2 and REACH compliant

STRANDING FOR CONDUCTORS

- Bunched
- Unilay
- Rope lay
- Concentric/Unilay
- And more

COPPER CONDUCTOR, PLATING OR COATING OPTIONS

- Temperature rated from 150°C to 260°C
- Tin
- Silver, Nickel
- High-strength alloys

FLEX

- Torsional
- Rolling
- Variable
- Bending
- Continuous

FLEX:



TORSIONAL ROLLING VARIABLE BENDING CONTINUOUS

INSULATION MATERIALS FOR INNER CONDUCTORS

PVC

- Flexible
- Semi-rigid
- Semi-conductive

Olefins

- PE (Polyethylene)
- LLDPE (Linear Low-Density Polyethylene)
- HDPE (High-Density Polyethylene)
- XLPE (Cross-Link Polyethylene)
- Foamed XLPE (Cross-Link Polyethylene)
- PP (Polypropylene)

TPE/TPR – Thermoplastic Elastomer/Thermoplastic rubber

PES – Polyester Elastomer

Fluoropolymers – High-temperature insulations

- FEP (Fluorinated Ethylene Propylene), 200°C
- ETFE (Ethylene Tetrafluoroethylene), 150°C
- PFA (Perfluoroalkoxy), 260°C
- ECTFE (Ethylene Chlorotrifluoroethylene), 150°C

MECHANICAL STRENGTH

- Aramid fiber
- Individual galvanized or stainless steel cable
- Stainless steel braiding

EXTREME ENGINEERING:



ECO FRIENDLY SILICONE FREE

TUBES

- PVC, Nylon, Polyethylene and many more options for breather and vent tubes

SHIELDING

- Aluminum foil tape
- Aluminized polyester tape
- Foil tape, braiding with tinned copper, stainless steel, bronze and other materials
- Drainwire

FREQUENCY SPECTRUM

- Braid or spiral/serve, 30 KHz to 30,000 KHz
- Aluminum Polyester tape, 25,000 KHz to 300,000 KHz

BRAIDING STYLES

- Basket weave and spiral
- Drain wire

JACKET MATERIAL

- USP Class VI approved
- Medical and Food Grade
 - PUR (Polyurethane)
 - TPR (Thermoplastic Rubber)
 - PVC (Polyvinyl Chloride)
- Fluoropolymers
- PES (Polyester Elastomer)
- TPE (Thermoplastic Elastomer)

CUSTOM COMPOSITE AND HYBRID OPTIONS

- Assemblies
- Connectors
- Electrical and fiber-optic
- Coaxial—video, high-speed data and power
- Injection molded parts

Hybrid and Electric Vehicle Cable



Compatible with UL 2594 Electric Vehicle Charging Systems.

An innovation leader, NWI offers EV Cable, a high-performance line of bulk cable, CoilBoss™ Retractable Cords and complete cable solutions for dependable power charging of electric and hybrid vehicles and other equipment.

Charging Into the Future

NWI meets your cabling requirements with design services and prototyping, expert guidance to navigate automotive and EV standards, express delivery options and no minimum quantity or length requirements.

NWI's EV Cables are guaranteed to perform with unparalleled durability. They are engineered to withstand severe temperature extremes and harsh environments, including exposure to oil, chemicals, abrasion, crushing and more.

Backed by NWI's expertise, product quality and services, EV Cables are built to last.

- UL 62 listed; compatible with SAE J1772 connectors, UL 2594 and NEC® 625 charging systems
- Available in standard straight and retractile cable or custom configurations that include composite designs, colors, private labeling, enhanced environmental or electrical performance and more
- Options include 600V EVE (TPE) and 600V EVT (PVC) cables from 18 to 2 AWG; and 300V EVJE (TPE) and 300V EVJT (PVC) cables from 18 to 12 AWG
- Standard jacket materials are exposed-run rated TPE or PVC employing PVC/nylon primaries
- Cables may include hybrid data, signal and communication cable in any AWG size
- Materials are RoHS2 compliant for EV charging stations in wet locations
- Ideal for Electric Vehicles (EV), Neighborhood Electric Vehicles (NEV), Battery Electric Vehicles (BEV), Hybrid Vehicles, Low-Speed Vehicles (LSV), Personal Electric Vehicles (PEV), Plug-in Hybrid Vehicles (PHV) and Plug-in Hybrid electric Vehicles (PHEV)
- Cables are compatible with charging applications at residences, commercial establishments, parking facilities or dedicated charging stations

For a complete solution—and the fastest delivery—turn to the innovative specialists with the technical expertise to give you the rugged cable performance you need. EV Cables from NWI offer the most reliable solutions available.

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



EXTREME ENGINEERING:



Alternative Energy

Rugged, Reliable Solutions – Guaranteed to Perform.

NWI's Resilience™ technical line of cables provide a wide variety of reliable solutions for alternative power generation including wind, hydro, solar and other renewable energy applications.

Tomorrow's Energy Requires Innovative Solutions Today



Wind

Wind Turbine Tray Cable

- WTTC Rated 1000V
- UL listed and approved for CE Mark
- High-flex cables designed to handle torsional bend, heat, oil and vibration typically found in the nacelle

EnduroFLEX® XM + CRXM

- High-flex, low-voltage control cable for the nacelle of wind turbines
- Rated for 20+ million flex cycles
- Highly oil, chemical and abrasion resistant

EnduroFLEX ERP

- Flexible power cables for wind turbines
- UL listed, CSA certified and approved for CE Mark - highly oil resistant

RIG 300™ | Extreme Frigid Flex RIG™

- Cable for offshore wind turbines
- UL listed, CSA certified and approved CEMark
- THHN/THWN -25°C
- UV rated, water resistant

ITC/PLTC Cable

- Low voltage Instrumentation Tray Cable and Power Limited Tray Cable
- Exposed Run (ER) rated for use in wind turbines



Hydroelectric

Underwater Cable for Hydroelectric Applications

- Resilience™ Hydro Cables for underwater power and control
- Designed to withstand the effects of long-term submersion in freshwater, saltwater, fluids, chemicals, solvents and more



Solar

Cable for Solar and Solar Thermal Plants

- Resilience™ Solar Cables are designed to withstand temperature extremes, outdoor / harsh weather environments, UV, water, oil, chemicals and more
- UL listed, CSA certified and approved for CE Mark



Resilience™ | UL 2277 | Flexible Motor Supply Cable and Wind Turbine Tray Cable

Guaranteed to Perform in the Harshest Environments.

Our flexible, rugged and technically advanced Resilience™ Cables are engineered and constructed with high-performance stranding that's rated for constant flex per NFPA 79 (12.2.2). Resilience™ is your assurance for ultra reliable performance in the wind turbine nacelle for low-voltage control and power applications.

	TW, THW, THW2, THHN	THWN, THWN-2, THHN	TF, TFF	TFN, TFFN
FEATURES				
Control	✓	✓	✓	✓
Power	✓	✓	✓	✓
ATTRIBUTES				
Low-Temperature Rating	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
High-Temperature Rating	90°C	90°C	90°C	90°C
Cold Bend	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
Flame Resistant	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray
Wet Location Use	✓	✓	✓	✓
Oil Resistant	I and II	I and II	I and II	I and II
Chemical Resistant	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓
Weld Flash Resistant	✓	✓	✓	✓
Weld Slag Resistant	✓	✓	✓	✓
FLEXIBILITY				
Torsional Flex	★	★	★	★
Rolling Flex	★	★	★	★
Variable Flex	★	★	★	★
Bend Flex	★	★	★	★
Continuous Flex	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE				
UL	✓	✓	✓	✓
ANSI	✓	✓	✓	✓
CE	✓	✓	✓	✓
NEC®	Article 336	Article 336	Article 402	Article 402
NFPA 79	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓
REACH	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES

- Control
- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Oil Res I and II
- Rugged and ultra reliable
- Outstanding torsional and bend high flex life
- High performance stranding rated for constant flex
- Cold bend test as low as -25°C
- Highly oil and flame resistant

- Composite and custom options available
- Over-mold and assembly compatible
- Retractable options available

DYNAMIC RANGE OF USE:

- Wind Turbine Tray Cable low-voltage control, power and data
- Installation in cable trays or raceways within a wind turbine generator and nacelles
- Flexible Motor Supply
- Variable Frequency Drives (VFD)
- Servo motors

	TW, THW, THW2, THHN	THWN, THWN-2, THHN	TF, TFF	TFN, TFFN
INSULATED CONDUCTORS				
Conductor Count	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	14 - 12 (2.08 - 3.31) 10 (5.26) 8 (8.37) 6 (13.3)	14 - 12 (2.08 - 3.31) 10 (5.26) 8 (8.37) 6 (13.3)	18 - 16 (0.824 - 1.31)	18 - 16 (0.824 - 1.31)
Stranding - Minimum and Maximum Diameter of individual wires AWG in inches (mm)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.254 - .813) 10 .010 - .0385 (.254 - .978) 8 .0201 - .0508 (.511 - 1.29) 6 .0201 - .064 (.511 - 1.626)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.254 - .813) 10 .010 - .0385 (.254 - .978) 8 .0201 - .0508 (.511 - 1.29) 6 .0201 - .064 (.511 - 1.626)	18 - 16 .005 - .0159 (.127 - .404)	18 - 16 .005 - .0159 (.127 - .404)
Material	PVC	PVC/Nylon	PVC	PVC/Nylon
Minimum Wall Thickness in inches (mm)	.030 (0.762) .030 (0.762) .045 (1.143) .060 (1.524)	.015 / .004 (0.381 / 0.102) .020 / .004 (0.508 / 0.102) .030 / .005 (0.762 / 0.127) .030 / .005 (0.762 / 0.127)	.030 (0.762)	.015 / .004 (0.381 / 0.102)
OVERALL CABLING				
Fillers	★	★	★	★
Shielding	★	★	★	★
Wraps	★	★	★	★
Strength Members	★	★	★	★
OUTER JACKET				
Material	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE
Color	★	★	★	★
Overall OD inches and jacket thickness inches (mm)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)
ELECTRICAL				
Max. Operating Voltage - UL	600V - 1000V	600V - 1000V	600V - 1000V	600V - 1000V
DC Resistance Max	Reference UL 83	Reference UL 83	Reference UL 66	Reference UL 66
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	NEC® Article 392.80(A)	NEC® Article 392.80(A)	NEC® Article 402.5	NEC® Article 402.5

Products ENERGY

FLEX:



EXTREME ENGINEERING:



Custom-Engineered,
Combat-Proven,
Military-Grade Wire,
Cable & Assemblies.

Government Contracting

Guaranteed to Meet the Most Demanding Application Requirements.

NWI designs and manufactures innovative, budget-compliant, military-grade technical and retractile cables, assemblies, connectors and harnesses for power, control, video and communication. Serving the Department of Defense (DoD), Department of Energy (DoE), Homeland Security, research laboratories and government prime contractors, NWI is America's source for dependable custom-engineered, mil-spec and mil-std compliant technical products and contract manufacturing.

- Thoroughly tested and guaranteed to withstand the rigors of military applications
- Application analysis; rapid, no-cost prototyping
- Expertise navigating all standards including mil-spec, mil-std, SAE, COTS, Federal Trade Commission, NEMA and more
- The industry's fastest lead times – custom cable in as little as five days; stock products shipped the same day
- No minimum order length or quantity requirements
- Value-added services including:
 - Custom colors
 - Private labeling
 - Color coding
 - Custom cutting, stripping
 - Bar coding
 - RFID tags
 - Packaging to mil-spec requirements

Northwire is a woman-owned, small business with the agility and expertise to give you solutions and service that exceed your expectations.



Technical cables, retractiles, assemblies, connectors and harnesses for today's modern warrior.

Contract manufacturing

From *Concept to Completion*, NWI engineers will engage with you through every process phase from R&D, new product development, prototype, pilot models, clinical trials, low volume through high volume production, life cycle innovation and logistics.



ITAR and EAR Registered

Mission-critical, battle-tested cable

Technical Expertise

NWI has been meeting defense, maritime and aerospace wire and cable needs for nearly four decades. We have the experience, engineering expertise, service excellence and made-in-the-USA quality to deliver the very best solutions for your mission-critical requirements.

Budget-Compliant Solutions

In addition to being cost-effective, NWI products are test-proven to withstand the toughest military harsh duty application, saving time and money in maintenance. It's your assurance of long product life that endures the most extreme environments, temperatures and hazardous materials.

A Wide Variety of Applications

NWI's military cable is designed for use throughout the United States Armed Forces:

Land: tanks, trailers, trucks, ground combat vehicles, hook-up wire, unmanned vehicles, VIS (Vehicular Intercommunication Systems), MRAP vehicles (Mine Resistant Ambush Protected), JLTV (Joint Light Tactical Vehicle) Stryker, Humvee and Abrams vehicle projects

Maritime: power, control, communications and shipboard instrumentation

Aerospace: airframe point to point, avionics systems, missiles and aerospace flight and combat rescue vehicles, refueling and GPS satellites

C4ISR: armament, sensor systems, radar systems, platform connectivity, communication satellites, unmanned aerial vehicles, military headsets, field wire, specialty wire, nuclear and more

Military Specialty Cables

Engineered and field tested to endure hostile environments, temperatures and hazardous materials, NWI's specialty cables are designed to survive crush, impact, flame, chemicals, rodents, water, abrasion, torsion, compression and more:

- Protection from RFI and EMI
- Composite and hybrid configurations: fiber optic, high-speed data, control, power and video conductors combined into a single cable
- Retractable cables: superior retractibility and reliable performance in abusive environments (30V, 300V and 600V rated)
- Superior coaxial cable with tightly controlled electricals
- QPL-approved MIL-C-17
- Special RG and RF microwave designs
- Custom maritime/shipboard cables
 - Reduced weight designs for use on ships
 - Watertight, flexible installation configurations
- Antifungal options available

Wide Range of Project Experience

Northwire – NWI Lab360 leverages professional certifications in Six Sigma®, Lean, Project Management and the American Society for Quality to optimize design, manufacturing and quality to achieve highest quality and the shortest lead times for any volume.

NWI's projects range in diversity and application from direct multi-year contracts with various Government entities to specialty product orders including WF-16 and WD-1A. Contact us today to explore your most demanding requirements!

MADE IN USA



CAGE Code 7V821

Numerous Options for Maximum Performance

Including Protection from Radio Frequency Interference and ElectroMagnetic Interference.

Electricals

- 30V, 300V, 600V, 1000V, 2000V

AWG (Gauge) Sizes/Ranges

- 36 AWG and larger

Stranding

Common Copper Stranding(s)

- 36–20 AWG (7, 19 strands or higher)
- 18–16 AWG (19 strands or higher)
- 14–2 AWG (41 strands or higher)
- Other stranding options available

Stranding Options for Conductors

- Bunched
- Unilay
- Rope lay
- True Concentric/Unilay
- And more

Copper Conductors, Plating or Coating Options

- Tin Copper
- Silver
- Nickel
- High-strength alloys

Conductor Temperature Rating

Tinned Cu : 150°C

Bare Cu : 200°C

Silver Cu : 200°C

Alloy 135 : 200°C

Nickel Plate Cu : 260°C



Insulation Materials for Inner Conductors

PVC

- Flexible
- Semi-rigid PVC
- Semi-conductive

Olefins

- PE (Polyethylene)
- LLDPE (Linear Low-Density Polyethylene)
- HDPE (High-Density Polyethylene)
- XLPE (Cross-Linked Polyethylene)
- Foamed XLPE (Cross-Link Polyethylene)
- PP (Polypropylene)
- PP Foam (Polypropylene)
- FRPP (Flame-Retardant Polypropylene)

TPE/TPR

- Thermoplastic Elastomer/ Thermoplastic Rubber

PES (Polyester Elastomer)

Fluoropolymers

- High-temperature insulations
- FEP (Fluorinated Ethylene Propylene) 200°C
- ETFE (Ethylene Tetrafluoroethylene) 150°C
- PFA (Perfluoroalkoxy) 260°C
Foamed FEP (Fluorinated Ethylene Propylene)
- ECTFE (Ethylene Chlorotrifluoroethylene)

Coaxial Cable

- May be added to a composite cable
- Custom options with unique electrical properties

Mechanical Strength

- Aramid fibers
- Individual galvanized or stainless steel cable
- Stainless steel braiding

Water Blocking

- Water-blocking features can be provided in conductors tape or fillers to prevent water migration if a cable jacket is damaged



Shielding – EMI/RFI Protection

- Aluminum foil tape
- Braiding with tinned copper
- Frequency spectrum:
Braid or spiral/served
– 3 kHz up to 30,000 kHz
Aluminum Polyester tape
– 25,000 kHz to 300,000 kHz

Braiding Styles

- Basket weave
- Spiral
- Serve
- Steel wire armor

Tape Separation Options

- Aluminum Foil
- Aluminized Polyester
- Foam PP (Polypropylene)
- Paper
- PES (Polyester)
- PTFE (Polytetrafluoroethylene)
- Spun Nylon

Armoring

- Interlocked aluminum or steel wire

Jacket Materials

- PVC (Polyvinyl Chloride)
- TPE (Thermoplastic Elastomer)
- TPR (Thermoplastic Rubber)
- TPU (Thermoplastic Urethane)
- PUR (Polyurethane)
- FEP (Fluorinated Ethylene Propylene)
- PES (Polyester Elastomer)

WOMAN-OWNED SMALL BUSINESS



With over 50 years of combined professional experience in contracting with the Government, rely on NWI experts for contract writing, review, negotiations and execution.

Client-focused, we have Program and Project Management Professionals on our Team who look forward to meeting your most challenging demands.

Made in the USA for over 4 decades, our competitive edge includes:

- Woman-Owned Small Business
- ITAR and EAR Registered
- CAGE Code 7V821
- OEM direct
- Contract manufacturing
- 3 regional locations
- Shorter supply chain
- Rapid response
- 24/7/365



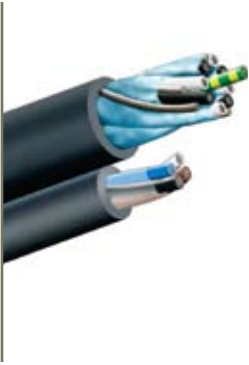
Our collaborative, multi-disciplinary performance-driven professionals achieved desirable outcomes with the following organizations:

- DCAA** – Defense Contract Audit Agency
- DCMA** – Defense Contract Management Agency
- DHS** – Department of Homeland Security
- DLA** – Defense Logistics Agency
- DOD** – Department of Defense
- FBI** – Federal Bureau of Investigation
- FEMA** – Federal Emergency Management Agency
- GSA** – General Services Administration
- MARCORSYSCOM** – Marine Corps Systems Command
- NGSI** – National Geospatial-Intelligence Agency
- NASA** – National Aeronautics Space Administration
- NFPA** – National Fire Protection Association
- TACOM** – Tank-automotive and Armaments Command

Work with Team NWI to advance your competitive advantage.



MADE IN USA



ITC | PLTC

Millions of Possibilities. Custom-Configured Cost Savings.

NWI's ITC/PLTC exposed-run industrial instrument and control wiring is engineered to meet application requirements for factory floor automation equipment, material handling, sensors and transducers, process controls and other applications. Northwire also offers all major instrumentation network protocols such as FOUNDATION™ fieldbus, ODVA™ DeviceNet™, and Profibus™ DP and PA. Enjoy lower installation costs, utilizing the ITC | PLTC exposed run amendment to the NEC®, eliminating the need for conduit.

Products

INDUSTRIAL

	ITC-GP	ITC-GP (ER)	ITC-RS	ITC-RS (ER)	ITC-DB (ER)	ITC-Extreme
	General Purpose	General Purpose/ Exposed Run	Rugged Service	Rugged Service/ Exposed Run	Direct Burial/ Exposed Run	Extreme
FEATURES						
Signal	✓	✓	✓	✓	✓	✓
Control	✓	✓	✓	✓	✓	✓
Instrumentation	✓	✓	✓	✓	✓	✓
ATTRIBUTES						
Low-Temperature Rating	≤ -30°C	≤ -30°C	≤ -40°C	≤ -40°C	≤ -30°C	≤ -60°C
High-Temperature Rating	105°C	105°C	105°C	105°C	105°C	105°C
Cold Bend	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C
Impact Resistant	✓	✓	✓	✓	✓	✓
Crush Resistant	✓	✓	✓	✓	✓	✓
Flame Resistant	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray	UL 1685 Vertical-Tray
Exposed Run Rated	–	NEC® 727.4(5)	–	NEC® 727.4(5)	NEC® 727.4(5)	–
Direct Burial Rated	✓	✓	–	–	NEC® 727.4(8)	–
Hazardous	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2
Wet Location Use	✓	✓	✓	✓	✓	✓
Oil Resistant	✓	✓	✓	✓	✓	✓
Chemical Resistant	✓	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓	✓
Cut/Abrasion Resistant (unarmored)	✓	✓	✓	✓	✓	✓
Weld Flash Resistant	–	–	✓	✓	–	–
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE						
UL	✓	✓	✓	✓	✓	✓
ANSI	✓	✓	✓	✓	✓	✓
CSA	✓	✓	✓	✓	✓	✓
CE	✓	✓	✓	✓	✓	✓
NEC®	Article 727	Article 727	Article 727	Article 727	Article 727	Article 727
NFPA	✓	✓	✓	✓	✓	✓
IEC	✓	✓	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓	✓	✓
REACH	✓	✓	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:
 – Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation

BENEFITS:

- UL listed and approved for CE Mark
- No conduit required means cost savings
- Versatile - suitable for use in Class I, Div 2 areas
- Saves space
- Wet location use
- Cold bend, impact and crush resistant
- Flame resistant, exposed run and direct burial options available

- Oil, chemical, sunlight, cut and weld flash resistant options available

DYNAMIC RANGE OF USE:

- Connectivity, low power sensors, instruments and control components
- Factory floor automation equipment
- Material handling
- Transducers
- Variable Frequency Drives (VFD)

	ITC-GP	ITC-GP (ER)	ITC-RS	ITC-RS (ER)	ITC-DB (ER)	ITC-Extreme			ITC-DB		
	General Purpose	General Purpose/ Exposed Run	Rugged Service	Rugged Service/ Exposed Run	Direct Burial/ Exposed Run	Extreme			Direct Burial		
INSULATED CONDUCTORS											
Conductor Count (flat or round)	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)	22-12 (.325-3.31)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	★	★	★	★	★	★	★	★	★	★	★
Material	ETFE, ECTFE, FEP, SRPVC	XLPE	PVC	PVC	Nylon	XLPE	PVC	Nylon	XLPE	PVC	Nylon
Insulation Wall Thickness AWG Inches (mm)	22-20 .009 (0.23) 19-15 .009 (0.23) 14-12 .012 (0.30)	All AWG sizes .020 (0.51)	22-20 .012 (0.30) 19-15 .015 (0.38) 14-12 .020 (0.51)	22-20 .015 (.38) 19-15 .015 (.38) 14-12 .015 (.38)	.005 (.13) .005 (.13) .005 (.13)	All AWG sizes .020 (0.51)	22-20 .015 (.38) 19-15 .015 (.38) 14-12 .015 (.38)	.005 (.13) .005 (.13) .005 (.13)	All AWG sizes .020 (0.51)	22-20 .015 (.38) 19-15 .015 (.38) 14-12 .015 (.38)	.005 (.13) .005 (.13) .005 (.13)
OVERALL CABLING											
Fillers	★	★	★	★	★	★	★	★	★	★	★
Shielding	★	★	★	★	★	★	★	★	★	★	★
Armoring	★	★	★	★	★	★	★	★	★	★	★
Wraps	★	★	★	★	★	★	★	★	★	★	★
Strength Members	★	★	★	★	★	★	★	★	★	★	★
OUTER JACKET											
Material	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE
Color	★	★	★	★	★	★	★	★	★	★	★
Overall OD inches (mm)	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction
ELECTRICAL											
DC Resistance	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2
Ampacity	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max	5 amp max

EXTREME ENGINEERING:



Variable Frequency Drive

Select from Custom and Composite Constructions for Severe Duty VFD Applications.

Designed and manufactured to withstand harsh electrical and mechanical environments, our custom engineered solutions meet or exceed VFD, UL and CSA standards and CE Mark approval.

Consistent electrical performance

Select from constructions that utilize materials specifically designed to withstand the typical voltage spikes that occur when power voltage peaks align with standing wave peaks. PVC or semi-rigid PVC alternative materials are better suited to control electricals. **Benefits of improved system performance include:**

- Lower capacitance
- Lower operating temperatures
- Longer length cables
- Consistent performance during spikes
- Custom configured mechanical solutions

Select from high flex options, several jacket materials, shielding and custom composite constructions for optimal mechanical performance.

Longer life, high flex options are easier to install:

- High strand count, material and construction options are available to increase flex life and durability

Choose from a variety of materials for optimal oil and sunlight resistance, high temperature and low temperature bend and impact performance:

- PVC
- TPE
- TPU

Robust shielding protects your data in noisy environments:

- Low resistance to ground offers strong protection against low frequency interference

- Combine braided shielding and aluminized wraps for high optical coverage of 85% or better for optimal EMI/RFI coverage

Advantages of custom composite signal and power constructions include:

- Cost competitive
- Easy installation
- Several separate cables are configured into one smaller solution

Built to suit your VFD requirements, a variety of UL and CSA AWM approved listings are available:

UL 1277 Tray Cable

- 600V | 2 or more conductors
- 105°C
- Exposed Run and Direct Burial options
- Compliant to NEC® Article 336 and ANSI

UL 2277 Flexible Motor Supply Cable and Wind Turbine Tray Cable

- 1000V | 2 or more conductors
- 90°C
- Sunlight and Oil Resistant I or II options

UL 2250 Instrumentation Tray Cable

- 150V | 2 or more conductors | 5 Amps
- 105°C
- Exposed Run and Direct Burial options
- Compliant to NEC® Article 727

UL 13 Power-Limited Tray Cable

- 300V | 2 or more conductors
- Exposed Run and Direct Burial options
- Compliant to NEC® Article 725

*Check out the
Agency Standards
section for more
Industrial selections.*

Page 84

UL 1309 | CSA 245 | Marine Shipboard Cable | RIG 300™ | Extreme Frigid Flex RIG™

Arctic Grade. Proven Performance in the Field.



Meets or exceeds US Coast Guard Regulations and American Bureau of Shipping Standards. Ideally suited for applications in cold climates where extreme performance is required, space is limited and reliability is paramount, including marine environments for offshore and fixed oil rigs, aboard fixed or floating offshore structures.

Products

UNDERWATER

Check out the Frigid Flex Press Release - available on www.northwire.com/pr

	RIG 300™	Extreme Frigid Flex RIG™
FEATURES		
Signal	✓	✓
Control	✓	✓
Instrumentation	✓	✓
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	-25°C	≤ -40°C
High-Temperature Rating	≥ 90°C	≥ 90°C
Cold Bend	-25°C	-55°C
Cold Impact	–	-40°C
Flame Resistant	FT4/IEEE 1202	FT4/IEEE 1202
Wet Location Use	✓	✓
Oil Resistant to Marine Standards	✓	✓
Chemical Resistant	✓	✓
Sunlight/UV Resistant	✓	✓
1,000 Hour Weatherometer Compliant	–	✓
Weld Flash Resistant	–	✓
Weld Slag Resistant	–	✓
FLEXIBILITY		
Torsional Flex	✓	✓
Rolling Flex	✓	✓
Variable Flex	✓	✓
Bend Flex	✓	✓
Continuous Flex	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CSA	–	✓
CE	✓	✓
IEEE	1580-2010, 45-98	1580-2010
ABS	✓	✓
RoHS2	✓	✓
REACH	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available

MSC



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL listed and CSA 245 certified and approved for CE Mark
- Compliant to ANSI, IEEE, ABS, USCG, RoHS2 and REACH Standards
- Arctic rated
- Superior flexibility - torsional, rolling, variable, bend and continuous
- Long life expectancy
- Meets 1,000 hour weatherometer requirement

- Oil resistant to marine standards
- Resistant to water, UV and weld slag
- Approved for all colors
- Options for armored shield, over-braid, foil, composite and custom designs

DYNAMIC RANGE OF USE:

- Marine environments
- Aboard offshore and fixed oil drilling rigs

	RIG 300™		Extreme Frigid Flex RIG™		
INSULATED CONDUCTORS					
Conductor Count	Up to 60 pairs		Up to 60 pairs		
AWG (mm2)	Dependent on type - no AWG restrictions Otherwise 22 - 10 (0.325, 5.26)		Dependent on type - no AWG restrictions Otherwise 22 - 10 (0.325, 5.26)		
AWG Minimum Strand Count	★		★		
Material	PVC	PVC/Nylon	XLPE	PVC	PVC/Nylon
Insulation Wall Thickness AWG in inches (mm)	22-19 .020 (0.50) 18-16 .020 (0.50)	22-19 .015 / .004 (0.37 / 0.10) 18-16 .015 / .004 (0.37 / 0.10)	22-19 .015 (0.28) 18-16 .020 (0.50)	22-19 .020 (0.50) 18-16 .020 (0.50)	22-19 .015 / .004 (0.37 / 0.10) 18-16 .015 / .004 (0.37 / 0.10)
	Control and Distribution options available		Control and Distribution options available		
OVERALL CABLING					
Fillers	★		★		
Ground	★		★		
Shielding	★		★		
Armoring	★		★		
Wraps	★		★		
Strength Members	★		★		
OUTER JACKET					
Material	PVC		TPE		
Color	★		★		
Overall OD inches (mm)	Dependent on AWG size and number of conductors		Dependent on AWG size and number of conductors		
ELECTRICAL					
Max. Operating Voltage - UL	Signal 300V, Control and Distribution 600/1000V		Signal 300V, Control and Distribution 600/1000V		

Products

UNDERWATER

FLEX:



EXTREME ENGINEERING:





Underwater Cable

A Variety of Marine Grade Applications.

At NWI we build a wide range of custom underwater cables that meet or exceed US Coast Guard and American Bureau of Shipping regulations. Whether the application is for freshwater or saltwater, chlorine, chemicals, solvents or all of the above, NWI has your cable solution.

Since 1972, Northwire has been designing and building custom cable solutions for the most demanding underwater applications.



Reliable Performance

NWI uses unique compounds formulated to withstand the effects of long-term immersion in aqueous fluids. In addition to these insulation and jacket extrusions, NWI leverages an assortment of fillers, tapes and other compounds that protect the cables from water penetration. In the event that the cable is cut or impaled, these materials will absorb and swell, resulting in blockage at the point of entry.



Custom Designs for Power, Video, Control and Data Communication Needs

Underwater cable uses include lighting, camera, video and monitoring systems, sonar, control, sensors, well, sewer and geophysical applications.



Consider Your Requirements

Cables in submerged environments require unique consideration:

- Materials must be compatible with a wide range of fluid environments
- Fluid blocking components may be desirable to block migration of fluid (should the outer jacket become compromised)
- Strength members may be desirable to isolate stress from electrical components
- Buoyancy (neutral, positive and negative)
- Temperature of liquid environment
- Special markings on cable (for depth for example)

In addition to the above, all the usual discussion items relating to custom cable apply. Included in these are conductor strandings and platings, insulating options, electrical performance requirements, colors, conductor marking options, shielding necessities and jacketing options, to name a few.

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



Contractor threatened with liquidated damages seeks rapid solution from NWI EXPRESS.

Northwire Underwater Cable bails out international underwater entertainment venue.

OSCEOLA, WI — Northwire Technical Cable, an innovative solutions provider in the marketing, design and manufacture of technical and retractile cables and cable assemblies, came to the rescue when operations at one of the world’s largest casino’s underwater entertainment venue were waylaid by failed underwater cable. Faced with liquidated damages, the contractor responsible for the installation contacted Northwire for an expedited custom solution. At no cost, Northwire engineered several designs, tested and developed, and rapidly prototyped custom cable solutions in five days—enabling the multimillion dollar production to resume.

The casino’s application is in a water theater where the cable controls and powers moving platforms and water jets. The cable sends signals from a central control computer to system actuators, powering pumps, valves and lighting. Forensic cable experts referred the executive contractor responsible for the underwater venue installation to Northwire. The original cable failed to block water and, instead, acted like a hose, siphoning water into central control computers—destroying over \$250,000 worth of equipment.

“The customer called late on Friday in need of an urgent solution,” says Mike Conger, president of Northwire. “Our engineering team translated the customer’s critical-to-quality requirements into several designs, test and development protocols and rapid prototypes. Results were reported to the customer the following business day. He selected one of several custom solutions. Two days later, our production team shipped his product.”

The application demanded water-blocking cable that could withstand 15 pounds per square inch (PSI) of water pressure—all day, every day. Northwire provided 6,000 feet of its Underwater Cable, which is tested to withstand 100 PSI. In addition to being engineered to tolerate submersion in chlorinated water, the customer’s cable specifications required flexibility for installation around

concrete pylons and resistance to cuts and abrasions.

Consecutively producing engineered solutions for the contractor for other underwater entertainment venues, including the world’s largest cruise ship, Northwire’s continuous test and development methodology ensures the performance of its Underwater Cable.

“Northwire’s team demonstrates commitment to all of our valued customers through company-wide initiatives in research and development, rapid prototyping, new product engineering, and test and development,” says Mike Conger. Northwire’s Underwater Cable offers solutions for fresh water, salt water, chlorine, chemical and solvent environments; and custom designs for power, video, control and data communication needs. Buoyancy options include neutral, positive and negative.

Underwater Cable features premium abrasion-resistant jacket materials and material formulations for specific applications, including a jacket that repels salt water. FDA-approved materials also are available. Other special features are various fluid- and water-blocking tapes and fillers, markings on cable for depth, custom jacket colors, custom labeling and overmold compatibility. Custom constructions include strength members and aramid fibers for added pull strength.

Additional applications include power for fountains and other water features, underwater lighting in pools and water features, umbilical cables that attach to sensors and instruments for monitoring water quality and conditions of underwater structures, and control and power cables for underwater theaters.

Northwire provides quotes in 24 hours or less and offers no-cost design and rapid prototyping to encourage customers to explore innovative solutions. Subject matter experts help customers navigate complex domestic and international standards, agency compliance, environmental regulations and electrical, mechanical, ergonomic, aesthetic and end-user requirements.

FLEX:



TORSIONAL ROLLING VARIABLE BENDING CONTINUOUS

EXTREME ENGINEERING:



CRUSH RESISTANT WET USE OIL RESISTANT UV RESISTANT CUT RESISTANT SILICONE FREE



Lument™

Custom Cable for Architectural and Decorative Lighting.

For maximum style and utility, NWI will manufacture the high tensile strength member into your design.

FIGURE B

Light up your imagination. Lument™ gives you the freedom to create designs and fixtures that are more spectacular than ever—with virtually unlimited options.

High-tech or contemporary. Transform your designs with color-matched metallic finishes, holographic glitter or fluorescent colors. **FIGURE A**

Retro. Select our woven-fabric outer jacket for a vintage look –available in a variety of colors and patterns like chevron and argyle. **FIGURE A**

Get exactly what you want. With Lument™, you get a quality, custom-designed cable that complements the unique look of your commercial or residential lighting designs. Shipped fast direct from the factory with no minimum order quantity or length requirements.

Check out our Lument™ debut on DIY Network's "I Hate My Kitchen" - available on www.northwire.com/pr

Architectural and Decorative Lighting Cable with Distinctive Style.

BENEFITS:

- UL listed, CSA certified and approved for CE Mark options available
- Wide variety of options to enhance lighting fixtures and décor
- Performance guarantee
- Lightning-fast delivery
- Round, oval, flat, flexible, limp, miniaturized and high-speed data transmission designs
- Retractable coil cable in almost any length or diameter
- Outdoor rated UV, water and weather resistant materials
- You work directly with NWI's designers to create a proprietary design to your exact specifications.

UNIQUE FINISHES INCLUDE:

- Color matching to RAL, PMS or custom color
- Holographic glitter
- Fluorescent colors
- Shiny and flat finishes
- Metallic effects
- Glow-in-the-dark
- Custom fabric weaves vintage
- Clear jackets, insides visible
- And more

FIGURE A

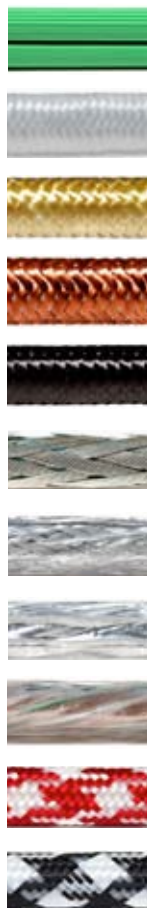
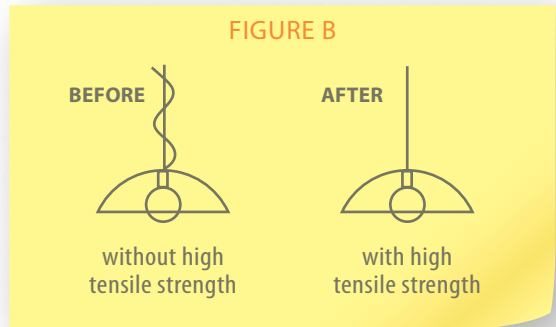


FIGURE B





ViViD and GloGo™

13 Trendy New Colors Perfect for You.

Select from neon, sheen, glitter and glow-in-the-dark options for your next project! NWI's newest innovations, ViViD and GloGo™ bring style and utility to you. Tell us what you want and we will make it your way. Options include straight and coiled, logos, private labels, custom colors, lengths, custom design assemblies and more.



NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

BRILLIANT



Baja Wave



Citrus Lime



Cotton Candy



Double Shot



Lemon Twist



Purple Tang



Tangerine Tart

SHEEN



Titanium Tight



Hot Flash

GLITTER



Coral Razz



Cosmic Blue



GLOW-IN-THE-DARK COLORS

Unique photoluminescent technology glows for 22+ hours after exposure to a light source



Sapphire Blue



Citrine Green



STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



ANSI CSA CE

FLEX:



TORSIONAL



ROLLING



VARIABLE



BENDING



CONTINUOUS

EXTREME ENGINEERING:



CRUSH RESISTANT



EXPOSED RUN



WET USE



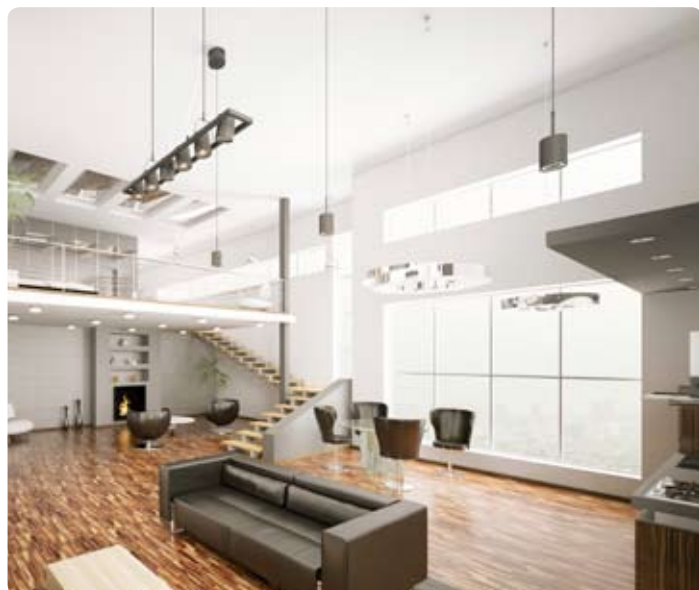
UV RESISTANT



CUT RESISTANT



SILICONE FREE





For techies who love fashion and function.



Zonkey

**Fashionable.
Flexible. Functional.**

What's a Zonkey, you ask? It's NWI's retail product line. You see, Zonkey is a hybrid critter. Zonkey's parents are called "Zedonks." Dad is a Zebra and Mom is a Donkey. Together they make a harmonious blend of flash and function... which makes Zonkey the perfect name for a hybrid – **a Custom Original Cable Manufacturer (Northwire)/Online Retailer (Zonkey) to reach you-trendsetters-who-got-to-have-it-yesterday!**

Zonkey is NWI's custom retail line of USB compatible cables with simultaneous data transfer and power charging. Zonkey accessorizes your mobile and smart phones, car charger, camera, gaming and GPS units and a variety of hand-held devices and electronics. Zonkey is available in convenient XL and XXL lengths, straight or retractile cable versions.



13 Trendy New Colors Perfect for You.

Select from neon, sheen, glitter and glow-in-the-dark options for your next project! NWI's newest innovations, ViViD and GloGo™ bring style and utility to you. Tell us what you want, and we will make it your way. Options include straight and coiled, logos, private labels, custom colors, lengths, custom design assemblies and more.



BRILLIANT



Baja Wave



Citrus Lime



Cotton Candy



Double Shot



Lemon Twist



Purple Tang



Tangerine Tart



SHEEN

Titanium Tight



Hot Flash



GLITTER

Coral Razz



Cosmic Blue



GLOW-IN-THE-DARK COLORS

Unique photoluminescent technology glows for 22+ hours after exposure to a light source

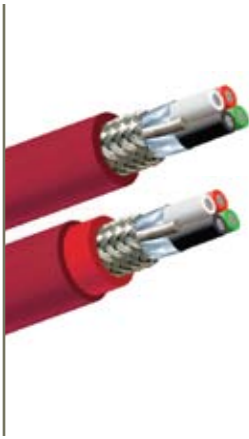


Sapphire Blue



Citrine Green





Guardian™

No Minimum Order Quantity Requirements (on all products)!

Rugged Guardian™ Load Cell cables are engineered to meet requirements for truck, livestock, floor, railroad and other weigh scale applications. Two versions are offered for standard and extreme environments with 4- or 6-conductor load cells. The 6-conductor cables are best suited for longer runs where remote sense lines can be used.

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- Flexible-construction 20 AWG stranded tinned copper wire
- Protection against Radio Frequency Interference (RFI) and ElectroMagnetic Interference (EMI) with tinned copper braid shield over aluminized foil shield
- Industry standard color-coded conductors
- Temperature rating -30°C to 80°C (-22°F to 176°F)
- Custom legends, colors, private labeling, logos and more available
- Environmentally-friendly rodent aversion options available



SPECIFICATIONS

Standard Load Cell Cable

Part Number : **FAWM204-061: 4-conductor**
FAWM206-023: 6-conductor

Cable Outside Diameter

inches (mm) : 4-conductor – 0.245 (6.22)
 6-conductor – 0.280 (7.11)

- Tough, weatherproof PVC cable jacket
- UL Recognized AWM Style, CSA certified and approved for CE Mark

Load Cell for Extreme Environments

Part Number : **FCAB204-070: 4-conductor**
FCAB206-045: 6-conductor

Cable Outside Diameter

inches (mm) : 4-conductor – 0.280 (7.11)
 6-conductor – 0.320 (8.13)

Double jacketed: Polyurethane over PVC jacketing provides superior resistance to chemicals, oils, fuels, crush, impact, abrasion and weather elements

- Unmatched durability, yet extremely flexible

FLEX:



EXTREME ENGINEERING:



STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:





NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

got rodents?

ANTI-RODENT ADDITIVES:

Environmentally-friendly, patented bio-active ingredients effectively repel rodents.

Safe for humans and all other animals, anti-rodent additives help you avoid:

- Safety issues
- Equipment damage
- Productivity downtime
- Loss of revenue



Rodent damage is a significant issue, according to the additive manufacturer CTECH CORPORATION:

“...forty percent of mammal species found on earth are rodents. **The bright colours and texture of polymer, the aromatic odour of polymeric products and the plasticizers used are all responsible for animals being attracted towards plastic goods.** In addition, Rodentia, an order of mammals also known as rodents, is characterized by two continuously growing incisors in the upper and lower jaws which are kept short by gnawing. Thus to satisfy their own need, they hamper our living.”

Reports on extensive testing from the manufacturer demonstrate that rodent aversion technology is “designed to keep the rodents away effectively and not kill the rodents or harm any other animal.”

Talk with one of our engineers or customer care for more information about this environmentally-friendly solution to a growing problem.

“Forty percent of mammal species found on earth are rodents... and they are attracted to plastics!”

– CTECH CORPORATION

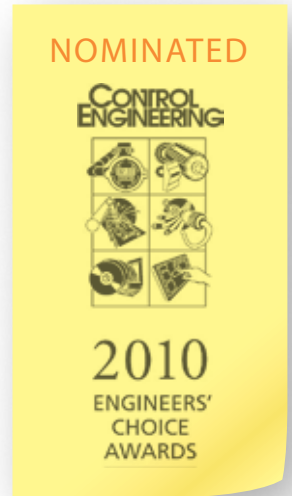


DataCELL® FOUNDATION™ fieldbus Cable

Save Time and Money with Rugged Bus Cables for FOUNDATION™ fieldbus H1 Applications – FF-844 Certified.

We lead the way manufacturing rugged FOUNDATION™ fieldbus cable specifically designed for tough plant environments utilizing networked discrete automation and control.

Control Engineering Magazine nominee for **2010 Engineer's Choice Award**, Data-CELL® M-EZ cables have up to 24 individually foil-shielded pairs with an extruded binder over each pair - in a single cable. Easier to strip and install, the design eliminates cross continuity between shields and maintains shield integrity within the cabinet.



	Marshal EZ H1 Type A	H1 Type A	Instrumentation Tray Cable Extreme
FEATURES			
Signal	✓	✓	✓
Instrumentation	✓	✓	✓
Control	✓	✓	✓
Power	✓	✓	✓
ATTRIBUTES			
Low-Temperature Rating	-40°C	-40°C	-60°C
High-Temperature Rating	105°C	105°C	90°C
Cold Bend	-40°C	-40°C	-60°C
Cold Impact	★	★	★
Flame Resistant	FT4/IEEE 1202, IEC 332-3	FT4/IEEE 1202, IEC 332-3	FT4/IEEE 1202, IEC 332-3
Exposed Run Rated	✓	✓	✓
Hazardous	Class I, Div 2	Class I, Div 2	Class I, Div 2
Wet Location Use	✓	✓	✓
Oil Resistant	★	★	★
Sunlight/UV Resistant	✓	✓	✓
Cut Resistant	-	-	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE			
UL	✓	✓	✓
ANSI	✓	✓	✓
CSA	✓	✓	✓
CE	✓	✓	✓
NEC®	✓	✓	✓
NFPA 70	✓	✓	✓
FOUNDATION™ fieldbus	✓	✓	✓
RoHS2	✓	✓	✓
REACH	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Instrumentation
- Control
- Power

DYNAMIC RANGE OF USE:

- Outdoors
- Arctic grade rated
- Marine shipboard
- Factory settings

BENEFITS:

- UL listed ITC/PLTC-ER and CSA certified CMX-Outdoor-CMG and approved for CE Mark
- Meets or exceeds the new FF-844 specifications for Type A
- Versatile - suitable for use in Class I, Div 2 areas
- New dual rated ITC and marine shipboard version is arctic grade extreme - suitable for applications to -40°C
- 3rd Generation Design – easy to strip and install; round, smooth jacket makes installation in cable glands effortless and secure

- Most Complete Line – 18 and 16 AWG, single and multi-pair cables with alternate color, shielding and grounding options
- Save time and money – ITC-ER (Exposed Run) rating on all versions eliminates the need for conduit in most applications
- Strong – NWI ITC/PLTC-ER rated fieldbus cables pass the same crush and impact tests for metal clad cable (UL 1569) without the difficult metal armor
- Eliminate conduit – when installed in accordance with recent NEC® amendments, allowing exposed installation of ITC/PLTC-ER cable

	Marshal EZ H1 Type A	H1 Type A	Instrumentation Tray Cable Extreme
INSULATED CONDUCTORS			
Conductor Count	1 or more pairs	1 or more pairs	1 or more pairs
AWG (mm2)	18 - 16 (0.824 - 1.31)	18 - 16 (0.824 - 1.31)	18 - 16 (0.824 - 1.31)
Stranding - Minimum and Maximum AWG - strand count	18 19 strands 16 19 strands	18 19 strands 16 19 strands	18 19 strands 16 19 strands
Material	Cross-link Polyethylene	Cross-link Polyethylene	Cross-link Polyethylene
Minimum Wall Thickness in inches (mm)	18.030 (0.762) 16.035 (0.889)	18.030 (0.762) 16.035 (0.889)	18.030 (0.762) 16.035 (0.889)
OVERALL CABLING			
Fillers	✓	✓	✓
Shielding	★	★	★
Armoring	★	★	★
Wraps	✓	✓	✓
Binder (PVC Sub-jacket)	✓	–	–
Strength Members	★	★	★
OUTER JACKET			
Material	PVC	PVC	TPE, Polyurethane
Color	★	★	★
Overall OD and jacket thickness inches (mm)	Dependent on construction	Dependent on construction	Dependent on construction
ELECTRICAL			
Max. Operating Voltage - UL	150V - 300V	150V - 300V	150V - 300V
DC Resistance Max	Reference UL 44	Reference UL 44	Reference UL 44
DC Resistance Nominal	Reference UL 44	Reference UL 44	Reference UL 44
Characteristic Impedance Ohms	100 +/- 10	100 +/- 10	100 +/- 10
Conductor to conductor Capacitance pF/ft Nominal	18 - 21.9 16 - 20.9	18 - 21.9 16 - 20.9	18 - 21.9 16 - 20.9

EXTREME ENGINEERING:



Products

SIGNAL, CONTROL + COMMUNICATION



DataCELL® J1939 | J1128

Ruggedized CANbus Data Network Cable.

Designed to the exacting SAE J1939 specification, DataCELL® J1939 CANbus Data Network Cable delivers consistent, reliable performance for your sophisticated, ruggedized data network—at a competitive price. DataCELL® J1939 features a jacket that makes pulling and stripping faster and easier.

DataCELL® J1939 cables are specifically designed to withstand the extreme conditions today's equipment is subjected to—such as oil, fluids, equipment vibration and EMI/RFI interference. NWI's proprietary DataCELL® technology means reliable cable performance with exceptional impedance consistency over the entire cable length—which increases the efficiency and safety of your equipment and provides dependability you can count on.

	SAE J1939/11	SAE J1939/15	SAE J1128
	Shielded Twisted Pair	Unshielded Twisted Pair	Low Voltage Primary Cable - TXL
FEATURES			
Signal	✓	✓	✓
Control	✓	✓	–
Instrumentation	✓	✓	✓
Power	–	–	✓
ATTRIBUTES			
Low-Temperature Rating	-40°C	-40°C	-40°C
High-Temperature Rating	125°C	125°C	125°C
Cold Bend	★	★	–
Impact Resistant	★	★	–
Flame Resistant	★	★	FT1
Oil Resistant	✓	✓	✓
Chemical Resistant	★	★	✓
Sunlight/UV Resistant	★	★	✓
Cut/Abrasion Resistant (unarmored)	★	★	–
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE			
SAE	✓	✓	✓
RoHS2	✓	✓	✓
REACH	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

DYNAMIC RANGE OF USE:

- 20 AWG or 18 AWG, data pairs, power, video or control, and tinned copper stranding, drain wire, multiple shielding options available
- Vehicle bus standard used for communication and diagnostics among vehicle components
- Light and heavy duty, on and off-road trucks and trailers, construction and agricultural equipment and implements, marine and stationary applications like generator sets

BENEFITS:

- Designed to exacting SAE J1939/11, SAE J1939/15 and SAE J1128 specification
- Compliant to RoHS2 and REACH standards
- Competitively priced
- Delivers consistent, reliable performance for your sophisticated, ruggedized data network
- Features a jacket that makes pulling and stripping faster and easier
- Withstands extreme conditions such as oil, fluids, equipment vibration and EMI/RFI interference
- Exceptional impedance consistency over the entire cable length-which increases the efficiency and safety of your equipment and provides dependability you can count on
- Type-Tough, waterproof TPR jacket offering high environmental performance
- Type-Cut Resistant, special elastomer construction featuring unsurpassed cut and abrasion resistance plus outstanding oil resistance

	SAE J1939/11	SAE J1939/15	SAE J1128
INSULATED CONDUCTORS			
Conductor Count	2+	2+	1
AWG (mm2)	20 - 18 (0.5 - 0.8)	20 - 18 (0.5 - 0.8)	24 - 8 (.22 - 8)
Material	XLPE	XLPE	XLPE
Minimum Wall Thickness in inches (mm)	Dependent on construction	Dependent on construction	Dependent on gauge size
OVERALL CABLING			
Fillers	✓	✓	-
Shielding	✓	✓	-
Wraps	✓	✓	-
OUTER JACKET			
Material	★	★	-
Color	★	★	-
Overall OD inches (mm)	Dependent on construction	Dependent on construction	Dependent on gauge size
ELECTRICAL			
Max. Operating Voltage	★	★	60
DC Resistance Max mΩ/ft (mΩ/m)	15.25 (50)	15.25 (50)	Dependent on construction
DC Resistance Nominal mΩ/ft (mΩ/m)	7.625 (25)	7.625 (25)	-
Impedance (Ω)	120 ± 10%	120 ± 10%	-
Capacitance pF/ft (pF/m)	22.9 (75) conductor to conductor 33.5 (110) conductor to shield	22.9 (75) conductor to conductor 33.5 (110) conductor to shield	-

EXTREME ENGINEERING:





DataCELL® FIELD CANopen® | ODVA™ DeviceNet™ Cable

Rugged Cables for Industrial Networks.

Widely accepted, **CANopen®** applications are broad, including communication systems, medical equipment, robotics, off-road vehicles, maritime electronics, public transportation, building automation and more. CANopen® provides device designers with the ability to implement desired network behavior of several communication objects into a device.

Proven Network Cables for **ODVA™ DeviceNet™**. NWI leads the way manufacturing rugged DeviceNet™ cable specifically designed for tough plant environments utilizing networked discrete automation and control. Through continued product innovation and refinement, NWI remains the leading manufacturer of cables for industrial networking.

ATTRIBUTES	SAE J1939/11	SAE J1939/15	ODVA™ DeviceNet™
	Shielded Twisted Pair	Unshielded Twisted Pair	Thin
Low-Temperature Rating	-40°C	-40°C	-25°C
High-Temperature Rating	125°C	125°C	80°C
Cold Bend	★	★	★
Cold Impact	★	★	-
Impact Resistant	★	★	-
Crush Resistant	★	★	-
Flame Resistant	★	★	★
Exposed Run Rated	★	★	-
Direct Burial Rated	★	★	-
Wet Location Use	★	★	★
Oil Resistant to Marine Standards	★	★	-
Chemical Resistant	★	★	★
Sunlight/UV Resistant	★	★	★
Cut/Abrasion Resistant (unarmored)	★	★	★
Weld Flash Resistant	★	★	-
Weld Slag Resistant	★	★	-
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE			
UL	-	-	✓
ANSI	-	-	✓
CSA	-	-	✓
CE	✓	✓	✓
NEC®	-	-	Article 725
NFPA 79	-	-	✓
SAE	✓	✓	-
ODVA	-	-	✓
RoHS2	✓	✓	✓
REACH	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

DataCELL® FIELD CANopen®

BENEFITS:

- Designed to exacting SAE J1939 CAN specifications
- Many UL listed and CSA certified and CE Mark options available
- CAN compatible configurations options include: DeviceNet™, SAE J1939/11, SAE J1939/15, Standard CAN and Custom CAN

DYNAMIC RANGE OF USE:

- Medical equipment
- High-flex versions for robotics
- Off-road vehicles
- Maritime electronics
- Public transportation
- Building automation

DataCELL® FIELD ODVA™ DeviceNet™

BENEFITS:

- ODVA-compliant to Thin versions
- Special PLTC versions available
- 10 million-cycle high-flex life versions
- Delivers consistent, reliable performance for your sophisticated industrial networking solution

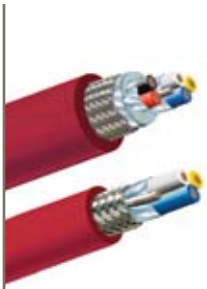
DYNAMIC RANGE OF USE:

- Designed for connecting electronic control units - typically sensors, actuators and other control devices

	SAE J1939/11	SAE J1939/15	ODVA™ DeviceNet™	
	Shielded Twisted Pair	Unshielded Twisted Pair	Thin	
INSULATED CONDUCTORS				
Conductor Count	2+	2+	4	
AWG (mm2)	20 - 18 (0.5 - 0.8)	20 - 18 (0.5 - 0.8)	24 and 22/2 (0.51 and 0.325)	
Stranding - Strands	—	—	19 Strand TC	
Material	XLPE	XLPE	Data Pair - Foam Polyethylene	Power Pair - PVC
Minimum Wall Thickness in inches (mm)	.038 (0.965)	.038 (0.965)	.026 (0.66)	.015 (0.38)
OVERALL CABLING				
Fillers	★	★	★	
Shielding	★	★	★	
Armoring	★	★	★	
Wraps	★	★	★	
Strength Members	★	★	★	
OUTER JACKET				
Material	★ TPE, Polyester	★ TPE, Polyester	PVC	
Color	★ Black	★ Black	★ Gray	
Overall OD inches (mm)	Dependent on construction	Dependent on construction	.290 (7.37)	
ELECTRICAL				
Max. Operating Voltage - UL	★	★	300V	
DC Resistance Max mΩ/ft (mΩ/m)	15.25 (50)	15.25 (50)	Data Pair - 28 (91.9) Power Pair - 17.5 (57.4)	
DC Resistance Nominal mΩ/ft (mΩ/m)	7.625 (25)	7.625 (25)	—	
Impedance (Ω)	120 ± 10%	120 ± 10%	Data Pair - 120 ± 10%	
Capacitance pF/Ft (pF/m)	22.9 (75) conductor to conductor 33.5 (110) conductor to shield	22.9 (75) conductor to conductor 33.5 (110) conductor to shield	12.0 (39.4) conductor to conductor	

EXTREME ENGINEERING:





DataCELL® FIELD CC-Link® Cable

Industrial-Tough Network Cables.

NWI leads the way manufacturing rugged DataCELL® FIELD CC-Link® (Control and Communication Link) cables specifically designed for the tough plant environments utilizing networked discrete automation and control. CC-Link® offers high-speed communication between controllers and intelligent field devices like I/Os, sensors and actuators. Through continued product innovation and refinement, NWI remains the leading manufacturer of cables for industrial networking.

	Power Limited Tray Cable	Power Limited Tray Cable plus power pair
FEATURES		
Signal	✓	✓
Instrumentation	✓	✓
Control	✓	✓
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	≤ -25°C	≤ -25°C
High-Temperature Rating	80°C	80°C
Cold Bend	≤ -25°C	≤ -25°C
Cold Impact	★	★
Flame Resistant	FT4/IEEE 1202	FT4/IEEE 1202
Exposed Run	✓	✓
Direct Burial	✓	✓
Hazardous	Class I, Div 2	Class I, Div 2
Sunlight/UV Resistant	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CSA	✓	✓
CE	✓	✓
NEC®	✓	✓
NFPA 70	✓	✓
CC-Link®	✓	✓
RoHS2	✓	✓
REACH	✓	✓



KEY:
 - Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:





NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Instrumentation
- Control
- Power

BENEFITS:

- UL listed and approved for CE Mark, Power Limited Tray Cable and CL2 for factory-floor installations
- Compliant to CSA certified CMX-Outdoor-CMG and FT4, ANSI, NEC®, RoHS2 and REACH standards
- Conformance tested and passed by CLPA
- Constructed to comply with CC-Link® dedicated cable specification (Ver. 1.10)
- Versatile- suitable for use in Class I, Div 2 areas
- High-speed, reliability without the need for repeaters
- Two design options
 - Standard network cable
 - Standard network cable plus power pair

DYNAMIC RANGE OF USE:

- Tough plant environments
- Networked discrete factory automation, process control and instrumentation
- High-speed communication between controllers and intelligent field devices; I/Os, sensors and actuators

	Power Limited Tray Cable	Power Limited Tray Cable plus power pair
INSULATED CONDUCTORS		
Conductor Count	3	5
AWG (mm2)	20 (0.519)	20 and 18 (0.519 and 0.824)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	.030 (0.762)	20 AWG .0121 (0.307) 18 AWG .030 (0.762)
Material	Foamed Polyethylene	Foamed Polyethylene PVC
Minimum Wall Thickness in inches (mm)	.028 (0.711)	.028 (0.711) .015 (0.381)
OVERALL CABLING		
Fillers	-	✓
Shielding	✓	✓
Armoring	-	-
Wraps	✓	✓
Strength Members	-	-
OUTER JACKET		
Material	PVC	PVC
Color	★ Custom colors available in addition to industry standard red	★ Custom colors available in addition to industry standard red
Overall OD and jacket thickness inches (mm)	.305, .035 (7.75, 0.889)	.413, .040 (10.49, 1.016)
ELECTRICAL		
Max. Operating Voltage - UL	300V	300V
DC Resistance Max	Reference UL 44	Reference UL 44
DC Resistance Nominal	Reference UL 44	Reference UL 44
Characteristic Impedance Ohms	110 nominal	110 nominal
Capacitance pF/ft (pF/m)	14 (45.9)	14 (45.9)
Velocity of Propagation	75% nominal	75% nominal

EXTREME ENGINEERING:



Products

SIGNAL, CONTROL + COMMUNICATION



Actuator Sensor Interface

Proven to Perform in the Toughest Environments.

Widely used, AS-i bus cables from NWI are used in network systems for low field level automation and industrial communication. They facilitate a broader spectrum of control needs and allow data and power transmission at the same time. AS-i bus cables from NWI offer easy and cost-effective network solutions.



	AS-i Plus	AS-i
FEATURES		
Signal	✓	✓
Control	✓	✓
Instrumentation	✓	✓
ATTRIBUTES		
Low-Temperature Rating	-30°C	-30°C
High-Temperature Rating	105°C	105°C
Cold Bend	-30°C	-30°C
Cold Impact	-	-
Impact Resistant	★	★
Crush Resistant	★	★
Flame Resistant	UL 1685 Vertical tray, FT4	UL 1685 Vertical tray, FT4
Exposed Run Rated	✓	-
Direct Burial Rated	✓	-
Hazardous	Class I, Div 2	Class I, Div 2
Wet Location Use	✓	✓
Chemical Resistant	★	★
Sunlight/UV Resistant	✓	✓
Cut/Abrasion Resistant (unarmored)	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CE	✓	✓
NEC®	✓	✓
IEC	✓	✓
RoHS2	✓	✓
REACH	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Instrumentation
- Control

BENEFITS:

- UL listed ITC/PLTC and approved for CE Mark
- Designed to exacting AS-i Standard
- Competitively priced
- Delivers consistent, reliable performance for your sophisticated industrial networking solution
- High flex, flame resistant, exposed run and direct burial listed versions available
- Rugged designs resistant to UV, chemicals, water, abrasion and more
- Versatile - suitable for use in Class I, Div 2 areas

- Custom color options available and industry standard orange, yellow or black
- Custom and composite options available
- Overmold and assembly compatible
- Retractable options

DYNAMIC RANGE OF USE:

- Designed for connecting simple I/O devices
- Used as a partnering device for higher level protocol cables such as Profibus®, DeviceNet™ and Industrial Ethernet

	AS-i Plus	AS-i
INSULATED CONDUCTORS		
Conductor Count	2	2
AWG (mm2)	16 (1.31)	16 (1.31)
Stranding	19 strand	19 strand
Material	PVC/Nylon	PVC
Minimum Wall Thickness inches (mm)	.014 / .004 (0.35 / .012)	.020 (0.51)
OUTER JACKET		
Material	PVC	PVC
Color	Black, Orange, Yellow, Blue	Black, Orange, Yellow, Blue
Overall OD inches (mm)	.285 (7.24)	.280 (7.11)
ELECTRICAL		
Max. Operating Voltage - UL	150V - 300V	150V - 300V
Resistance Max mΩ/ft (mΩ/m)	< 27.4 @ 167 kHz < 90 @ 167 kHz	< 27.4 @ 167 kHz < 90 @ 167 kHz
Impedance Ohms	70 - 140	70 - 140
Capacitance pF/ft (pF/m)	< 25 < 80	< 25 < 80
Inductance μH/ft (μH/m)	1312.3 - 4265.1 400 -1300	1312.3 - 4265.1 400 -1300

EXTREME ENGINEERING:



Products

SIGNAL, CONTROL + COMMUNICATION

TIA | EIA

Telecommunications Industry Association | Electronics Industry Association

Made in the USA.

Standards compliant, select from high speed, high flex, harsh duty, custom configurations featuring optimal EMI/RFI shielding capabilities. Our products meet or exceed the standards developed by an alliance of trade associations for U.S. electronic manufacturers, suppliers of global networks and transmission protocols. Compliance to TIA/ EIA ensures the equipment of different manufacturers is compatible and interchangeable.

EIA RS-232:

Interface between data processing terminal and communication equipment

TIA/ EIA 485:

Electrical characteristics of generators and receivers in balanced digital multipoint systems

TIA/ EIA 568-B:

Commercial building telecommunications standard

TIA/ EIA 644:

Electrical characteristics of low voltage differential signaling interface circuits

	EIA RS-232	TIA/ EIA 485	TIA/ EIA 568-B	TIA/ EIA 644
FEATURES				
Signal	✓	✓	✓	✓
Control	✓	✓	✓	✓
Power	-	-	✓	-
ATTRIBUTES				
Low-Temperature Rating	★	★	★	★
High-Temperature Rating	★	★	★	★
Cold Bend	★	★	★	★
Cold Impact	★	★	★	★
Impact Resistant	★	★	★	★
Crush Resistant	★	★	★	★
Flame Resistant	★	★	★	★
Wet Location Use	★	★	★	★
Oil Resistant	★	★	★	★
Chemical Resistant	★	★	★	★
Sunlight/UV Resistant	★	★	★	★
Cut/Abrasion Resistant (unarmored)	★	★	★	★
Weld Flash Resistant	★	★	★	★
Weld Slag Resistant	★	★	★	★
FLEXIBILITY				
Torsional Flex	★	★	★	★
Rolling Flex	★	★	★	★
Variable Flex	★	★	★	★
Bend Flex	★	★	★	★
Continuous Flex	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE				
UL	✓	✓	✓	✓
CSA	✓	✓	✓	✓
CE	✓	✓	✓	✓
EIA	✓	✓	✓	✓
TIA	-	✓	✓	✓
RoHS2	✓	✓	✓	✓
REACH	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES

- Signal
- Control
- Power

BENEFITS:

- TIA and EIA standards compliant
- UL recognized AWM Style and CSA certified and approved for CE Mark
- Compliant to requirements for RoHS2 and REACH standards
- Highly customizable including shielding and high flex constructions
- Composite and custom options available
- Over-mold and assembly compatible
- Available in retractile

DYNAMIC RANGE OF USE:

- Data Transfer
- Communications
- Voice
- Audio
- Video
- Automotive infotainment systems
- Machine Vision
- Notebook & tablet computers
- Intelligent Transportation Systems
- LAN & Home Networks
- Ethernet CAT 5e

	EIA RS-232	TIA/ EIA 485	TIA/ EIA 568-B	TIA/ EIA 644
INSULATED CONDUCTORS				
Conductor Count	3+	3+ (1 Pair)	4 (pairs)	2+
AWG (mm ²)	34 - 10 (.022 - 5.07)	34 - 10 (.022 - 5.07)	24 - 14 (0.25 - 2.3)	34 - 10 (.022 - 5.07)
Stranding - Nominal Diameter of individual strands AWG in inches (mm)	.005+ (0.127+)	.005+ (0.127+)	.005+ (0.127+)	.005+ (0.127+)
Material	PVC Semi-rigid PVC Polyolefin Cross link Polyolefin Foamed Polyethylene	PVC Semi-rigid PVC Polyolefin Cross link Polyolefin Foamed Polyethylene	Polypropylene Cross Link Polyethylene Foamed Polyethylene Polyethylene	Polypropylene Cross Link Polyethylene Foamed Polyethylene Polyethylene
Insulation Wall Thickness inches (mm)	.004+ (0.102+)	.004+ (0.102+)	.004+ (0.102+)	.004+ (0.102+)
OVERALL CABLING				
Fillers	★	★	★	★
Shielding	★	★	★	★
Armoring	★	★	★	★
Wraps	★	★	★	★
Strength Members	★	★	★	★
OUTER JACKET				
Material	PVC TPE TPU TPR Foamed Polyethylene	PVC TPE TPU TPR Foamed Polyethylene	PVC TPE TPU TPR Foamed Polyethylene	PVC TPE TPU TPR Foamed Polyethylene
Color	★	★	★	★
Minimum Acceptable Jacket Wall Thickness inches (mm)	.010+ (0.254)	.010+ (0.254)	.010+ (0.254)	.010+ (0.254)
ELECTRICAL				
Max. Operating Voltage - UL	30V - 2000V	30V - 2000V	30V - 2000V	30V - 2000V
DC Resistance Max Ω/1000ft (Ω/m)	-	-	Dependent on construction	Dependent on construction
DC Resistance Nominal mΩ/ft (mΩ/m)	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Impedance Ohms	-	-	100 ± 15	110 ± 10
Mutual Capacitance pF/ft Nominal	< 2500 pF	-	-	-

FLEX:



EXTREME ENGINEERING:



Products

SIGNAL, CONTROL + COMMUNICATION

UL 2250 | Instrumentation Tray Cable

Custom-Configured Cost Savings.

Customizable in virtually endless options to fit your unique application requirements and specifications. NWI's ITC industrial instrument and control wiring is engineered to meet or exceed application requirements for factory floor automation equipment, material handling, sensors and transducers, process controls and other applications.

Multiple Product Platforms. Endless Options.

NORTHWIRE ITC-GP

General Purpose—for price sensitive applications.

NORTHWIRE ITC-GP(ER)

General Purpose/Exposed Run— most economical ER-rated cable; for lower-cost indoor installation where exposed-run-rated cabling is desired.

NORTHWIRE ITC-DB(ER)

Direct Burial/Exposed Run—for outdoor use and direct burial applications where maximum crush resistance is needed and exposed run can be used.

PRODUCT SPECIFICATIONS:

NWI also offers all major network protocols such as:

- FOUNDATION™ fieldbus
- ODVA™
- DeviceNet™
- PROFIBUS® DP and PA
- PROFINET®
- AS-i®
- CC-Link®
- CANopen®
- CAN-Bus®
- HART®

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Lower installation costs - no conduit needed
- Saves space - inherently smaller and less expensive than standard tray cable
- Designed and approved for wet installation
- Versatile -suitable for use in Class I, Div 2 areas

DYNAMIC RANGE OF USES:

- Factory floor automation equipment
- Material handling
- Sensors and transducers
- Process controls
- Variable Frequency Drives (VFD)
- Other applications

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



Need MSHA
rated cables?

Contact us for
hundreds of part
numbers!



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	General Purpose	Exposed Run	Direct Burial
FEATURES			
Signal	✓	✓	✓
Control	✓	✓	✓
Instrumentation	✓	✓	✓
Power	✓	✓	✓
FLEXIBILITY			
Bend Flex	✓	✓	✓
ATTRIBUTES			
Low-Temperature Rating	≤ -20°C	≤ -20°C	≤ -20°C
High-Temperature Rating	105°C	105°C	105°C
Cold Bend	✓	✓	✓
Impact Resistant	-	✓	-
Crush Resistant	-	✓	✓
Flame Resistant	FT4/IEEE1202, UL1685 Vertical-Tray	FT4/IEEE1202, UL1685 Vertical-Tray	FT4/IEEE1202, UL1685 Vertical-Tray
Exposed Run Rated	-	✓	✓
Hazardous	Class I, Div 2	Class I, Div 2	Class I, Div 2
Direct Burial Rated	-	-	✓
Wet Location Use	★	★	★
Oil Resistant	★	★	★
Chemical Resistant	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓
Weld Slag Resistant	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE			
UL	✓	✓	✓
ANSI	✓	✓	✓
CE	✓	✓	✓
NEC®	Article 727	Article 727	Article 727
NFPA 79	-	-	-
RoHS2	✓	✓	✓
REACH	★	★	★
PRODUCT SPECIFICATIONS			
FOUNDATION™ fieldbus	✓	✓	✓
ODVA™	✓	✓	✓
DeviceNet™	✓	✓	✓
PROFIBUS® DP and PA	✓	✓	✓
PROFINET®	✓	✓	✓
AS-i®	✓	✓	✓
CC-Link®	✓	✓	✓
CANopen®	✓	✓	✓
CAN-Bus®	✓	✓	✓
HART®	✓	✓	✓

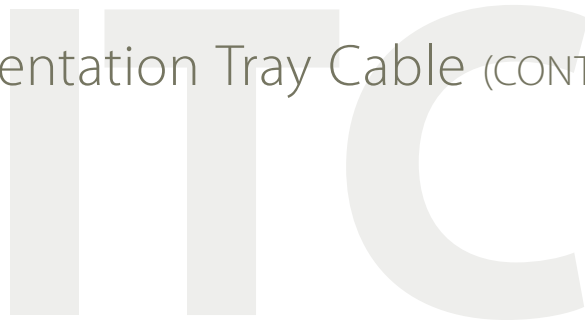
KEY:
 - Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available

FLEX: EXTREME ENGINEERING:



Products
AGENCY STANDARDS

UL 2250 | Instrumentation Tray Cable (CONTINUED)



	General Purpose			
Material	ETFE, ECTFE, FEP, SRPVC	XLPE	PVC	PVC/Nylon
INSULATED CONDUCTORS				
Insulation Wall Thickness AWG in inches (mm)	22-20 .009 (0.23) 19-15 .009 (0.23) 14-12 .012 (0.30)	All sizes .020 (0.51)	22-20 .012 (0.30) 19-15 .015 (0.38) 14-12 .020 (0.51)	22-20 .015 / .005 (.38 / .13) 19-15 .015 / .005 (.38 / .13) 14-12 .015 / .005 (.38 / .13)
Conductor Count	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	22-12 (.325 - 3.309)	22-12 (.325 - 3.309)	22-12 (.325 - 3.309)	22-12 (.325 - 3.309)
AWG - Minimum Strand Count	★	★	★	★
OVERALL CABLING				
Fillers	★	–	★	★
Ground	★	–	★	★
Shielding	★	–	★	★
Armoring	★	–	★	★
Wraps	★	–	★	★
Strength Members	★	–	★	★
OUTER JACKET				
Material	PVC or TPE	–	PVC or TPE	PVC or TPE
Color	★	–	★	★
Overall OD inches (mm)	Determined by AWG size and number of conductors	–	Determined by AWG size and number of conductors	Determined by AWG size and number of conductors
ELECTRICAL				
Max. Operating Voltage - UL	150V	150V	150V	150V
DC Resistance	UL 2250, tables 11.1 & 11.2	–	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2
Ampacity	5 amp max	5 amp max	5 amp max	5 amp max

Products

AGENCY STANDARDS

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



- KEY:
- Not Applicable
 - ✓ Featured
 - ★ Cost Competitive Custom Options Available



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Exposed Run		Direct Burial	
XLPE	PVC/Nylon	XLPE	PVC/Nylon
All sizes .020 (0.51)	22-20 .015 / .005 (.38 / .13) 19-15 .015 / .005 (.38 / .13) 14-12 .015 / .005 (.38 / .13)	All sizes .020 (0.51)	22-20 .015 / .005 (.38 / .13) 19-15 .015 / .005 (.38 / .13) 14-12 .015 / .005 (.38 / .13)
2 or more	2 or more	2 or more	2 or more
22-12 (.325 - 3.309)	22-12 (.325 - 3.309)	22-12 (.325 - 3.309)	22-12 (.325 - 3.309)
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
PVC or TPE	PVC or TPE	PVC or TPE	PVC or TPE
★	★	★	★
Determined by AWG size and number of conductors	Determined by AWG size and number of conductors	Determined by AWG size and number of conductors	Determined by AWG size and number of conductors
150V	150V	150V	150V
UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2	UL 2250, tables 11.1 & 11.2
5 amp max	5 amp max	5 amp max	5 amp max

FLEX: EXTREME ENGINEERING:



Products
AGENCY STANDARDS

UL 13 | Power-Limited Tray Cable

Custom Engineered Solutions. Meet or Exceed Agency Standards.

For factory installation in discrete and continuous process automation and instrumentation applications, select from a variety of options, including conductors, gauge size, shielding and armoring to meet your demands. Partner with our engineers to manufacture cost-effective, custom solutions and navigate the complexities of ITC, PLTC and the corresponding UL requirements. With over 40 years of experience, we understand the criticality of transmitting analogue and digital signals in instrument and control systems.

Products

AGENCY STANDARDS

	PLTC Power Limited Tray Cable	CL2 Class 2 Circuit Rating	CL3 Class 3 Circuit Rating	CL2R Class 2 Circuit Rating Riser	CL3R Class 3 Circuit Rating Riser	CL2X Class 2 Circuit Rating Limited Use	CL3X Class 3 Circuit Rating Limited Use
FEATURES							
Signal	✓	✓	✓	✓	✓	✓	✓
Control	✓	✓	✓	✓	✓	✓	✓
Instrumentation	✓	✓	✓	✓	✓	✓	✓
ATTRIBUTES							
Low-Temperature Rating	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C
High-Temperature Rating	105°C	105°C	105°C	105°C	105°C	105°C	105°C
Cold Bend	✓	✓	✓	✓	✓	✓	✓
Impact Resistant	✓	–	–	–	–	–	–
Crush Resistant	✓	–	–	–	–	–	–
Flame Resistant	FT4/IEEE 1202, UL1685 Vertical-Tray	FT4/IEEE 1202, UL1685 Vertical-Tray	FT4/IEEE 1202, UL1685 Vertical-Tray	UL 1666 Riser, FT4	UL 1666 Riser, FT4	VW-1	VW-1
Exposed Run Rated	✓	–	–	–	–	–	–
Direct Burial Rated	✓	–	–	–	–	–	–
Hazardous	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2
Wet Location Use	✓	✓	✓	✓	✓	✓	✓
Oil Resistant	I and II	–	–	–	–	–	–
Chemical Resistant	✓	✓	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓	✓	✓
FLEXIBILITY							
Torsional Flex	★	★	★	★	★	★	★
Rolling Flex	★	★	★	★	★	★	★
Variable Flex	★	★	★	★	★	★	★
Bend Flex	★	★	★	★	★	★	★
Continuous Flex	★	★	★	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE							
UL	✓	✓	✓	✓	✓	✓	✓
ANSI	✓	✓	✓	✓	✓	✓	✓
CE	✓	✓	✓	✓	✓	✓	✓
IEEE	✓	✓	✓	✓	✓	✓	✓
NEC®	Article 725	Article 725	Article 725	Article 725	Article 725	Article 725	Article 725
NFPA 70	✓	✓	✓	✓	✓	✓	✓
NFPA 79	✓	✓	✓	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓	✓	✓	✓
REACH	✓	✓	✓	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available

Shop for:
 UL 2250 ITC
 listed products
Pages 84-87

ITC/PLTC
 rated products
Page 58

FEATURES:

- Signal
- Control
- Instrumentation

BENEFITS:

- UL listed and approved for CE Mark
- Agency compliant to ANSI, NEC®, IEEE, NFPA, RoHS2 and REACH standards
- Dynamic temperature range from -20°C to 105°C
- Cold bend, impact and crush resistant
- Flame resistant
- Exposed run and direct burial

- Suitable for use in wet locations
- Versatile - suitable for use in Class I, Div 2 areas
- Chemical, sunlight, Oil I and II resistant
- Composite and custom options available
- Over-mold and assembly
- Retractable options available



NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

DYNAMIC RANGE OF USE:

- Transmission of analog and digital signals
- Intercom systems
- Security alarms
- Computer interconnections

	PLTC Power Limited Tray Cable	CL2 Class 2 Circuit Rating	CL3 Class 3 Circuit Rating	CL2R Class 2 Circuit Rating Riser	CL3R Class 3 Circuit Rating Riser	CL2X Class 2 Circuit Rating Limited Use	CL3X Class 3 Circuit Rating Limited Use
INSULATED CONDUCTORS							
Conductor Count	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	22-12 (.34-4.0)	30-12 (.05-4) 11-6 (5.0-16) audio only	24-10 (.25-6)	30-12 (.05-4) 11-6 (5.0-16) audio only	24-10 (.25-6)	30-12 (.05-4) 11-6 (5.0-16) audio only	24-10 (.25-6)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm2)	★	★	★	★	★	★	★
Material	ETFE,ECTFE, FEP, SRPVC, PVC with or without nylon, XLPE	ETFE,ECTFE, FEP, SRPVC, PVC with or without nylon, XLPE	ETFE,ECTFE, FEP, SRPVC, PVC with or without nylon, XLPE	ETFE,ECTFE, FEP, SRPVC, PVC with or without nylon, XLPE	ETFE,ECTFE, FEP, SRPVC, PVC with or without nylon, XLPE	PVC	PVC
Insulation Wall Thickness AWG in inches (mm)	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction
OVERALL CABLING							
Fillers	★	★	★	★	★	★	★
Ground	★	★	★	★	★	★	★
Shielding	★	★	★	★	★	★	★
Armoring	★	★	★	★	★	★	★
Wraps	★	★	★	★	★	★	★
Strength Members	★	★	★	★	★	★	★
OUTER JACKET							
Material	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE, Polyurethane	PVC, TPE, Polyurethane
Color	★	★	★	★	★	★	★
Overall OD inches (mm)	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction	Dependent on construction
ELECTRICAL							
Max. Operating Voltage - UL	300V	30V	300V	30V	300V	30V	300V
DC Resistance	UL 13, Table 17.1, 17.2	UL 13, Table 17.1, 17.2	UL 13, Table 17.1, 17.2	UL 13, Table 17.1, 17.2	UL 13, Table 17.1, 17.2	UL 13, Table 17.1, 17.2	UL 13, Table 17.1, 17.2
Ampacity	No ampacity for signal cables	No ampacity for signal cables	No ampacity for signal cables	No ampacity for signal cables	No ampacity for signal cables	No ampacity for signal cables	No ampacity for signal cables

Products

AGENCY STANDARDS

FLEX:



EXTREME ENGINEERING:



UL 1277 | Tray Cable

Experience Value with Velocity from the Industry Leader.

Engineered to withstand weld slag, our flame resistant cables resist chemicals, oil, UV and crush. Exposed run and impact resistant, our harsh-duty products consistently deliver in refineries, robotics, power generation sets and beyond.

	TW, THW, THW-2, THHW	THWN, THWN-2, THHN	TF, TFF	TFN, TFFN
FEATURES				
Control	✓	✓	✓	✓
Power	✓	✓	✓	✓
ATTRIBUTES				
Low-Temperature Rating	-25°C*	-25°C*	-25°C*	-25°C*
High-Temperature Rating	60°C, 75°C, 90°C	60°C, 75°C, 90°C	90°C	90°C
Cold Bend	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
Cold Impact	-25°C*	-25°C*	-25°C*	-25°C*
Impact Resistant	✓	✓	✓	✓
Crush Resistant	✓	✓	✓	✓
Flame Resistant	FT4/IEEE 1202	FT4/IEEE 1202	FT4/IEEE 1202	FT4/IEEE 1202
Exposed Run Rated	✓	✓	✓	✓
Direct Burial Rated	★	★	★	★
Hazardous	Class I, Div 2	Class I, Div 2	Class I, Div 2	Class I, Div 2
Wet Location Use	✓	✓	✓	✓
Oil Resistant	I and II	I and II	I and II	I and II
Chemical Resistant	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓
Weld Slag Resistant	✓	✓	✓	✓
FLEXIBILITY				
Torsional Flex	★	★	★	★
Rolling Flex	★	★	★	★
Variable Flex	★	★	★	★
Bend Flex	★	★	★	★
Continuous Flex	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE				
UL	✓	✓	✓	✓
ANSI	✓	✓	✓	✓
CE	✓	✓	✓	✓
IEEE	✓	✓	✓	✓
NEC®	Article 336	Article 336	Article 336	Article 336
NFPA 70	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓
REACH	✓	✓	✓	✓

* Required to pass -40°C impact to receive extreme cold rating

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Control
- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, IEEE, NEC®, NFPA, RoHS2 and REACH standards
- Hybrid, composite and custom options available
- Over-mold and assembly compatible
- Retractable options available
- Suitable for use in Class I, Div 2 areas
- Versatile

DYNAMIC RANGE OF USE:

- Engineered for rugged industrial applications
- Refineries, robotics and power generation sets
- Exposed run, cold bend and cold impact resistant
- Crush, impact and flame resistant
- Water, oil I and II, chemical, sunlight and weld slag resistant

	TW, THW, THW-2, THHW	THWN, THWN-2, THHN	TF, TFF	TFN, TFFN
INSULATED CONDUCTORS				
Conductor Count	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	14 - 12 (2.08 - 3.31) 10 (5.26) 8 (8.37) 6 (13.3)	14 - 12 (2.08 - 3.31) 10 (5.26) 8 (8.37) 6 (13.3)	18 - 16 (0.824 - 1.31)	18 - 16 (0.824 - 1.31)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.254 - .813) 10 .010 - .0385 (.254 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .0640 (.510 - 1.626)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.254 - .813) 10 .010 - .0385 (.254 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .0640 (.510 - 1.626)	18 - 16 .005 - .0159 (.127 - .404)	18 - 16 .005 - .0159 (.127 - .404)
Material	PVC	PVC/Nylon	PVC	PVC/Nylon
Minimum Wall Thickness inches (mm)	.030 (0.762) .030 (0.762) .045 (1.143) .060 (1.524)	.015 / .004 (0.381 / 0.102) .020 / .004 (0.508 / .0102) .030 / .005 (0.762 / 0.127) .030 / .005 (0.762 / 0.127)	.030 (0.762)	.015 / .004 (0.381 / 0.102)
OVERALL CABLING				
Fillers	★	★	★	★
Ground	★	★	★	★
Shielding	★	★	★	★
Wraps	★	★	★	★
Strength Members	★	★	★	★
OUTER JACKET				
Material	PVC,TPE	PVC,TPE	PVC,TPE	PVC,TPE
Color	★	★	★	★
Jacket wall thickness based on core diameter inches (mm)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.50 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.50 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.50 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.50 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)
ELECTRICAL				
Max. Operating Voltage - UL	600V	600V	600V	600V
DC Resistance Max	Reference UL 83	Reference UL 83	Reference UL 66	Reference UL 66
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	See Chart A, Page 165	See Chart A, Page 165	See Chart A, Page 165	See Chart A, Page 165

FLEX:



EXTREME ENGINEERING:



Products
AGENCY STANDARDS

UL 1569 | Metal-Clad Cable

Made in the USA. OEM Direct Savings.

Enjoy no minimum order quantity requirements and the industry's fastest lead times on all of our products including our UL 1569 Metal Clad options - *Made in the USA for over 40 years.*



	TFN, TFFN	THWN, THWN-2, THHN
FEATURES		
Signal	✓	✓
Control	✓	✓
Instrumentation	✓	✓
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	-25°C	-25°C
High-Temperature Rating	90°C	90°C
Cold Bend	-25°C	-25°C
Impact Resistant	✓	✓
Crush Resistant	✓	✓
Flame Resistant	FT4/IEEE 1202, UL 1685 Vertical-Tray	FT4/IEEE 1202, UL 1685 Vertical-Tray
Exposed Run Rated	✓	✓
Hazardous Area	Class I, Div 2	Class I, Div 2
Wet Location Use	✓	✓
Oil Resistant	I and II	I and II
Chemical Resistant	✓	-
Sunlight/UV Resistant	✓	✓
Cut/Abrasion Resistant	✓	✓
Weld Flash Resistant	✓	✓
Weld Slag Resistant	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	-
CE	✓	-
NEC®	Article 330	Article 330
NFPA 70	✓	✓
RoHS2	✓	✓
REACH	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL 1569 listed and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Hybrid, composite and custom options available
- Engineered for rugged applications
- Resistant to cold bend
- Crush and impact resistant
- Resistant to water, oil I and II, chemical, sunlight and weld slag
- Versatile - suitable for use in Class I, Div 2 areas

DYNAMIC RANGE OF USE

- For power, lighting, control and signal circuits
- Indoors, exposed or concealed
- Outdoors or in wet locations where the armor has an overall outer, moisture resistant PVC jacket and the conductors are wet rated
- Interconnectivity and connectivity
- In cable tray or as exposed run
- In locations classified as hazardous as permitted in NEC® Articles 501, 502, 503, 504, and 505

	TFN, TFFN	THWN, THWN-2, THHN
INSULATED CONDUCTORS		
Conductor Count	2 or more	2 or more
AWG (mm2)	18 - 16 (0.824 - 1.31)*	14 - 12 (2.08 - 3.31)* 10 (5.26) 8 (8.37) 6 (13.3)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	18 - 16 .005 - .0159 (.127 - .404)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .0640 (.510 - 1.626)
Material	PVC/Nylon	PVC/Nylon
Minimum Wall Thickness AWG in inches (mm)	.015 / .004 (0.381 / 0.102)	14-12 .015 / .004 (0.38 / 0.10) 10 .020 / .005 (0.51 / 0.13) 8-6 .030 / .005 (0.76 / 0.13) 4-2 .040 / .006 (0.102 / 0.15)
OVERALL CABLING		
Fillers	★	★
Shielding	★	★
Interlock Armoring	✓	✓
Wraps	★	★
Strength Members	★	★
OUTER JACKET		
Material	PVC	
Color	★	
Overall OD inches (mm) Thicknesses of jacket under or over the armor	0 - .425, .040 (0 - 10.80, 1.02) .426 - 1.500, .050 (10.81 - 38.10, 1.27) 1.500 - 2.250, .060 (38.10 - 57.15, 1.52)	
ELECTRICAL		
Max. Operating Voltage - UL	600V	
DC Resistance Max	Reference UL 83	
DC Resistance Nominal	See Chart C, Page 166	
Ampacity	18-16 AWG Article 402.5 14 AWG and larger 310.15 or 310.60	

* Mixing of AWG sizes is permitted

EXTREME ENGINEERING:





Resilience™ | UL 2277 | Flexible Motor Supply Cable and Wind Turbine Tray Cable

Guaranteed to Perform in the Harshest Environments.

Our flexible, rugged and technically advanced Resilience Cables are engineered and constructed with high-performance stranding that's rated for constant flex per NFPA 79 (12.2.2). Resilience™ is your assurance for ultra-reliable performance in the wind turbine nacelle for low-voltage control and power applications.

	TW, THW, THW-2 THHN	THWN, THWN-2, THHN	TF, TFF	TFN, TFFN
FEATURES				
Control	✓	✓	✓	✓
Power	✓	✓	✓	✓
ATTRIBUTES				
Low-Temperature Rating	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
High-Temperature Rating	90°C	90°C	90°C	90°C
Cold Bend	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
Flame Resistant	FT4, UL1685 Vertical-Tray	FT4, UL1685 Vertical-Tray	FT4, UL1685 Vertical-Tray	FT4, UL1685 Vertical-Tray
Wet Location Use	✓	✓	✓	✓
Oil Resistant	I and II	I and II	I and II	I and II
Chemical Resistant	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓
Weld Flash Resistant	✓	✓	✓	✓
Weld Slag Resistant	✓	✓	✓	✓
FLEXIBILITY				
Torsional Flex	★	★	★	★
Rolling Flex	★	★	★	★
Variable Flex	★	★	★	★
Bend Flex	★	★	★	★
Continuous Flex	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE				
UL	✓	✓	✓	✓
ANSI	✓	✓	✓	✓
CE	✓	✓	✓	✓
NEC®	Article 336	Article 336	Article 402	Article 402
NFPA 79	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓
REACH	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



- KEY:**
- Not Applicable
 - ✓ Featured
 - ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES

- Control
- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Oil Res I and II
- Rugged and ultra-reliable
- Outstanding torsional and bend high flex life
- High performance stranding rated for constant flex
- Cold bend test as low as -25°C
- Highly oil and flame resistant

- Composite and custom options available
- Over-mold and assembly compatible
- Retractable options available

DYNAMIC RANGE OF USE:

- Wind Turbine Tray Cable low-voltage control, power and data
- Installation in cable trays or raceways within a wind turbine generator and nacelles
- Flexible Motor Supply Cable
- Variable Frequency Drives (VFD)
- Servo motors

	TW, THW, THW-2 THHN	THWN, THWN-2, THHN	TF, TFF	TFN, TFFN
INSULATED CONDUCTORS				
Conductor Count	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	14 - 12 (2.08 - 3.31) 10 (5.26) 8 (8.37) 6 (13.3)	14 - 12 (2.08 - 3.31) 10 (5.26) 8 (8.37) 6 (13.3)	18 - 16 (0.824 - 1.31)	18 - 16 (0.824 - 1.31)
Stranding - Minimum and Maximum Diameter of individual wires AWG in inches (mm)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.254 - .813) 10 .010 - .0385 (.254 - .978) 8 .0201 - .0508 (.511 - 1.29) 6 .0201 - .064 (.511 - 1.626)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.254 - .813) 10 .010 - .0385 (.254 - .978) 8 .0201 - .0508 (.511 - 1.29) 6 .0201 - .064 (.511 - 1.626)	18 - 16 .005 - .0159 (.127 - .404)	18 - 16 .005 - .0159 (.127 - .404)
Material	PVC	PVC/Nylon	PVC	PVC/Nylon
Minimum Wall Thickness in inches (mm)	.030 (0.762) .030 (0.762) .045 (1.143) .060 (1.524)	.015 / .004 (0.381 / 0.102) .020 / .004 (0.508 / .0102) .030 / .005 (0.762 / 0.127) .030 / .005 (0.762 / 0.127)	.030 (0.762)	.015 / .004 (0.381 / 0.102)
OVERALL CABLING				
Fillers	★	★	★	★
Shielding	★	★	★	★
Wraps	★	★	★	★
Strength Members	★	★	★	★
OUTER JACKET				
Material	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE
Color	★	★	★	★
Overall OD inches and jacket thickness inches (mm)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)	0 - .425, .045 (0 - 10.80, 1.14) .426 - .700, .060 (10.81 - 17.78, 1.52) .701 - 1.500, .080 (17.78 - 38.10, 2.03) 1.501 - 2.500, .110 (38.10 - 63.50, 2.79) ≥ 2.501, .140 (63.50, 3.56)
ELECTRICAL				
Max. Operating Voltage - UL	600V - 1000V	600V - 1000V	600V - 1000V	600V - 1000V
DC Resistance Max	Reference UL 83	Reference UL 83	Reference UL 66	Reference UL 66
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	NEC® Article 392.80(A)	NEC® Article 392.80(A)	NEC® Article 402.5	NEC® Article 402.5

Products AGENCY STANDARDS

FLEX:



EXTREME ENGINEERING:



CSA C22.2 No. 239 | Control and Instrumentation Cables | CSA C22.2 No. 230 | Tray Cables

Performance-Driven, Cost Savings.

Rugged applications are engineered to meet or exceed agency requirements. With a wide temperature range, crush and impact resistance, our cable is ideally suited for plant expansion and new factory construction.

	CIC		CIC-TC		
FEATURES					
Signal	✓	✓	✓	✓	✓
Control	✓	✓	✓	✓	✓
Instrumentation	✓	✓	✓	✓	✓
ATTRIBUTES					
Low-Temperature Rating	-25°C	-25°C	-40°C *	-40°C *	-40°C *
High-Temperature Rating	75°C (Wet), 105°C (Dry)	90°C (Wet), 105°C (Dry)	75°C (Wet), 105°C (Dry)	90°C (Wet), 90°C (Dry)	75°C (Wet), 105°C (Dry)
Cold Bend	-25°C	-25°C	-40°C *	-40°C *	-40°C *
Cold Impact	-25°C	-25°C	-40°C *	-40°C *	-40°C *
Impact Resistant	–	–	✓	✓	✓
Crush Resistant	✓	✓	✓	✓	✓
Flame Resistant	FT1	FT1	FT4/IEEE 1202	FT4/IEEE 1202	FT4/IEEE 1202
Direct Burial Rated	–	–	✓	✓	✓
Water Resistant	✓	✓	✓	✓	✓
Oil Resistant	✓	✓	✓	✓	✓
Chemical Resistant	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓
1,000 Hour Weatherometer Compliant	–	–	✓	✓	✓
Weld Slag Resistant	✓	✓	✓	✓	✓
FLEXIBILITY					
Torsional Flex	★	★	★	★	★
Rolling Flex	★	★	★	★	★
Variable Flex	★	★	★	★	★
Bend Flex	★	★	★	★	★
Continuous Flex	★	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE					
CSA	✓	✓	✓	✓	✓
CE	✓	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓	✓
REACH	✓	✓	✓	✓	✓

* -40°C markings allowed only on 14 AWG and larger

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES

- Signal
- Control
- Instrumentation

BENEFITS:

- CSA certified and approved for CE Mark
- Compliant to RoHS2 and REACH standards
- Meets 1,000 hour weatherometer requirement
- Cold temperature and cold impact resistant
- Cost savings as ducts and conduits are not required
- Impact and crush resistant
- Oil, chemical, water, and UV resistant
- Direct burial options available

- Excellent elongation and high insulation resistance
- Low dielectric strength

DYNAMIC RANGE OF USE:

- Plant expansion and new factory installation
- Machine tool equipment
- Industrial equipment
- Servo motors
- Variable Frequency Drives (VFD)

	CIC		CIC-TC		
INSULATED CONDUCTORS					
Conductor Count	2-75	2-75	2-75	2-75	2-75
AWG (mm2)	26-14 (0.14-2.08)	26-14 (0.14-2.08)	18-8 (0.824-8.37)	18-8 (0.824-8.37)	18-8 (0.824-8.37)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	18-16 .005-.0159 (.127-.404) 14 .0063-.0253 (.160-.643) 12 .010-.032 (.250-.813) 10 .010-.0385 (.250-.978) 8 .0201-.0508 (.510-1.29)	18-16 .005-.0159 (.127-.404) 14 .0063-.0253 (.160-.643) 12 .010-.032 (.250-.813) 10 .010-.0385 (.250-.978) 8 .0201-.0508 (.510-1.29)	18-16 .005-.0159 (.127-.404) 14 .0063-.0253 (.160-.643) 12 .010-.032 (.250-.813) 10 .010-.0385 (.250-.978) 8 .0201-.0508 (.510-1.29)	18-16 .005-.0159 (.127-.404) 14 .0063-.0253 (.160-.643) 12 .010-.032 (.250-.813) 10 .010-.0385 (.250-.978) 8 .0201-.0508 (.510-1.29)	18-16 .005-.0159 (.127-.404) 14 .0063-.0253 (.160-.643) 12 .010-.032 (.250-.813) 10 .010-.0385 (.250-.978) 8 .0201-.0508 (.510-1.29)
Material	PVC	XLPE	PVC	XLPE	PCV / Nylon
Minimum Wall Thickness AWG in inches (mm)	26-20 .015-.020 (0.381-0.508) 18-8 .020-.045 (0.508-1.143)	26-20 .015-.020 (0.381-0.508) 18-8 .020-.045 (0.508-1.143)	18-10 .030 (0.762) 8 .045 (1.143)	18-10 .030 (0.762) 8 .045 (1.143)	18-12 .015/.004 (0.381-0.1016) 10 .020/.004 (0.508/0.1016) 8 .030/.005 (0.762/0.127)
OVERALL CABLING					
Fillers	★	★	★	★	★
Ground	★	★	★	★	★
Shielding	★	★	★	★	★
Armoring	★	★	★	★	★
Wraps	★	★	★	★	★
AWG Strength Members	★	★	★	★	★
OUTER JACKET					
Material	PVC, TPE	PVC, TPE	TPE	TPE	TPE
Color	★	★	★	★	★
Jacket wall thickness based on core diameter in inches (mm)	0-.425, .045 (0-10.80, 1.14) .426-.700, .060 (10.81-17.78, 1.52) .701-1.500, .080 (17.78-38.10, 2.03) 1.501-2.500, .110 (38.10-63.50, 2.79) ≥2.501, .140 (63.50, 3.56)	0-.425, .045 (0-10.80, 1.14) .426-.700, .060 (10.81-17.78, 1.52) .701-1.500, .080 (17.78-38.10, 2.03) 1.501-2.500, .110 (38.10-63.50, 2.79) ≥2.501, .140 (63.50, 3.56)	0-.425, .045 (0-10.80, 1.14) .426-.700, .060 (10.81-17.78, 1.52) .701-1.500, .080 (17.78-38.10, 2.03) 1.501-2.500, .110 (38.10-63.50, 2.79) ≥2.501, .140 (63.50, 3.56)	0-.425, .045 (0-10.80, 1.14) .426-.700, .060 (10.81-17.78, 1.52) .701-1.500, .080 (17.78-38.10, 2.03) 1.501-2.500, .110 (38.10-63.50, 2.79) ≥2.501, .140 (63.50, 3.56)	0-.425, .045 (0-10.80, 1.14) .426-.700, .060 (10.81-17.78, 1.52) .701-1.500, .080 (17.78-38.10, 2.03) 1.501-2.500, .110 (38.10-63.50, 2.79) ≥2.501, .140 (63.50, 3.56)
ELECTRICAL					
Max. Operating Voltage - CSA	18-14 150V OR 300V 18-8 600V	18-14 150V OR 300V 18-8 600V	18-14 150V OR 300V 18-8 600V	26-20 150V OR 300V 18-8 300V OR 600V	26-20 150V OR 300V 18-8 300V OR 600V
DC Resistance Max	C22.2 No. 239	C22.2 No. 239	C22.2 No. 239 and C22.2 No. 230	C22.2 No. 239 and C22.2 No. 230	C22.2 No. 239 and C22.2 No. 230

Products

AGENCY STANDARDS

FLEX:

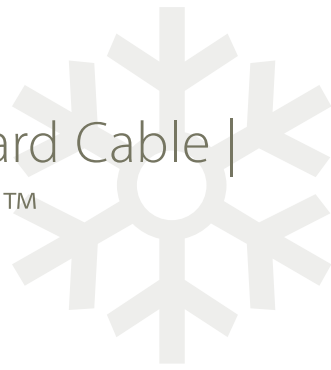


EXTREME ENGINEERING:



UL 1309 | CSA 245 | Marine Shipboard Cable | RIG 300™ | Extreme Frigid Flex RIG™

Arctic Grade. Proven Performance in the Field.



Meets or exceeds U.S. Coast Guard Regulations and American Bureau of Shipping Standards. Ideally suited for applications in cold climates where extreme performance is required, space is limited and reliability is paramount, including marine environments for offshore and fixed oil rigs, aboard fixed or floating offshore structures.

	RIG 300™	Extreme Frigid Flex RIG™
FEATURES		
Signal	✓	✓
Control	✓	✓
Instrumentation	✓	✓
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	-25°C	≤ -40°C
High-Temperature Rating	≥ 90°C	≥ 90°C
Cold Bend	-25°C	-55°C
Cold Impact	–	-40°C
Flame Resistant	FT4/IEEE 1202	FT4/IEEE 1202
Wet Location Use	✓	✓
Oil Resistant to Marine Standards	✓	✓
Chemical Resistant	✓	✓
Sunlight/UV Resistant	✓	✓
1,000 Hour Weatherometer Compliant	–	✓
Weld Flash Resistant	–	✓
Weld Slag Resistant	–	✓
FLEXIBILITY		
Torsional Flex	✓	✓
Rolling Flex	✓	✓
Variable Flex	✓	✓
Bend Flex	✓	✓
Continuous Flex	✓	✓
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CSA	–	✓
CE	✓	✓
IEEE	1580-2010, 45-98	1580-2010
ABS	✓	✓
RoHS2	✓	✓
REACH	✓	✓

Check out the Frigid Flex Press Release - available on www.northwire.com/pr

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:
 – Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available

MSC



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL listed and CSA 245 certified and approved for CE Mark
- Compliant to ANSI, IEEE, ABS, USCG, RoHS2 and REACH Standards
- Arctic rated
- Superior flexibility - torsional, rolling, variable, bend and continuous
- Long life expectancy
- Meets 1,000 hour weatherometer requirement

- Oil resistant to marine standards
- Resistant to water, UV and weld slag
- Approved for all colors
- Options for armored shield, over-braid, foil, composite and custom designs

DYNAMIC RANGE OF USE:

- Marine environments
- Aboard offshore and fixed oil drilling rigs

	RIG 300™		Extreme Frigid Flex RIG™		
INSULATED CONDUCTORS					
Conductor Count	Up to 60 pairs		Up to 60 pairs		
AWG (mm2)	Dependent on type - no AWG restrictions Otherwise 22 - 10 (0.325, 5.26)		Dependent on type - no AWG restrictions Otherwise 22 - 10 (0.325, 5.26)		
AWG Minimum Strand Count	★		★		
Material	PVC	PVC/Nylon	XLPE	PVC	PVC/Nylon
Insulation Wall Thickness AWG in inches (mm)	22-19 .020 (0.50) 18-16 .020 (0.50)	22-19 .015 / .004 (0.37 / 0.10) 18-16 .015 / .004 (0.37 / 0.10)	22-19 .015 (0.28) 18-16 .020 (0.50)	22-19 .020 (0.50) 18-16 .020 (0.50)	22-19 .015 / .004 (0.37 / 0.10) 18-16 .015 / .004 (0.37 / 0.10)
	Control and Distribution options available		Control and Distribution options available		
OVERALL CABLING					
Fillers	★		★		
Ground	★		★		
Shielding	★		★		
Armoring	★		★		
Wraps	★		★		
Strength Members	★		★		
OUTER JACKET					
Material	PVC		TPE		
Color	★		★		
Overall OD inches (mm)	Dependent on AWG size and number of conductors		Dependent on AWG size and number of conductors		
ELECTRICAL					
Max. Operating Voltage - UL	Signal 300V, Control and Distribution 600/1000V		Signal 300V, Control and Distribution 600/1000V		

FLEX:



EXTREME ENGINEERING:



UL 1426 | Electrical Cables for Boats

Marine Grade. Extreme Flex.

Meets or exceeds U.S. Coast Guard and American Bureau of Shipping regulations. Our extremely flexible, flame, oil and water resistant UL 1426 cables and retractiles are very easy to work with and available in flat, round, and oval shapes.

	TW, THW, THW-2, THHW	THWN, THWN-2, THHN
FEATURES		
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	≤ -25°C	≤ -25°C
High-Temperature Rating	105°C (60°C to 90°C wet)	105°C (60°C to 90°C wet)
Cold Bend	≤ -25°C	≤ -25°C
Flame Resistant	UL 1581 Section 1061, VW-1, FT2	UL 1581 Section 1061, VW-1, FT2
Wet Location Use	✓	✓
Oil Resistant	I	I
FLEXIBILITY		
Torsional Flex	★	★
Rolling Flex	★	★
Variable Flex	★	★
Bend Flex	★	★
Continuous Flex	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CE	✓	✓
NEC®	Article 310 and 400	Article 310 and 400
NFPA 70	✓	✓
ABS	✓	✓
USCG	✓	✓
RoHS2	✓	✓
REACH	✓	✓

*Not applicable for single conductor

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



ANSI CE

NEC®
ARTICLE
310 & 400



ABS USCG



REACH

KEY:

— Not Applicable

✓ Featured

★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES

- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to U.S. Coast Guard and American Bureau of Shipping regulations
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Composite and custom options available
- Available in flat, round and oval shapes
- Over-mold and assembly compatible
- Retractable options available

DYNAMIC RANGE OF USE:

- Marine pleasure craft
- Extremely flexible across wide temperature range
- Engineered for extreme cold bend
- Flame resistant
- Water and oil I resistant

	TW, THW, THW-2, THHW	THWN, THWN-2, THHN
INSULATED CONDUCTORS		
Conductor Count	2 - 4 Flat Cable only, 2 or more for multi-conductor round	2 - 4 Flat Cable only, 2 or more for multi-conductor round
AWG (mm2)	18-2 (0.824 - 33.6)	18-2 (0.824 - 33.6)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	18 - 16 .005 - .0159 (.127 - .404) 14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .064 (.510 - 1.626) 4 .0469 - .0772 (1.191 - 1.961) 2 .0591 - .0974 (1.501 - 2.4740)	18 - 16 .005 - .0159 (.127 - .404) 14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .064 (.510 - 1.626) 4 .0469 - .0772 (1.191 - 1.961) 2 .0591 - .0974 (1.501 - 2.4740)
Material	PVC	PVC/Nylon
Minimum Wall Thickness AWG in inches (mm)	18-10 .030 (0.76) 8 .045 (1.14) 6-2 .060 (1.52)	14-12 .015 / .004 (0.38 / 0.10) 10 .020 / .005 (0.51 / 0.13) 8-6 .030 / .005 (0.76 / 0.13) 4-2 .040 / .006 (01.02 / 0.15)
OVERALL CABLING		
Fillers	★	★
Grounds	★	★
Shielding	★	★
Armoring	★	★
Wraps	★	★
Strength Members	★	★
OUTER JACKET		
Material	PVC	PVC
Color	★	★
Overall OD inches (mm)	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count
ELECTRICAL		
Max. Operating Voltage - UL	600V	600V
DC Resistance Max	Reference UL 83 or 66	Reference UL 83 or 66
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166
Ampacity	Per U.S. Coast Guard regulations Title 33 Chapter 1 Part 183.430 and 183.435 of the CFR	Per U.S. Coast Guard regulations Title 33 Chapter 1 Part 183.430 and 183.435 of the CFR

FLEX:



EXTREME ENGINEERING:



UL 2571 | Irrigation Feeder, Control and Signal Cables

Harsh Duty. Dependable.

Remote applications demand reliable performance in extreme environments. Engineered to withstand chemicals and UV, our flame resistant, ultra-reliable products are designed and built to last! Ideally suited to supply signal, power and control to water management systems including central pivot, linear and lateral irrigation machines.



	TFN, TFFN	THWN-2
FEATURES		
Signal	✓	✓
Control	✓	✓
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	-25°C	-25°C
High-Temperature Rating	60°C or 75°C	60°C or 75°C
Cold Bend	-25°C	-25°C
Flame Resistant	VW-1	VW-1
Direct Burial	✓ *	✓ *
Wet Location Use	✓	✓
Chemical Resistant	✓	✓
Sunlight/UV Resistant	✓	✓
FLEXIBILITY		
Torsional Flex	★	★
Rolling Flex	★	★
Variable Flex	★	★
Bend Flex	★	★
Continuous Flex	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CE	✓	✓
NEC®	✓	✓
NFPA 70	✓	✓
RoHS2	✓	✓
REACH	✓	✓

* Requires inner jacket over core assembly

got rodents?

Anti-rodent additives are environmentally-friendly, patented bio-active ingredients that effectively repel rodents and help you avoid:

- Safety issues
- Equipment damage
- Productivity downtime
- Loss of revenue

For more information, see page 32



STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Wide temperature range from -25°C to 75°C
- Extreme cold bend flex to -25°C
- Wet location use
- Flame resistant
- Environmentally-friendly rodent aversion options available

- Resistant to chemical, UV and water
- Composite and custom options available
- Over-mold and assembly compatible

DYNAMIC RANGE OF USE:

- Water management systems
- Central pivot, liners and lateral irrigation machines

	TFN & TFFN	THWN & THWN-2
INSULATED CONDUCTORS		
Conductor Count	1 or more	1 or more
AWG (mm2)	18 - 16 (.75 - 1.5)	14 - 6 (2.5 - 16)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	18 .005 - .0159 (.127 - .404)	—
	16 .005 - .0159 (.127 - .404)	—
	—	14 .0063 - .0253 (.160 - .643)
	—	12 .010 - .032 (.250 - .813)
	—	10 .010 - .0385 (.250 - .978)
—	8 .0201 - .0508 (.510 - 1.29)	
—	6 .0201 - .064 (.510 - 1.626)	
Material	PVC/Nylon	PVC/Nylon
Minimum Wall Thickness AWG in inches (mm)	18 .015 / .004 (.381 / .102)	—
	16 .015 / .004 (.381 / .102)	—
	—	14 .015 / .004 (.381 / .102)
	—	12 .015 / .004 (.381 / .102)
	—	10 .020 / .004 (.508 / .102)
—	8 .030 / .005 (.762 / .127)	
—	6 .030 / .005 (.762 / .127)	
OVERALL CABLING		
Fillers	★	★
Ground	★	★
Shielding	★	★
Wraps	★	★
Strength Members	★	★
JACKET		
Material	PVC	PVC
Color	★	★
Inner jacket wall thickness based on core diameter inches (mm) (required for direct burial)	≤ .700, .030	(19.05, .762)
	.701-1.499, .045	(17.81-38.07, 1.143)
	1.500-2.500, .060	(38.1-63.5, 1.52)
Outer jacket wall thickness based on core diameter inches (mm)	≤ .750, .050	(19.05, 1.27)
	.751-1.000, .060	(19.08 - 25.37, 1.52)
	1.001-1.500, .080	(25.38 - 38.1, 2.03)
ELECTRICAL		
Max. Operating Voltage - UL	600V	600V
DC Resistance Max	Reference UL 66	Reference UL 66
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166
Ampacity	NFPA 70	NFPA 70

FLEX:



EXTREME ENGINEERING:



UL 444 | CSA 214 | Communications Cables

Your Data Integrity is Critical. Depend on Our Reliability.

Global markets are easily accessible with our internationally recognized standards. Our versatile offering features the harmonized standards of the United States and Canada. This widely recognized standard complies with both requirements after minor adjustments. Shielding from interference is critical to the quality of your data transmission. Count on our design engineering and manufacturing expertise to deliver maximum shielding cost-competitively.

	CM	General	Limited Use	CSA Designations Only	
		CMG	CMX	CMX-Outdoor-CM	CMX-Outdoor-CMG
FEATURES					
Signal	✓	✓	✓	✓	✓
Control	✓	✓	✓	✓	✓
Instrumentation	✓	✓	✓	✓	✓
ATTRIBUTES					
Low-Temperature Rating	≤-20°C	≤-20°C	≤-20°C	≤-20°C	≤-20°C
High-Temperature Rating	105°C	105°C	105°C	105°C	105°C
Cold Bend	✓	✓	✓	✓	✓
Cold Impact	-	-	✓	✓	✓
Flame Resistant	FT4/IEEE 1202, UL1685 Vertical-Tray	FT4/IEEE 1202	VW-1	UL 1685 Vertical-Tray	FT4/IEEE 1202
Wet Location Use	★	★	★	★	★
Oil Resistant	★	★	★	★	★
Chemical Resistant	✓	✓	✓	✓	✓
Sunlight/UV Resistant	✓	✓	✓	✓	✓
FLEXIBILITY					
Torsional Flex	★	★	★	★	★
Rolling Flex	★	★	★	★	★
Variable Flex	★	★	★	★	★
Bend Flex	★	★	★	★	★
Continuous Flex	★	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE					
UL	✓	✓	✓	✓	-
ANSI	✓	✓	✓	✓	-
CSA	✓	✓	✓	✓	✓
CE	✓	✓	✓	✓	✓
cUL	✓	✓	✓	✓	✓
NEC®	Article 800	Article 800	Article 800	Article 800	Article 800
NFPA 70	✓	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓	✓
REACH	★	★	★	★	★

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:
 - Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available



NWI EXPRESS

5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation

BENEFITS:

- UL listed and CSA certified and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- CMX - Outdoor - CMG options available
- Harmonized standards
- Versatile
- Widely recognized internationally
- Composite and custom options available
- Over-mold and assembly compatible
- Available in retractile

	CM	General	Limited Use	CSA Designations Only	
		CMG	CMX	CMX-Outdoor-CM	CMX-Outdoor-CMG
INSULATED CONDUCTORS					
Conductor Count	2 or more	2 or more	2 or more	2 or more	2 or more
AWG (mm2)	30-10 (.051-5.26)	30-10 (.051-5.26)	30-10 (.051-5.26)	30-10 (.051-5.26)	30-10 (.051-5.26)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	★	★	★	★	★
Material	ETFE, ECTFE, FEP, SRPVC, PVC, PP, XLPE	ETFE, ECTFE, FEP, SRPVC, PVC, PP, XLPE	PVC, SRPVC, ETFE, FEP, Foam LDPE, PE, XLPE, PVC/Nylon	PVC, SRPVC, ETFE, FEP, Foam LDPE, PE, XLPE, PVC/Nylon	PVC, SRPVC, ETFE, FEP, Foam LDPE, PE, XLPE, PVC/Nylon
Minimum Wall Thickness in inches (mm)	Dependent on Construction	Dependent on Construction	Dependent on Construction	Dependent on Construction	Dependent on Construction
OVERALL CABLING					
Fillers	★	★	★	★	★
Shielding	★	★	★	★	★
OUTER JACKET					
Material	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE	PVC, TPE
Color	★	★	★	★	★
Overall OD inches (mm)	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count	Dependent on AWG size and conductor count
ELECTRICAL					
Max. Operating Voltage - UL	300V	300V	300V	300V	300V
DC Resistance Max	Reference UL 444	Reference UL 444	Reference UL 444	Reference UL 444	Reference UL 444
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166

Products

AGENCY STANDARDS

FLEX:



EXTREME ENGINEERING:



UL 758 | Appliance Wiring Material UL 1581 | UL 2556 | Test Protocols



Select from a Diverse Range of AWM Styles.

With over 40 years of experience navigating complex domestic and international standards and agency compliance, you can count on our design engineers to assist you with all of your Appliance Wiring Material needs. A UL *recognized* component, all of our AWM Styles meet the safety standards required for UL listed or classified end products. Our adherence to UL 1581 and UL 2556 ensures that our material and products meet testing requirements as well.

Made in the USA - NWI's extensive range of Appliance Wiring Material Styles are easy to shop. Construction dependent, each Style highlights temperature, conductor size, voltage rating and insulation/jacket material. Select from the Styles available, or *contact our design engineers with your custom configuration needs.*

FEATURES:

- Signal
- Control
- Power
- Instrumentation

BENEFITS:

- UL 758 is the Standard for Safety of Appliance Wiring Material
- UL 1581 and UL 2556 are the Standard for Wire and Cable Test Methods
- AWM establishes requirements and test protocols ensuring consistency
- Versatile construction options
- Wide selection of conductor sizes,
- Insulation and jacket materials available

DYNAMIC RANGE OF USE

- AWM required UL listed or classified end products and approved for CE Mark
- Factory installations
- Extensive variety of electrical components

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SINGLE



NWI EXPRESS
5 Days Design to Deliver

UL 758 Appliance Wiring Material

UL Recognized AWM Style

THERMOSET INSULATION

SINGLE CONDUCTOR

STYLE # 3167 - 3923

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
3167	105	26 - 9	600	XLPE
3173	125	26 - 9	600	XLPE
3271	125	30 - 1000	600 AC, 750 DC	XLPE
3446	80	30 - 16	300	XLPE / Shield* / Textile braid, Nylon, SRPVC, PVC* / PVC
3468	200	30 - 4/0	600	XLFEP
3551	200	32 - 16	150	XLFEP
3552	200	30 - 10	300	XLFEP
3553	200	30 - 4/0	600	XLFEP
3693	125	26 - 9	600	XLPE
3694	105	36 - 9	600	XLPE
3697	125	26 - 9	300	XLPE
3698	105	26 - 9	300	XLPE
3893	125	50 - 10	1000	XLPE
3894	125	50 - 10	1000	Cellular XLPE
3898	125	50 - 10	600	XLPE
3899	125	50 - 10	600	Cellular XLPE
3906	125	30 - 2000	300	XLPE
3923	125	50 - 10	1000	XLPE

* Optional UL Style constructions available

UL 758 | Appliance Wiring Material

UL Recognized AWM Style

THERMOPLASTIC INSULATION SINGLE CONDUCTOR



STYLE # 1003 - 1108

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1003	60	26 - 16	300	PE / PVC
1007	80	32 - 16	300	PVC
1011	80	30 - 2000	600	PVC
1013	80, 90	30 - 2000	600	PVC
1015	80, 90, 105	30 - 2000	600	PVC
1017	80	22 - 8	600	PVC
1019	80	8 - 2	600	PVC
1020	80	1 - 4/0	600	PVC
1021	80	225 - 500	600	PVC
1022	80	525 - 1000	600	PVC
1023	80	1100 - 2000	600	PVC
1024	90	22 - 8	600	PVC
1026	90	8 - 2	600	PVC
1027	90	1 - 4/0	600	PVC
1028	105	22 - 6	600	PVC
1032	90	30 - 2000	1000	PVC
1041	60	20 - 16	300	PVC
1053	60	18 - 10	600	PVC
1055	90	20 - 10	600	PVC
1057	60	14 - 10	600	PVC
1059	90	18 - 10	600	PVC
1061	80	30 - 10	300	SR PVC
1062	60	20 - 18	300	PVC / Shield* / PVC
1063	60	20 - 18	300	PVC / Shield* / PVC
1064	60	26 - 16	600	PE / Shield* / Lacquered cotton, rayon, glass over conductor over shielding / PVC jacket
1065	60	26 - 16	600	PVC / Shield* / Lacquered cotton, rayon, glass over conductor / PVC
1066	60	22	300	PE / Shield* / PVC
1095	80	30 - 16	300	PVC
1107	60	30 - 16	300	PE / Rayon braid* / Shield* / PVC / Shield* / PVC*
1108	80	30 - 16	300	FEP, PTFE, TFE, PVC / Shield* / Lacquered glass, rayon cotton* / PVC

* Optional UL Style constructions available

STYLE # 1110 - 1276

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1110	105	26 - 16	300	PVC / Shield* / PVC
1113	60	30 - 16	600	PE / Shield* / PVC
1115	80	30 - 16	300 insulation, 600 jacket	PVC / Shield* / PVC
1116	80	30 - 12	600	PVC / Shield* / PVC
1118	90	26 - 16	300 insulation, 600 jacket	PVC / Shield* / Lacquered braid / PVC
1119	90	26 - 16	600	PVC / Shield / Lacquered braid* / PVC
1120	105	30 - 4/0	600	PVC / Shield* / PVC / PVC*
1122	80	30	300	SR PVC
1123	80	22, 20	300	PVC / Shield / PVC
1124	80	22, 20	300	PVC / Shield / PVC
1148	60	26 - 16	600	PVC
1150	60	26 - 16	300	FRPE / Shield / PVC
1161	60	26 - 9	600	PVC
1181	60	18 - 16	600	PVC / Nylon
1184	60	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
1188	60	18 - 16	600	PVC
1190	90	26 - 16, 14 - 9	600	PVC
1191	60, 80	26 - 9	600	PVC
1195	80	30 - 14	300	SR PVC
1208	80	30 - 16	300	SR PVC
1226	80	32 - 14	not specified	FEP
1227	105	32 - 10	not specified	FEP
1228	90	18 - 8	600	PVC
1229	90	8 - 2	600	PVC
1230	105	26 - 9	600	PVC
1231	105	18 - 6	600	PVC
1232	105	8 - 4/0	600	PVC
1270	90	18 - 9	600	PVC
1271	75, 90	8 - 2	600	PVC
1272	90	1 - 4/0	600	PVC
1273	90	1 - 4/0	600	PVC
1275	105	18 - 10	600	PVC
1276	60, 105	14 - 10	600	PVC

* Optional UL Style constructions available

SINGLE



NWI EXPRESS
5 Days Design to Deliver

STYLE # 1277 - 1331

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1277	60, 80	4/0 - 500	600	PVC
1278	60, 80	4 - 4/0	600	PVC
1279	60, 80	7 - 2	600	PVC
1280	80	18 - 8	600	PVC
1282	80	26 - 16	300	PE / Shield / PVC
1287	60	26 - 16	600	PE / Shield / PVC
1288	80	26 - 16	300	PE / Shield / Lacquered fibrous braid* / PVC
1289	60	26 - 16	600	PE / Shield / PVC
1291	80	29	300	PE / Shield (closely woven braid) / PVC
1293	105	30 - 20	not specified	FEP / Nylon
1294	80	30 - 20	not specified	FEP / Nylon
1295	80	26 - 16	300	PE / Shield / PVC
1297	80	26 - 16	300	PE / Shield / PVC
1298	80	26 - 16, 27	300	PE / Shield / PVC
1299	80	26 - 20	300	FRPE / FRPE tube / Shield / Nylon / Braid* / PVC
1300	80	26	600	PE / Shield* / PVC
1310	60	18 - 10	600	PVC
1311	80	18 - 10	600	PVC
1316	90, 105	26 - 12	600	PVC / Nylon
1317	90, 105	10	600	PVC / Nylon
1318	90, 105	8 - 6	600	PVC / Nylon
1319	90, 105	4 - 2	600	PVC / Nylon
1320	90, 105	1 - 4/0	600	PVC / Nylon
1321	90, 105	250 - 1000	600	PVC / Nylon
1322	90	14 - 10	600	PVC
1323	60, 80	14 - 10	600	PVC
1324	80	30 - 16	300	PE / Shield* / PVC
1325	80	26 - 16	600	PE / Shield / PVC
1326	80	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
1329	105	14 - 10	600	PVC
1330	200	30 - 4/0	600	FEP / Glass braid, FEP*
1331	150	30 - 4/0	600	FEP / Glass braid, FEP*

* Optional UL Style constructions available

STYLE # 1332 - 1383

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1332	200	30 - 10	300	FEP / Glass braid, FEP*
1333	150	30 - 10	300	FEP / Glass braid, FEP*
1334	60	26 - 16	600	PE / Shield / Lacquered rayon braid / PVC
1335	90	26 - 10	600	PVC
1336	90	8	600	PVC
1337	90	6 - 2	600	PVC
1338	90	1 - 4/0	600	PVC
1339	90	4/0 - 500	600	PVC
1340	60, 90	500 - 1000	600	PVC
1342	105	14 - 10	600	PVC
1343	105	18 - 10	600	PVC
1344	105	18 - 8	600	PVC
1345	105	26 - 9	600	PVC
1346	105	8 - 2	600	PVC
1347	80	26 - 16	300	PVC / Shield / PVC
1348	60	26 - 16	300	PE / Shield / PVC
1349	80	26 - 16	300	PVC / Shield / PVC
1350	80	26 - 16	600	PE / PVC
1354	60, 80	44 minimum	30	Solid, cellular optional / Solid inner, middle shield* / Outer shield
1355	200	32 - 20	not specified	FEP / Nylon
1365	60	30 - 16	300	FRPE / PVC* / Shield* / PVC / Shield* / PVC*
1366	90	26 - 9	600	PVC / PVC
1369	90	Resistance wire (size varies dependant on wattage)	250	PVC
1371	105	36 - 6	not specified	FEP, PTFE extruded / FEP or PTFE extruded, PFA
1380	60	29 - 20	300	FRPE / FRPE tube / Shield* / PVC
1381	60, 80	29 - 20	600	PE / FRPE tube / Shield* / PVC
1382	80	29 - 20	300	PE / FRPE tube / Shield* / PVC
1383	90	18 - 10	600	PVC

* Optional UL Style constructions available

Products

AGENCY STANDARDS

UL 758 | Appliance Wiring Material

UL Recognized AWM Style

THERMOPLASTIC INSULATION (CONTINUED)

SINGLE CONDUCTOR



STYLE # 1384 - 1477

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1384	105	8 - 500	600	PVC
1386	80	27 - 16	300	PVC
1387	60	26 - 16	300	PE / Braid (rayon)* / Shield / PVC
1389	90	20 - 8	600	PVC
1390	90	18 - 2	600	PVC
1391	90	18 - 2	600	PVC
1392	90	26 - 9	600	PVC
1396	90	8 - 2	600	PVC
1400	90	14 - 10	600	PVC
1401	90	8	600	PVC
1402	90	22 - 10	600	PVC / Nylon
1403	90	8	600	PVC / Nylon
1404	90	6 - 2	600	PVC / Nylon
1405	90	1 - 4/0	600	PVC / Nylon
1406	90	250 - 500	600	PVC / Nylon
1407	90	600 - 1000	600	PVC / Nylon
1408	90	22 - 12	600	PVC / Nylon
1409	90	10	600	PVC / Nylon
1410	90	8 - 6	600	PVC / Nylon
1411	90	4 - 2	600	PVC / Nylon
1412	90	1 - 4/0	600	PVC / Nylon
1413	90	250 - 500	600	PVC / Nylon
1414	90	600 - 1000	600	PVC / Nylon
1435	80	30 - 10	300	Solid of cellular PE / Shield* / Textile braid* / PVC
1436	80	27 - 16	300	FRPE / Shield* / Textile braid* / PVC
1437	80	22	300	PE / Shield / PVC
1438	80	22	300	PE / Shield / PVC
1439	80	26 - 16	300	PE / Shield / PVC
1441	75	18 - 16	600	PVC / Nylon
1452	90	26 - 12	1000	PVC / Nylon
1453	90	10	1000	PVC / Nylon
1475	60	28 - 16	not specified	PE / Shield / PVC
1477	80	30 minimum	300	PVC / Shield* / Barrier* / PVC

* Optional UL Style constructions available

STYLE # 1478 - 1643

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1478	60	30 minimum	30	PVC / Shield* / Barrier* / PVC
1479	60	18 - 2	600	PVC
1480	60	4/0 Maximum	600	PVC / Shield* / Barrier* / PVC
1493	80	26 - 22	300	PE / Shield / Braid (cotton, rayon, fibered glass) / PVC
1494	80	25	300	PE / Braid (cotton, rayon, fibered glass; lacquered) / PVC
1495	80	26 - 16	300	PVC / Shield / Nylon / PVC
1498	80	26 - 9	600	PVC
1499	90	26 - 9	600	PVC
1500	105	26 - 9	600	PVC
1508	105	32 - 20	30	ETFE
1513	105	36 - 20	not specified	ETFE
1516	105	36 - 10	not specified	ETFE
1517	105	32 - 20	not specified	ETFE
1523	105	32 - 20	not specified	ETFE
1533	80	30 - 16	not specified	SRPVC / Shield* / PVC
1538	105	36 - 6	125	FEP, PFA, PTFE, TFE
1558	125	34 - 16	not specified	ETFE
1568	80	30 - 16	150	PVC
1569	80, 90, 105	30 - 2	300	PVC / PVC*
1581	80	15 - 10	300	PVC
1582	80	30 - 9	300	PVC
1586	105	36 - 6	not specified	ETFE
1589	60, 80	50 minimum	30	Optional / Shield* / Lacquered braid*
1591	150	32 - 16	300	FEP
1592	200	32 - 16	300	FEP
1598	60, 80	50 minimum	30	Solid, cellular PE / Shield* / PVC*
1605	60	47 minimum	30	PVC
1606	105	8 - 500	600	PVC
1609	105	36 - 6	125	ETFE
1610	105	32 - 10	not specified	Extruded ETFE
1643	150	32 - 4/0	300	Extruded ETFE

* Optional UL Style constructions available

SINGLE



NWI EXPRESS
5 Days Design to Deliver

STYLE # 1644 - 1864

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1644	150	30 - 4/0	600	Extruded ETFE
1645	105	Flat wire, 0.400 - 1.500 inches width	90	ETFE
1646	105	26 - 16 flat	not specified	ETFE
1649	105	15 - 5 flat 0.400 - 1.500 inches width	90	ETFE
1670	150	32 - 14	not specified	ETFE
1671	150	32 - 10	300	ETFE
1686	105	32 - 20	not specified	ECTFE
1687	105	32 - 20	not specified	ECTFE
1688	105	32 - 20	not specified	ECTFE
1689	105	30 - 16	not specified	ECTFE
1692	80, 90, 105	42 minimum	30	PVC
1704	150	32 - 10	300	ECTFE
1705	150	30 - 4/0	600	ETFE
1708	200	32 - 20	not specified	PFA
1726	250	32 - 4/0	300	MFA, PFA
1729	80	50 - 16	300	PVC / Nylon*
1730	90	32 - 16	300	PVC / Nylon*
1731	105	50 - 16	300	PVC / Nylon*
1766	80	42 minimum	30	Solid, cellular FEP
1813	200	30 - 10	3000	FEP
1814	150	36 - 20	150	ETFE
1827	150	32 - 10	125	Extruded ETFE
1828	150	32 - 10	300	ETFE
1829	150	32 - 10	600	ETFE
1831	105	24 - 18	150	ETFE / PVC*
1837	60	40 minimum	30	Solid, cellular FEP / Shield* / FEP
1841	105	26 - 12	600	PVC / Nylon
1842	90	26 - 9	600	PVC / Nylon
1847	105	40 minimum	30	FEP
1862	125	32 - 16	150	ETFE
1863	125	32 - 10	300	ETFE
1864	125	30 - 4/0	600	ETFE

* Optional UL Style constructions available

STYLE # 1873 - 10050

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
1873	105	36 - 18	300	PVC
1886	150	30 - 10	300	FEP
1887	150	30 - 4/0	600	FEP
1900	200	30 - 10	300	FEP
1901	200	30 - 4/0	600	FEP
1903	60	32 - 14	300	PE, FRPE
1905	105	32 - 20	30	ETFE
1920	60	23 - 10	600	Solid of cellular PE, FRPE
1921	80	32 - 4/0	300	PE, FRPE
1922	80	32 - 10	600	PE, FRPE
1933	250	36 - 20	not specified	PFA
1947	105	26 - 20	600	PVC / Nylon
1970	60, 80	32 - 20	300	Cellular FEP
1973	60, 80	36 - 16	300	PE, FRPE
1976	80	36 - 18	300	SRPVC
1984	105	36 - 16	300	PVC
1988	105	32 - 10	150	ETFE
1989	105	32 - 10	300	ETFE
1990	105	30 - 4/0	600	ETFE
1999	150	36 - 10	300	Solid, cellular FEP / Shield* / FEP
10002	105	32 - 16	300	SRPVC
10009	150	36 minimum	300	Solid, cellular FEP / Shield* / FEP
10027	105	36 - 18	300	PVC
10030	250	30 - 10	300	PFA / Felted impregnated glass
10032	250	30 - 10	600	PFA / Felted impregnated glass
10033	105	Resistance wire (size varies dependent on wattage)	600	ETFE / Nylon* / ETFE / PVC*
10042	80	32 - 2	300	TPES
10043	80	40 minimum	30	PVC / Shield* / Nylon*
10045	150	36 - 14	not specified	FEP
10048	200	30 - 10	1000	FEP
10050	150	30 - 4/0	600	FEP

* Optional UL Style constructions available

Products

AGENCY STANDARDS

UL 758 | Appliance Wiring Material

UL Recognized AWM Style

THERMOPLASTIC INSULATION (CONTINUED)

SINGLE CONDUCTOR



STYLE # 10071 - 10263

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
10071	80	36 - 18	300	SRPVC
10086	150, 200	36 - 4/0	600	ETFE
10088	150	32 - 10	125	ETFE / ETFE*
10090	150	Flat wire, 0.400 - 1.500 inches width	250	ETFE
10099	150	Flat wire, 0.400 - 1.500 inches width	600	ETFE
10100	150	Flat wire, 0.400 - 1.500 inches width	300	ETFE
10101	105	32 - 20	250	ETFE
10109	150, 200	36 - 4/0	300	ETFE
10125	150	36 - 4/0	300	Extruded ETFE
10126	150	36 - 4/0	600	ETFE
10128	105	40 minimum	30	ECTFE
10140	80	42 minimum	30	PET, PETP
10141	80, 90, 105	40 - 2	1000	PVC / Shield* / PVC* / PVC
10152	80	40 - 12	300	PP
10184	150	25	1500 DC	FEP / Braid / FEP* / Braid* / FEP
10186	105	40	30	FEP / Shield* / FEP* / Braid* / FEP
10192	150, 200	30 - 1	600	FEP
10203	150, 200	30 - 4/0	1000	FEP / FEP*
10204	80	28	600	FEP / Braid
10210	150	24 - 10	600	ETFE
10211	150	20 - 4/0	600	ETFE
10220	150	28 - 10	1000 DC	FEP / Shield* / FEP
10232	60, 80	36 - 10	600	Cellular PE, cellular FRPE / FRPE, PE*
10233	60, 80	36 - 14	300	Cellular PE, cellular FRPE / FRPE, PE*
10238	105	36 - 15	150	ECTFE
10239	60, 80	36 - 10	600	PE, FRPE / PE, FRPE*
10250	80	50 minimum	30	Solid, cellular FEP / Fluoropolymers, PVC* / Fluoropolymers, PVC*
10263	80	32 - 4/0	600, 1000	TPES

* Optional UL Style constructions available

STYLE # 10264 - 10872

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
10264	80	32 - 4/0	1000	TPES
10269	80, 90, 105	30 - 2000	1000	PVC
10271	60, 75, 90, 105	30 - 3/0	1000	PVC
10277	105	32 - 10	300	ETFE
10278	105	30 - 20	300	ETFE
10279	105	18 - 10	300	ETFE
10290	80	32 - 20	300	ETFE / Shield* / PVC
10302	105	19 - 9	600	ETFE
10304	200	44 minimum	30, 60, 90, 150	FEP, PFA, PTFE, TFE / Inner shield* / FEP, PFA, PTFE, TFE* / Outer shield* / FEP, PFA, PTFE, TFE* / PFA* / FEP, PFA, PTFE, TFE
10305	150	40 - 6	150	ETFE
10306	200	30 - 10	300	FEP / FEP
10308	200	Resistance Wire (size varies dependent on wattage)	600	FEP
10310	150	36 - 20	300	ETFE / Braid* / ETFE, PVDF
10312	150	40 - 6	300	ETFE
10318	150	36 - 15	150	ECTFE
10319	150	32 - 20	not specified	ECTFE
10335	105	32 - 9	600	SRPVC
10340	105	36 - 8	600	PVC / Shield* / PVC
10342	200	50 - 12	1000	FEP
10345	200	40 - 6	150	FEP
10354	150	20 - 8	2000	FEP / Braid* / Braid* / ETFE
10370	200	40 - 4/0	1000	FEP, PFA
10371	250	40 - 4/0	1000	PFA
10390	80	36 - 4/0	600	TPES
10412	150, 200	32 - 4	600	ETFE
10446	80	36 - 16	300	PE, FRPE
10493	80	32 - 10	300	PP
10535	105	36 - 18	300	SRPVC
10708	105	30 - 1000	600	PVC
10872	105	18, 16, 12	600	PVC / PVC

* Optional UL Style constructions available

SINGLE



NWI EXPRESS
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STYLE # 10874 - 11342

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
10874	60	36 - 8	30	PVC / Shield* / PVC
10875	80	36 - 8	30	PVC / Shield* / PVC
10876	60	36 - 8	150	PVC / Shield* / PVC
10877	80	36 - 8	150	PVC / Shield* / PVC
10878	60	36 - 8	300	PVC / Shield* / PVC
10879	80	36 - 8	300	PVC / Shield* / PVC
10901	60	44 - 6	30	TPES
10902	60	44 - 6	150	TPES
10903	60	44 - 6	300	TPES
10904	60	44 - 6	600	TPES
10905	80	44 - 6	30	TPES
10906	80	44 - 6	150	TPES
10907	80	44 - 6	300	TPES
10908	80	44 - 6	600	TPES
10909	105	44 - 6	30	TPES
10910	105	44 - 6	150	TPES
10911	105	44 - 6	300	TPES
10912	105	44 - 6	600	TPES
11002	200	44 - 19	600	FEP / Shield* / FEP
11003	200	44 - 19	300	FEP / Shield* / FEP
11104	105	44 - 6	600	TPES
11105	105	44 - 6	300	TPES
11151	105	50 - 16	300	SRPVC / Nylon*
11169	125	50 - 10	600	TPES
11342	200	50 - 12	1000	FEP

* Optional UL Style constructions available

Products

AGENCY STANDARDS

UL 758 | Appliance Wiring Material

UL Recognized AWM Style



THERMOPLASTIC INSULATION MULTI CONDUCTOR

STYLE # 2001 - 2125

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2001	80	18 - 10	300	PVC / PVC (Type SJT cord)
2003	60	18	300	PVC / PVC (Type SJT cord)
2032	105	14 - 10	600	PVC (Type SPT-3 cord)
2089	60	20 - 18	300	PVC / Shield / PVC
2090	60	20 - 18	300	PVC / Shield / PVC
2091	60	20 - 18	300	PVC / Shield / PVC
2092	60	30 - 16	300	FRPE, PE / Shield* / PVC
2093	60	30 - 16	300	FRPE, PE / Shield* / PVC
2094	60	30 - 16	300	FRPE, PE / Shield* / PVC* / PVC
2095	80	32 minimum	300	Shield* / PVC* / Braid* / PVC
2096	80	30 - 16	300	PVC / Shield* / PVC
2097	80	30 - 16	300	PVC / Shield / PVC
2098	90	26 - 16	300	PVC / Shield / PVC
2099	90	26 - 16	300	PVC / Shield / PVC
2100	90	26 - 16	300	PVC / Shield* / PVC
2101	105	30 - 16	300	Shield* / PVC
2102	105	30 - 16	300	Shield* / PVC
2103	105	30 - 10	300	Shield* / PVC* / Braid* / PVC
2106	60	26 - 12	600	FRPE / Shield / PVC
2107	60	26 - 12	600	FRPE / Shield / PVC
2108	60	26 - 16	600	FRPE, PE / Shield / PVC
2112	80	26 - 16	600 insulation, 300 jacket	PVC / Shield / PVC
2113	80	26 - 16	600 insulation, 300 jacket	PVC / Shield / PVC
2114	80	26 - 16	600 insulation, 300 jacket	PVC / Shield / PVC
2115	80	26 - 16	600	PVC / Shield / PVC
2116	80	26 - 16	600	PVC / Shield / PVC
2117	80	28 - 9	600	PVC / Shield* / PVC
2121	90	26 - 16	600 insulation, 300 jacket	PVC / Shield / Lacquered braid / PVC
2122	90	26 - 16	600 insulation, 300 jacket	PVC / Shield / Lacquered braid / PVC
2123	90	36 - 16	600 insulation, 300 jacket	PVC / Shield / Lacquered braid / PVC
2124	90	28 - 9	600	PVC / Shield* / PVC
2125	90	28 - 9	600	PVC / Shield* / PVC

* Optional UL Style constructions available

STYLE # 2126 - 2214

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2126	90	28 - 9	600	PVC / Shield* / PVC
2127	105	28 - 9	600	PVC / Shield* / PVC
2128	105	28 - 9	600	PVC / Shield* / PVC
2129	60, 80, 90, 105	28 - 9	600, 1000	PVC / Shield* / PVC
2133	80	22 - 20	300	PVC / Shield* / PVC
2134	80	22 - 20	300	PVC / Shield / PVC
2145	60	18	300	PVC / PVC (Type SVT cord)
2146	60	18	300	PVC / PVC (Type SVT cord)
2147	60	18	300	PVC / PVC (Type SVT cord)
2165	60	22	300	PE, PVC / Shield / PVC
2176	60	20	300	PVC / Braid* / PVC
2177	60	24 and 18	300	PVC / PVC
2178	60	24 and 18	300	PVC / PVC
2179	60	20, 18	300	PVC / PVC
2180	105	18 - 16	300	PVC / PVC (Type SJT cord)
2181	60	18 - 10	300	PVC / PVC
2182	60	18 - 10	300	PVC / PVC
2183	60	18 - 10	300	PVC / PVC (Type SJT cord)
2184	80	18 - 2	600	PVC / PVC (Type ST cord)
2185	90	18 - 2	600	PVC / PVC (Type ST cord)
2186	105	18 - 2	600	PVC / PVC (Type ST cord)
2187	60	22 and 18	300	PVC / Shield / PVC (Type SJT cord)
2188	60	22 and 18	300	PVC / Shield / PVC
2189	80	22 and 18	300	PVC / Shield / PVC
2190	80	22 and 18	300	PVC / Shield / PVC (Type SJT cord)
2194	60	22	300	PVC / Shield / PVC (Type SVT cord)
2195	60	18	300	PVC / Shield / PVC (Type SVT cord)
2196	80	18	300	PVC / Shield / PVC (Type SVT cord)
2197	60	22	300	PVC / Shield / PVC
2198	80	22	300	PVC / Shield / PVC (Type SJT cord)
2199	60	22	300	PVC / Shield / PVC (Type SJT cord)
2211	60	18 - 16	300	PVC / PVC (Type SVT cord)
2214	60	22 - 16	300	PVC (Type SPT-1 cord)

* Optional UL Style constructions available

MULTI



NWI EXPRESS
5 Days Design to Deliver

STYLE # 2215 - 2262

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2215	60	22 - 16	300	PVC (Type SPT-1 cord)
2216	60	22 - 16	300	PVC (Type SPT-1 cord)
2217	60	22 - 16	300	PVC (Type SPT-1 cord)
2218	60	22 - 16	300	PVC (Type SPT-1 cord)
2219	60	22 - 16	300	PVC (Type SPT-1 cord)
2220	60	22 - 16	300	PVC (Type SPT-1 cord)
2221	60	22 - 16	300	PVC (Type SPT-1 cord)
2222	60	22 - 16	300	PVC (Type SPT-1 cord)
2223	60	22 - 16	300	PVC (Type SPT-1 cord)
2224	60	22 - 16	300	PVC (Type SPT-1 cord)
2225	80	20, 18, 16	300	PVC (Type SPT-2 cord)
2226	90	20, 18, 16	300	PVC (Type SPT-2 cord)
2227	105	20, 18, 16	300	PVC (Type SPT-2 cord)
2228	80	20, 18, 16	300	PVC (Type SPT-2 cord)
2229	90	18, 16	300	PVC (Type SPT-3 cord)
2230	105	18, 16	300	PVC (Type SPT-3 cord)
2231	80	14, 12, 10	600	PVC (Type SPT-3 cord)
2232	90	14, 12, 10	600	PVC (Type SPT-3 cord)
2233	105	14, 12, 10	600	PVC (Type SPT-3 cord)
2234	80	18, 16	300	PVC (Type SPT-2 cord)
2235	90	18, 16	300	PVC (Type SPT-2 cord)
2236	105	18, 16	300	PVC (Type SPT-2 cord)
2237	80	18, 16	600	PVC (Type SPT-3 cord)
2238	90	18, 16	600	PVC (Type SPT-3 cord)
2240	60	20 and 18	300	PVC / PVC (Type SJT cord)
2246	60	20	300	PVC / PVC (Type SJT cord)
2247	80	26 - 16	300	PVC / PVC (Type SJT cord)
2248	60	20	300	PVC / PVC (Type SJT cord)
2249	80	26 - 16	300	PVC / PVC (Type SJT cord)
2250	60	20	300	PVC / PVC (Type SJT cord)
2251	80	26 - 16	300	PVC / PVC (Type SJT cord)
2252	80	18 - 16	300	PVC / PVC (Type SVT cord)
2253	80	18 - 16	300	PVC / PVC (Type SVT cord)
2254	80	18 - 16	300	PVC / PVC (Type SVT cord)
2255	80	18 - 16	300	PVC / PVC (Type SVT cord)
2257	60	18 - 10	300	PVC / PVC (Type SJT cord)
2262	60	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC

* Optional UL Style constructions available

STYLE # 2263 - 2385

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2263	60	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
2264	60	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
2265	80	26 - 16	300	PVC / Shield* / PVC
2266	80	26 - 16	300	PVC / Shield* / Jacket
2267	80	26 - 16	300	PVC / Shield / PVC
2268	80	26 - 16	600 insulation, 300 jacket	PVC / Shield / PVC
2269	80	26 - 16	600 insulation, 300 jacket	PVC / Shield / Braid* / PVC
2270	80	26 - 16	600 insulation, 300 jacket	PVC / Shield / PVC
2310	80	22 - 16	600	PVC / Shield / PVC
2311	60	26 - 16	600	FRPE, PE / Shield / PVC
2319	90	26 - 16	600	PVC / PVC
2321	80	22	600	PVC / Shield / PVC
2343	80	30 minimum	not specified	Shield* / PVC / PVC
2344	80	30 minimum	not specified	Shield* / PVC / PVC
2345	80	30 minimum	not specified	PVC* / Shield* / PVC
2346	80	30 minimum	not specified	Shield* / PVC / PVC
2350	80	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
2352	80	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
2353	80	26 - 16	600 insulation, 300 jacket	PE / Shield / PVC
2355	80	26 - 16	600	PE / Shield / PVC
2356	105	20	300	PVC / PVC
2373	80	26 - 16	300	FRPE, PE / Lacquered glass, rayon* / Shield / PVC
2376	105	26 - 16	300	PVC / Shield* / PVC
2377	60	22 - 16	300	PVC / PVC (Type SJT cord)
2378	60	22 - 16	300	PVC / PVC (Type SJT cord)
2379	60	22 - 16	300	PVC / PVC (Type SJT cord)
2380	60	22 - 16	300	PVC / PVC (Type SJT cord)
2381	60	22 - 16	300	PVC / PVC (Type SJT cord)
2382	60	22 - 16	300	PVC / PVC (Type SJT cord)
2383	60	22 - 16	300	PVC / PVC (Type SJT cord)
2384	60	40 - 10	30	Shield* / PVC / PVC
2385	60	40 - 10	30	Shield* / PVC* / PVC

* Optional UL Style constructions available

Products

AGENCY STANDARDS

UL 758 | Appliance Wiring Material

UL Recognized AWM Style

THERMOPLASTIC INSULATION (CONTINUED)

MULTI CONDUCTOR



STYLE # 2386 - 2560

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2386	60	40 - 10	30	Shield* / PVC* / PVC
2387	60	40 - 10	30	Shield* / PVC* / PVC
2388	60	40 - 10	30	Shield* / PVC* / PVC
2439	80	26 - 16	600	PE / Shield / PVC
2447	60	20 - 18	300	PVC / PVC
2448	60, 80	40 minimum	30	Shield* / PVC* / PVC* / PVC
2449	105	26 - 16	300	PVC / PVC (Type SJT cord)
2450	105	26 - 16	300	PVC / PVC (Type SVT cord)
2461	80	26 - 16	300	Shield* / PVC* / PVC
2463	80	40 minimum	600	Shield* / PVC* / PVC
2464	80	-	300	Shield* / PVC* / Braid* / PVC
2468	80	32 - 16	300	PVC / Shield* / PVC*
2481	105	26 - 16	600 insulation, 300 jacket	PVC / Shield / PVC
2482	105	26 - 16	300, 600	PVC / Shield / PVC
2490	60	36 minimum	not specified	Shield* / PVC, PTFE, Etc. / PVC
2493	60	30 - 16	not specified	Shield* / PVC* / PVC
2501	105	40 minimum	600	PVC* / Shield* / PVC
2502	80	40 minimum	30	Shield* / PVC* / PVC
2516	105	40 minimum	600	Shield* / PVC* / PVC
2517	105	40 minimum	300	Shield* / PVC* / Braid* / PVC
2532	80	40 minimum	30	Shield* / PVC* / PVC
2535	80	40 minimum	30	Shield* / PVC* / PVC
2549	90	40 - 16	300	Shield* / PVC* / PVC
2550	90	40 minimum	600	Shield* / PVC* / PVC
2551	105	40 minimum	30	PVC
2552	60	40 minimum	30	PE, cellular PE, XLPE, cellular XLPE, FRPE, cellular FRPE, XLFRPE, cellular XLFRPE, PP, cellular PP, XLPP, cellular XLPP / Shield* / PVC, Nylon, TPES, PVDF, Lacquered braid* / PE, cellular PE, XLPE, cellular XLPE, FRPE, cellular FRPE, XLFRPE, cellular XLFRPE, PP, cellular PP, XLPP, cellular XLPP* / PVC / Shield* / PVC*
2560	60	-	30	Shield* / PVC

* Optional UL Style constructions available

STYLE # 2564 - 2934

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2564	75	22 and 18	125	PVC / PVC
2570	80	40 minimum	600, 1000	Shield* / PVC / PVC* / PVC
2571	80	40 minimum	not specified	Shield* / PVC* / PVC
2574	105	40 minimum	30	Shield* / PVC* / PVC
2576	80	36 - 9	150	Shield* / PVC* / PVC
2582	60	30 - 16	150	FRPE, PE / Shield* / PVC* / PVC
2584	80	40 - 9	125	Shield* / PVC* / PVC
2586	105	40 minimum	600, 1000	Shield* / PVC* / PVC
2587	90	40 minimum	600	Shield* / PVC* / PVC
2598	60	-	300	Shield* / PVC* / PVC
2610	80	32 - 16	300	Style 1007 / PVC
2614	105	40 minimum	30	Shield* / PVC* / PVC
2626	80	-	30	Shield* / PVC* / PVC
2631	90	40 minimum	not specified	Shield* / PVC* / PVC
2661	80, 90, 105	40 - 6	300	PVC* / Shield* / PVC
2668	60	40 minimum	30	Shield* / PVC* / PVC
2704	60	40 minimum	30	Shield* / PVC* / PVC
2709	60	40 minimum	30	Shield* / PVC* / PVC
2722	105	26 - 15	300	PVC (Type SPT cord)
2747	150	-	300	Shield* / FEP
2748	150	-	600	Shield* / FEP
2749	200	-	300	Shield* / FEP
2750	200	-	600	Shield* / FEP
2778	60	30 - 16	150	Shield* / PVC* / PVC
2789	60	-	30	Shield* / PVC, PTFE, PFA, FEP, ETFE* / PVC, PTFE, PFA, FEP, ETFE* / PVC
2839	90	-	600	Shield* / PVC* / PVC
2841	80	40 minimum	30	Shield* / PVC
2842	80	40 minimum	30	Shield* / PVC
2876	80	40 minimum	not specified	Shield* / PVC
2894	150	-	300	Shield* / FEP
2895	200	-	300	Shield* / FEP
2919	80	40 minimum	30	Shield* / PVC* / Braid* / PVC
2920	60	40 - 10	30	Shield* / PVC
2934	80	-	150	Shield* / PVC* / PVC

* Optional UL Style constructions available

MULTI



NWI EXPRESS
5 Days Design to Deliver

STYLE # 2935 - 20379

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
2935	80	–	300	Shield* / PVC* / PVC
2960	60	32 minimum	30	PP, PE / PVC* / Shield* / PVC
2961	80	–	150	Shield* / PVC* / PVC
2969	80	40 minimum	30	Shield* / PVC* / PVC
2983	150	–	150	Shield* / FEP
2990	80	40 minimum	30	Shield* / PVC* / PVC
2991	105	40 minimum	30	Shield* / PVC* / PVC
2992	105	40 minimum	30	Shield* / PVC* / PVC
2993	60	40 minimum	30	Shield* / PVC* / PVC
20030	60	18 - 2	600	FEP, PE, PVC / PVC (Type STO cord)
20031	75	18 - 2	600	FEP, PE, PVC / PVC (Type STO cord)
20032	90	18 - 2	600	FEP, PE, PVC / PVC (Type STO cord)
20033	105	18 - 2	600	FEP, PE, PVC / PVC (Type STO cord)
20224	200, 250	–	300	Shield* / PFA
20225	200, 250	–	600	Shield* / PFA
20229	150	–	300	Shield* / FEP
20230	150	–	600	Shield* / FEP
20233	80	36 minimum	300	Shield* / PUR* / Braid* / PUR
20234	80	–	600, 1000	Shield* / PUR* / Braid* / PUR
20235	80	36 minimum	not specified	Shield* / PVC* / PUR
20236	80	36 minimum	30	Shield* / PVC* / PUR
20248	80	–	300	Shield* / FEP
20249	80	–	30	FEP
20262	200	30 - 10	300	Style 1332 / Shield* / FEP
20265	80	–	30	Shield* / PVC
20266	80	–	150	Shield* / PVC
20267	80	–	300	Shield* / PVC
20308	150	30 - 10	300	Style 1333 / Shield* / FEP
20315	125	28 - 10	600	TPE (Type SPE cord)
20327	105	36 minimum	300	Shield* / TPE
20328	105	36 minimum	600	Shield* / TPE
20368	200	–	300	Shield* / FEP
20379	80	50 minimum	30	Shield* / PVC* / PVC

* Optional UL Style constructions available

STYLE # 20387 - 21840

Style Number	Temperature °C	AWG and/or kcmil	Voltage V	Material
20387	105	–	300	Shield* / PVC
20404	60, 75, 80, 90, 105	18 - 10	300	PVC (Type SPT-3 cord)
20549	80	32 minimum	300	PVC* / Shield* / PUR
20604	200	–	300	Shield* / FEP* / FEP
20626	80, 90	–	30, 150, 300, 600	Shield* / TPE* / Braid* / TPE
20710	200	–	600	Shield* / FEP
20711	200	–	300	Shield* / FEP
20712	150	–	600	Shield* / FEP
20713	150	–	300	Shield* / FEP
20787	60, 75, 80, 90, 105	18 - 16	300	PVC (Type SPT-2 cord)
20810	105	40 - 10	30	FEP / FEP
20838	105	–	300	Braid* / PVC / PVC
20883	60, 80, 90, 105	–	150, 300, 600	Shield* / PVC
20920	200	–	150	Shield* / FEP
20947	80	–	30	Shield* / PVC* / PVC* / PVC
21002	105	–	300, 600	Shield* / TPE* / Braid* / TPE
21022	60, 75, 90, 105	26 - 16	300	PVC (Type SPT-2 cord)
21048	60, 75, 90, 105	18 - 10	300	(Type SPT-2, SVT, SJT cord) / Braid*
21103	105	40 minimum	30	Shield* / PVC* / PVC
21191	125	50 - 2000	30	Shield* / TPE* / TPE
21192	125	50 - 2000	150	Shield* / TPE* / TPE
21193	125	50 - 2000	300	Shield* / TPE* / TPE
21194	125	50 - 2000	600	Shield* / TPE* / TPE
21198	80	32 minimum	300	Shield* / PUR* / PUR
21397	75	50 - 1	300	Shield* / Binder* / PVC
21840	105	–	1000	TPE* / TPE

* Optional UL Style constructions available

Products

AGENCY STANDARDS



Charging Into the Future

Hybrid and Electric Vehicle Cables

Compatible with UL 2594 Electric Vehicle Charging Systems.

An innovation leader, NWI offers EV Cable, a high-performance line of bulk cable, CoilBoss™ Retractable Cords and complete cable solutions for dependable power charging of electric and hybrid vehicles and other equipment.

NWI meets your cabling requirements with design services and prototyping, expert guidance to navigate automotive and EV standards, express delivery options and no minimum quantity or length requirements. NWI's EV Cables are guaranteed to perform with unparalleled durability. They are engineered to withstand severe temperature extremes and harsh environments, including exposure to oil, chemicals, abrasion, crushing and more.

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



EV

Backed by NWI's expertise, product quality and services, EV Cables are built to last.



- UL 62 listed; compatible with SAE J1772 connectors, UL 2594 and NEC® 625 charging systems
- Available in standard straight and retractile cable or custom configurations that include composite designs, colors, private labeling, enhanced environmental or electrical performance and more
- Options include 600V EVE (TPE) and 600V EVT (PVC) cables from 18 to 2 AWG; and 300V EVJE (TPE) and 300V EVJT (PVC) cables from 18 to 12 AWG
- Standard jacket materials are exposed-run rated TPE or PVC employing PVC/nylon primaries
- Cables may include hybrid data, signal and communication cable in any AWG size
- Materials are RoHS2 compliant for EV charging stations in wet locations
- Ideal for Electric Vehicles (EV), Neighborhood Electric Vehicles (NEV), Battery Electric Vehicles (BEV), Hybrid Vehicles, Low-Speed Vehicles (LSV), Personal Electric Vehicles (PEV), Plug-in Hybrid Vehicles (PHV) and Plug-in Hybrid electric Vehicles (PHEV)
- Cables are compatible with charging applications at residences, commercial establishments, parking facilities or dedicated charging stations

For a complete solution—and the fastest delivery—turn to the innovative specialists with the technical expertise to give you the rugged cable performance you need. EV Cables from NWI offer the most reliable solutions available.

EXTREME ENGINEERING:



UL 62 | CSA 49 | cUL 49 | Flexible Cords and Cables

Extensive Rugged Wire, Cable and Retractiles Options.

Global markets are easily accessible with our internationally recognized standards. Our versatile offering features the harmonized standards of the United States, Canada and Mexico. This widely recognized standard complies with all three requirements after minor adjustments. Leveraging advanced materials and manufacturing technology, custom solutions are engineered for rigorous electrical, mechanical, ergonomic, aesthetic and extreme environmental conditions. Our design experts will navigate you through the complexities of harmonized standards to achieve a custom solution that meets your requirements.



Products

AGENCY STANDARDS

	Service Parallel Thermoplastic			Non-Integral Service Parallel Thermoplastic		Service Parallel Elastomer		
	SPT-1	SPT-2	SPT-3	NISPT-1	NISPT-2	SPE-1	SPE-2	SPE-3
FEATURES								
Power	✓	✓	✓	✓	✓	✓	✓	✓
ATTRIBUTES								
Low-Temperature Rating	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C
High-Temperature Rating	105°C	105°C	105°C	105°C	105°C	105°C	105°C	105°C
Cold Bend	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C	≤ -20°C
Flame Resistant	VW-1, FT2	VW-1, FT2	VW-1, FT2	VW-1, FT2	VW-1, FT2	VW-1, FT2	VW-1, FT2	VW-1, FT2
Wet Location Use	-	-	-	-	-	-	-	-
Oil Resistant	-	-	-	-	-	-	-	-
Sunlight/UV Resistant	-	-	-	-	-	-	-	-
Weld Flash Resistant	-	-	-	-	-	-	-	-
Weld Slag Resistant	-	-	-	-	-	-	-	-
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE								
UL	✓	✓	✓	✓	✓	✓	✓	✓
ANSI	✓	✓	✓	✓	✓	✓	✓	✓
CSA	✓	✓	✓	✓	✓	✓	✓	✓
cUL	✓	✓	✓	✓	✓	✓	✓	✓
NEC®	Article 400	Article 400	Article 400	Article 400	Article 400	Article 400	Article 400	Article 400
MSHA	-	-	-	-	-	-	-	-
RoHS2	✓	✓	✓	✓	✓	✓	✓	✓
REACH	★	★	★	★	★	★	★	★

* Low-Temperature Rating must have a "W" rating to call the TPE -50°C. National differences for US, Canada & Mexico exist, please contact our experienced designers for assistance.

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:





NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Power

BENEFITS:

- UL and cUL listed and CSA certified
- Compliant to ANSI, NEC®, MSHA, RoHS2 and REACH standards
- Harmonized standards
- Widely recognized internationally
- Versatile
- Extreme temperature performance
- Composite and custom options available
- Over-mold and assembly compatible
- Available in retractile

DYNAMIC RANGE OF USE:

- Specialty applications
- Architectural and decorative lighting
- Tensile and lamp cords
- Service cords
- Power cord for portable tools

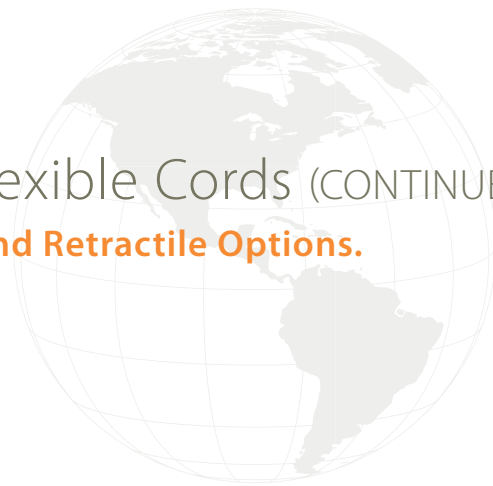
Non-Integral Service Parallel Elastomer		Service Vacuum Thermoplastic	Service Vacuum Elastomer	Service Junior Thermoplastic	Service Junior Elastomer	Service Thermoplastic	Service Elastomer
NISPE-1	NISPE-2	SVT	SVE	SJT	SJE	ST	SE
✓	✓	✓	✓	✓	✓	✓	✓
≤ -20°C	≤ -20°C	≤ -20°C	≤ -50°C	≤ -20°C	≤ -50°C	≤ -20°C	≤ -50°C
105°C	105°C	105°C	105°C	105°C	105°C	105°C	105°C
≤ -20°C	≤ -20°C	≤ -20°C	≤ -50°C*	≤ -20°C	≤ -50°C*	≤ -20°C	≤ -50°C*
VW-1, FT2	VW-1, FT2	VW-1, FT2	FT2	VW-1, FT2	FT2	VW-1, FT2	FT2
-	-	-	-	✓	✓	✓	✓
-	-	-	SVE0	SJTO, SJTO0	SJEO, SJEO0	STO, STO0	SEO, SEO0
-	-	-	-	SJTW, SJTOW, SJTOOW	SJEW, SJEOW, SJE0OW	STW, STOW, STOOW	SEW, SEOW, SE0OW
-	-	-	-	-	★	-	★
-	-	-	-	-	★	-	★
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
Article 400	Article 400	Article 400	Article 400	Article 400	Article 400	Article 400	Article 400
-	-	-	-	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓	✓
★	★	★	★	★	★	★	★

EXTREME ENGINEERING:



KEY:
 - Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available

Products
AGENCY STANDARDS



UL 62 | CSA 49 | cUL 49 | Flexible Cords (CONTINUED)

Extensive Ruggedized Wires, Cables and Retractable Options.

Products

AGENCY STANDARDS

	Service Parallel Thermoplastic			Non-Integral Service Parallel Thermoplastic		Service Parallel Elastomer		
	SPT-1	SPT-2	SPT-3	NISPT-1	NISPT-2	SPE-1	SPE-2	SPE-3
INSULATED CONDUCTORS								
Conductor Count	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
AWG (mm ²)	20-18 (.519 -.824)	18-16 (.824-1.31)*	18-10 (.824 - 5.26)	20-18 (.519 -.824)	18-16 (.824 - 1.31)	20-18 (.519 -.824)	18-16 (.824 - 1.31)	18-10 (.824 - 5.26)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)
Material	PVC	PVC	PVC	PVC	PVC	TPE	TPE	TPE
AWG- Insulation Wall Thickness inches (mm)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)
OVERALL CABLING								
Fillers	-	-	-	-	-	-	-	-
Shielding	-	-	-	-	-	-	-	-
Armoring	-	-	-	-	-	-	-	-
Wraps	-	-	-	-	-	-	-	-
Strength Members	-	-	-	-	-	-	-	-
OUTER JACKET								
Material	PVC	PVC	PVC	PVC	PVC	TPE	TPE	TPE
Color	★	★	★	★	★	★	★	★
Minimum Acceptable Jacket Wall Thickness inches (mm)	.030 (0.76)	.045 (1.14)	.060 (1.52)	.015 (0.38)	.030 (0.76)	.030 (0.76)	.045 (1.14)	.080 (2.03)
ELECTRICAL								
Max. Operating Voltage - UL	300V	300V	300V	300V	300V	300V	300V	300V
DC Resistance Max	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62
DC Resistance Nominal	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166
Ampacity	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165

*14 AWG (2.08mm²) SPT-2 applicable in Mexico

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:





NWI DIRECT
In Stock. Buy Now!

NWI EXPRESS
5 Days Design to Deliver

Non-Integral Service Parallel Elastomer		Service Vacuum Thermoplastic	Service Vacuum Elastomer	Service Junior Thermoplastic	Service Junior Elastomer	Service Thermoplastic	Service Elastomer
NISPE-1	NISPE-2	SVT	SVE	SJT	SJE	ST	SE
2-3	2-3	2-3	2-3	2-6	2-6	2 or more	2 or more
20-18 (.519 - .824)	18-16 (.824 - 1.31)	18-16 (.824 - 1.31)	18-16 (.824 - 1.31)	18-10 (.824 - 5.26)	18-10 (.824 - 5.26)	18-2 (.824 - 33.6)	18-2 (.824 - 33.6)
.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	≤ 14 .0049-.010 (.125-.260) ≥ 12 .0049-.016 (.125-.410)	≤ 14 .0049-.010 (.125-.260) ≥ 12 .0049-.016 (.125-.410)	≤ 14 .0049-.010 (.125-.260) ≥ 12 .0049-.016 (.125-.410)	≤ 14 .0049-.010 (.125-.260) ≥ 12 .0049-.016 (.125-.410)
TPE	TPE	PVC	TPE	PVC	TPE	PVC	TPE
Grounding Conductor .015 (0.38)	Grounding Conductor .015 (0.38)	18 .015 (0.38) 16 .015 (0.38)	18 .015 (0.38) 16 .015 (0.38)	18 .030 (0.762) 16 .030 (0.762) 14 .030 (0.762) 12 .030 (0.762) 10 .045 (1.143)	18 .030 (0.762) 16 .030 (0.762) 14 .030 (0.762) 12 .030 (0.762) 10 .045 (1.143)	18 .030 (0.762) 16 .030 (0.762) 14 .045 (1.143) 12 .045 (1.143) 10 .045 (1.143) 8 .060 (1.524) 6 .060 (1.524) 4 .060 (1.524) 2 .060 (1.524)	18 .030 (0.762) 16 .030 (0.762) 14 .045 (1.143) 12 .045 (1.143) 10 .045 (1.143) 8 .060 (1.524) 6 .060 (1.524) 4 .060 (1.524) 2 .060 (1.524)
-	-	★	★	★	★	★	★
-	-	★	★	★	★	★	★
-	-	★	★	★	★	★	★
-	-	★	★	★	★	★	★
-	-	★	★	★	★	★	★
TPE	TPE	PVC	TPE	PVC	TPE	PVC	TPE
★	★	★	★	★	★	★	★
.015 (0.38)	.030 (0.76)	.030 (0.76)	.030 (0.76)	18 - 14 .030 (0.76) 12 .045 (1.52) 10 .060 (1.52)	18 - 14 .030 (0.76) 12 .045 (1.52) 10 .060 (1.52)	Dependent on construction	Dependent on construction
300V	300V	300V	300V	300V	300V	600V	600V
Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62	Reference UL 62
See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166	See Chart C, Pg 166
See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165	See Chart A, Pg 165

Products
AGENCY STANDARDS

EXTREME ENGINEERING:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available

UL 66 | Fixture Wire

Easy Installation Saves Labor Costs.

Robust performance in extreme cold. Easy to install, our flame and oil resistant products meet or exceed UL 66 requirements. Approved for wet location use, applications include installations and connections to branch circuit wiring in lighting fixtures or similar equipment – like the internal wiring of appliances – when enclosed or protected.

	TF, TFF	TFN, TFFN
FEATURES		
Signal	✓	✓
Control	✓	✓
Instrumentation	✓	✓
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	≤ -20°C	≤ -20°C
High-Temperature Rating	60°C	90°C
Cold Bend	≤ -20°C	≤ -20°C
Cold Impact	★	★
Flame Resistant	VW-1,FT1, UL 1581 Section 1060	VW-1,FT1, UL 1581 Section 1060
Exposed Run Rated	✓	✓
Wet Location Use	✓	✓
Oil Resistant	✓	✓
Sunlight / UV Resistant	✓	✓
Cut / Abrasion Resistant (unarmored)	✓	✓
FLEXIBILITY		
Torsional Flex	★	★
Rolling Flex	★	★
Variable Flex	★	★
Bend Flex	★	★
Continuous Flex	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CE	✓	✓
NEC®	Article 402	Article 402
RoHS2	✓	✓
REACH	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, NEC®, RoHS2 and REACH standards
- Cold bend test as low as -20°C
- Suitable for wet location use
- Impact, oil, UV and cut resistant
- Composite and custom options available
- Retractable options available

DYNAMIC RANGE OF USE:

- Connection to branch circuit wiring in lighting fixtures
- Internal wiring of appliances
- Installed in conduit

	TF, TFF	TFN, TFFN
INSULATED CONDUCTORS		
Conductor Count	1	1
AWG (mm2)	18 - 16 (0.824 - 1.31)	18 - 16 (0.824 - 1.31)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	Solid or 7 strand for TF, Flexible stranded for TFF .005 - .0159 (.0127 - 0.404)	Solid or 7 strand for TFN, Flexible stranded for TFFN .005 - .0159 (.0127 - 0.404)
OUTER JACKET		
Material	PVC	PVC/Nylon
Color	-	★
Overall OD AWG in inches (mm)	18 .110 (2.794) 16 .120 (3.048)	18 .087 (2.210) 16 .102 (2.590)
ELECTRICAL		
Max. Operating Voltage - UL	600V	600V
DC Resistance Max	Reference UL 66	Reference UL 66
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166
Ampacity	Article 402	Article 402

FLEX:



EXTREME ENGINEERING:



Products

AGENCY STANDARDS

UL 83 | CSA 75 | Thermoplastic - Insulated Wires and Cables

Flexible, Easy to Install Insulated Wires, Cables and Retractable.

Engineered for rugged industrial applications and wet use locations, our UL 83 | CSA 75 products are ideally suited for exposed run tray cable, instrumentation tray cable, power limited tray cable and wind turbine tray cable. Flexible for easy installation, single and multi-conductor configurations add to the versatility of this widely recognized standard. Select from custom options, including resistance to cuts, UV, oil, flame and silicone free offerings.

	TW, THW, THW-2, THHW	THWN, THWN-2, THHN	TW75, TWN75 (CSA75)	T90 (CSA75)
FEATURES				
Control	✓	✓	✓	✓
Instrumentation	✓	✓	✓	✓
Power	✓	✓	✓	✓
ATTRIBUTES				
Low-Temperature Rating	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
High-Temperature Rating	≥ 90°C	≥ 90°C	≥ 75°C	≥ 90°C
Cold Bend	≤ -25°C	≤ -25°C	≤ -25°C	≤ -25°C
Cold Impact	★	★	★	★
Flame Resistant	VW-1, FT1, UL 1581 Section 1060	VW-1, FT1, UL 1581 Section 1060	VW-1, FT1, UL 1581 Section 1060	VW-1, FT1, UL 1581 Section 1060
Exposed Run Rated	✓	✓	✓	✓
Wet Location Use	✓	not THHN	✓	-
Oil Resistant	PRI and PRII	PRI and PRII	PRI and PRII	PRI and PRII
Sunlight / UV Resistant	✓	✓	✓	✓
Cut / Abrasion Resistant	✓	✓	✓	✓
FLEXIBILITY				
Torsional Flex	★	★	★	★
Rolling Flex	★	★	★	★
Variable Flex	★	★	★	★
Bend Flex	★	★	★	★
Continuous Flex	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE				
UL	✓	✓	-	-
ANSI	✓	✓	-	-
CSA	-	-	✓	✓
CE	✓	✓	✓	✓
NEC®	✓	✓	-	-
NFPA 70	✓	✓	-	-
RoHS2	✓	✓	✓	✓
REACH	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



- KEY:**
- Not Applicable
 - ✓ Featured
 - ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Control
- Instrumentation
- Power

BENEFITS:

- UL listed and CSA certified and approved for CE Mark
- Agency compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Widely recognized
- Flexible for easy installation
- Resistant to cut, UV and oil PRI and PRII
- Flame resistant
- Silicone free

DYNAMIC RANGE OF USE:

- Versatile for use in single and multi-conductor applications
- Wet location use and industrial settings
- Can be used in:
 - TC-ER
 - ITC
 - PLTC
 - WTTC (1000V)

	TW, THW, THW-2, THHW	THWN, THWN-2, THHN	TW75, TW75, TWN75	T90
INSULATED CONDUCTORS				
Conductor Count	1	1	1	1
AWG (mm2)	14-2 (2.08 - 33.6)	14-2 (2.08 - 33.6)	14-2 (2.08 - 33.6)	14-2 (2.08 - 33.6)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .064 (.510 - 1.626) 4 .0469 - .0772 (1.191 - 1.961) 2 .0591 - .0974 (1.501 - 2.4740)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .064 (.510 - 1.626) 4 .0469 - .0772 (1.191 - 1.961) 2 .0591 - .0974 (1.501 - 2.4740)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .064 (.510 - 1.626) 4 .0469 - .0772 (1.191 - 1.961) 2 .0591 - .0974 (1.501 - 2.4740)	14 .0063 - .0253 (.160 - .643) 12 .010 - .032 (.250 - .813) 10 .010 - .0385 (.250 - .978) 8 .0201 - .0508 (.510 - 1.29) 6 .0201 - .064 (.510 - 1.626) 4 .0469 - .0772 (1.191 - 1.961) 2 .0591 - .0974 (1.501 - 2.4740)
Material	PVC	PVC/Nylon	PVC	PVC/Nylon
Minimum Wall Thickness AWG in inches (mm)	14-10 .030 (.76) 8 .045 (1.143)	14-12 .015 / .004 (0.38 / 0.10) 10 .020 / .005 (0.51 / 0.13) 8-6 .030 / .005 (0.76 / 0.13) 4-2 .040 / .006 (0.102 / 0.15)	14-10 .030 (.76) 8 .045 (1.143) 6-2 .060 (1.52)	14-12 .015 / .004 (0.38 / 0.10) 10 .020 / .005 (0.51 / 0.13) 8-6 .030 / .005 (0.76 / 0.13) 4-2 .040 / .006 (0.102 / 0.15)
OUTER JACKET				
Color	★*	★*	★*	★*
Overall OD inches (mm)	14 .200 (5.08) 12 .220 (5.59) 10 .240 (6.10) 8 .330 (8.38) 6 .375 (9.53) 4 .430 (10.92) 2 .500 (12.7)	14 .208 (5.28) 12 .228 (5.79) 10 .248 (6.30) 8 .340 (8.64) 6 .385 (9.78) 4 .443 (11.25) 2 .512 (13.00)	14 .200 (5.08) 12 .220 (5.59) 10 .240 (6.10) 8 .330 (8.38) 6 .375 (9.53) 4 .430 (10.92) 2 .500 (12.7)	14 .208 (5.28) 12 .228 (5.79) 10 .248 (6.30) 8 .340 (8.64) 6 .385 (9.78) 4 .443 (11.25) 2 .512 (13.00)
ELECTRICAL				
Max. Operating Voltage - UL	600V	600V	600V	600V
DC Resistance Max	Reference UL 83	Reference UL 83	Reference UL 83	Reference UL 83
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	NFPA 70	NFPA 70	NFPA 70	NFPA 70

*Custom color options available for insulation only

FLEX:



EXTREME ENGINEERING:



Products
AGENCY STANDARDS

UL 1063 | Machine-Tool Wires and Cables

High Flex Options Make Installation Easy.

Manufactured in the USA for over 40 years, our cost competitive, easy to install MTW is oil, chemical and water resistant. UL listed, our MTW is flame resistant and ideally suited for wet location use, wiring new facilities or rewiring existing plants and more.

	Single Conductors		2 or More Conductors	
FEATURES				
Signal	✓	✓	✓	✓
Control	✓	✓	✓	✓
Instrumentation	✓	✓	✓	✓
Power	✓	✓	✓	✓
ATTRIBUTES				
Low-Temperature Rating	-20°C	-20°C	-20°C	-20°C
High-Temperature Rating	90°C	90°C	90°C	90°C
Flame Resistant	VW-1, UL 1581 Section 1060, FT2	VW-1, UL 1581 Section 1060, FT2	VW-1, UL 1581 Section 1060, FT2	VW-1, UL 1581 Section 1060, FT2
Wet Location Use	✓	✓	✓	✓
Oil Resistant	✓	✓	✓	✓
Chemical Resistant	✓	✓	✓	✓
FLEXIBILITY				
Torsional Flex	★	★	★	★
Rolling Flex	★	★	★	★
Variable Flex	★	★	★	★
Bend Flex	★	★	★	★
Continuous Flex	★	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE				
UL	✓	✓	✓	✓
ANSI	✓	✓	✓	✓
CE	✓	✓	✓	✓
NEC®	✓	✓	✓	✓
NFPA 70	✓	✓	✓	✓
NFPA 79	✓	✓	✓	✓
RoHS2	✓	✓	✓	✓
REACH	✓	✓	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:

- Not Applicable
- ✓ Featured
- ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Signal
- Control
- Instrumentation
- Power

BENEFITS:

- UL listed, UL recognized AWM Style
- Approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH Standards
- Oil resistant

DYNAMIC RANGE OF USE:

- Machine tool wiring
- Hook-up wire
- Internal appliance wiring

	Single Conductors		2 or More Conductors
INSULATED CONDUCTORS			
AWG (mm²)	22 - 2 (0.326 - 33.631)	22 - 2 (0.326 - 33.631)	22 - 2 (0.326 - 33.631)
AWG - Minimum Strand Count	Minimum number of strands 22 - 7 strands 20 - 10 strands 18 - 16 strands 16 - 26 strands 14 - 41 strands 12 - 65 strands 10 - 104 strands 8 - 219 strands or more	Minimum number of strands 22 - 7 strands 20 - 10 strands 18 - 16 strands 16 - 26 strands 14 - 41 strands 12 - 65 strands 10 - 104 strands 8 - 219 strands or more	Minimum number of strands 22 - 7 strands 20 - 10 strands 18 - 16 strands 16 - 26 strands 14 - 41 strands 12 - 65 strands 10 - 104 strands 8 - 219 strands or more
Material	PVC	PVC/Nylon	PVC
Minimum Wall Thickness AWG in inches (mm)	22 - 10 .030 (0.762) 8 .045 (1.143) 6 - 2 .060 (1.524)	22 - 12 .015 / .004 (0.381 / 0.102) 10 .020 / .004 (0.508 / 0.102) 8 .030 / .005 (0.762 / 0.127) 6 .030 / .005 (0.762 / 0.127) 2-4 .040 / .006 (1.016 / 0.152)	22 - 10 .030 (0.762) 8 .045 (1.143) 6 - 2 .060 (1.524)
OVERALL CABLING			
Fillers	-	-	★
Ground	-	-	★
Shielding	-	-	★
Armoring	-	-	★
Wraps	-	-	★
Strength Members	-	-	★
OUTER JACKET			
Material	-	-	PVC
Color	-	-	★
Overall OD inches (mm)	Dependent on construction	Dependent on construction	Dependent on construction
ELECTRICAL			
Max. Operating Voltage - UL	600V	600V	600V
DC Resistance Max	Reference 1063	Reference 1063	Reference 1063
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	NFPA 70, NFPA 79	NFPA 70, NFPA 79	NFPA 70, NFPA 79

FLEX:



EXTREME ENGINEERING:



Products

AGENCY STANDARDS

UL 44 | Thermoset-Insulated Wires and Cable

Cost Savings, Easy Installation with Extreme Flex Options.

Cross-linked and flame resistant, our high heat, cold temperature, UV, and water resistant UL 44 listed products are principally suited for factory settings. Widely recognized and versatile. For easy installation, select from a range of extreme flex options, torsional, rolling, variable, bend, and continuous.

	XHH, XHHW, XHHW-2	RHH, RHW, RHW-2
FEATURES		
Power	✓	✓
ATTRIBUTES		
Low-Temperature Rating	≤-25°C	≤-25°C
High-Temperature Rating	≥ 90°C	≥ 90°C
Cold Bend	≤-25°C	≤-25°C
Cold Impact	★	★
Flame Resistant	VW-1, FT1	VW-1, FT1
Wet Location Use	✓	✓
Oil Resistant	PRI and PRII	PRI and PRII
FLEXIBILITY		
Torsional Flex	★	★
Rolling Flex	★	★
Variable Flex	★	★
Bend Flex	★	★
Continuous Flex	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE		
UL	✓	✓
ANSI	✓	✓
CE	✓	✓
NEC®	NFPA 70	NFPA 70
NFPA	✓	✓
RoHS2	✓	✓
REACH	✓	✓

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



- KEY:
- Not Applicable
 - ✓ Featured
 - ★ Cost Competitive Custom Options Available



NWI EXPRESS
5 Days Design to Deliver

FEATURES:

- Power

BENEFITS:

- UL listed and approved for CE Mark
- Compliant to ANSI, NEC®, NFPA, RoHS2 and REACH standards
- Extreme cold bend and temperature performance
- Flame, UV, oil PRI and PRII and water resistant

DYNAMIC RANGE OF USES:

- Factory settings
- Wet location use
- Flexing applications

	XHH, XHHW, XHHW-2		RHH, RHW, RHW-2	
INSULATED CONDUCTORS				
Conductor Count	1		1	
AWG (mm2)	14-2 (2.08 - 33.6)		14-2 (2.08 - 33.6)	
Stranding - Minimum and Maximum Diameter of individual wire strands AWG in inches (mm)	14	.0117 - .0159 (0.30 - .404)	14	.0117 - .0159 (0.30 - .404)
	12	.0147 - .0210 (0.40 - 0.50)	12	.0147 - .0210 (0.40 - 0.50)
	10	.0185 - .0253 (0.50 - 0.60)	10	.0185 - .0253 (0.50 - 0.60)
	8	.0234 - .0319 (0.60 - 0.80)	8	.0234 - .0319 (0.60 - 0.80)
	6	.0294 - .0402 (0.70 - 1.0)	6	.0294 - .0402 (0.70 - 1.0)
	4	.0371 - .0507 (0.90 - 1.3)	4	.0371 - .0507 (0.90 - 1.3)
Material	XL		XL	XL
Minimum Wall Thickness AWG in inches (mm)	14-10	.030 (.76)	600V and 2000V	2000V
	8	.045 (1.14)	14 - 10 .045 (1.14)	14 - 10 .060 (1.52)
	6-2	.045 (1.14)	8 - 2 .055 (1.40)	8 - 2 .070 (1.78)
OVERALL CABLING				
Fillers	★		★	
Shielding	★		★	
Armoring	★		★	
Wraps	★		★	
Strength Members	★		★	
OUTER JACKET				
Material	-		-	
Color	★		★	
Overall OD and jacket thickness inches (mm)	0 - .425, .045	(0 - 10.80, 1.14)	0 - .425, .045	(0 - 10.80, 1.14)
	.426 - .700, .060	(10.81 - 17.80, 1.52)	.426 - .700, .060	(10.81 - 17.80, 1.52)
	.701 - 1.50, .080	(17.81 - 38.10, 2.03)	.701 - 1.50, .080	(17.81 - 38.10, 2.03)
	1.501 - 2.500, .110	(38.11 - 63.50, 2.79)	1.501 - 2.500, .110	(38.11 - 63.50, 2.79)
	over 2.500, .140	(63.50, 3.55)	over 2.500, .140	(63.50, 3.55)
ELECTRICAL				
Max. Operating Voltage - UL	600V		600V - 2000V	
DC Resistance Max	Reference UL 44		Reference UL 44	
DC Resistance Nominal	See Chart C, Page 166		See Chart C, Page 166	

Products

AGENCY STANDARDS

FLEX:



EXTREME ENGINEERING:





UL AWM STYLE 21048 | CSA AWM C22.2 No. 210

Architectural and Decorative Lighting Cable with Distinctive Style.

Lument™ cable from NWI offers a wide variety of options to enhance lighting fixtures and décor—from classic to contemporary to high-tech. Work directly with NWI’s design engineers to create a proprietary design to your exact specifications.

	SPT-2 Service Parallel Thermoplastic	SVT Service Vacuum Thermoplastic	SJT Service Junior Thermoplastic
FEATURES			
Power	✓	✓	✓
ATTRIBUTES			
Low-Temperature Rating	≤ -20°C	≤ -20°C	≤ -20°C
High-Temperature Rating	105°C	105°C	105°C
Cold Bend	≤ -20°C	≤ -20°C	≤ -20°C
Flame Resistant	VW-1, FT2	VW-1, FT2	VW-1, FT2
FLEXIBILITY			
Torsional Flex	★	★	★
Rolling Flex	★	★	★
Variable Flex	★	★	★
Bend Flex	★	★	★
Continuous Flex	★	★	★
STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE			
UL	✓	✓	✓
ANSI	✓	✓	✓
CSA	✓	✓	✓
NEC®	Article 400	Article 400	Article 400
RoHS2	✓	✓	✓
REACH	✓	✓	✓

**Need high
tensile strength?**
Check out more
information under
Architectural Lighting
on **page 66**

UNIQUE FINISHES AND COLORS INCLUDE:

- Color matching to RAL, PMS or custom color
- Holographic glitter
- Fluorescent colors
- Shiny and matte finishes
- Metallic effects
- Glow-in-the-dark
- Custom vintage fabric weaves
- Clear jackets, insides visible
- And more

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



KEY:
 – Not Applicable
 ✓ Featured
 ★ Cost Competitive Custom Options Available

FEATURES

- Power

BENEFITS:

- UL Recognized AWM Style and CSA AWM certified and approved for CE Mark
- Compliant to ANSI, NEC®, RoHS2 and REACH standards
- Composite and custom options available
- Over-mold and assembly compatible
- Logos, private labels, custom colors and lengths
- Straight and retractile coil cable in almost any length or diameter
- Round, oval, flat, flexible, limp and miniaturized options

DYNAMIC RANGE OF USE:

- Architectural and decorative lighting cable
- High tensile strength member manufactured into architectural cable design



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Check out our Lument™ debut on DIY Network's "I Hate My Kitchen" - available on www.northwire.com/pr

	SPT-2 Service Parallel Thermoplastic	SVT Service Vacuum Thermoplastic	SJT Service Junior Thermoplastic
INSULATED CONDUCTORS			
Conductor Count	2-3	2-3	2-6
AWG (mm ²)	18-16 (.824 - 1.31)	18-16 (.824 - 1.31)	18-10 (.824 - 5.26)
Stranding - Minimum and Maximum Diameter of individual strands AWG in inches (mm)	.0049 - .0065 (.125 - .165)	.0049 - .0065 (.125 - .165)	≤ 14 .0049 - .010 (.125 - .260) ≥ 12 .0049 - .016 (.125 - .410)
Material	PVC	PVC	PVC
Insulation Wall Thickness AWG in inches (mm)	Grounding Conductor .015 (0.38)	18 .015 (0.38) 16 .015 (0.38)	18 .030 (0.762) 16 .030 (0.762) 14 .030 (0.762) 12 .030 (0.762) 10 .045 (1.143)
OVERALL CABLING			
Fillers	–	★	★
Shielding	–	★	★
Wraps	–	★	★
Strength Members	–	★	★
OUTER JACKET			
Material	PVC	PVC	PVC
Color	★	★	★
Minimum Acceptable Jacket Wall Thickness inches (mm)	.045 (1.14)	.030 (0.76)	18 - 14 .030 (0.76) 12 .045 (1.52) 10 .060 (1.52)
ELECTRICAL			
Max. Operating Voltage - UL	300V	300V	300V
DC Resistance Max	Reference UL 62	Reference UL 62	Reference UL 62
DC Resistance Nominal	See Chart C, Page 166	See Chart C, Page 166	See Chart C, Page 166
Ampacity	See Chart A, Page 165	See Chart A, Page 165	See Chart A, Page 165

FLEX:



EXTREME ENGINEERING:





Endurance

Guaranteed to Perform.

Endurance Vision Cable Assemblies are designed and built to meet or exceed motion and vision system application requirements. Engineered with the industry's first industrial-grade dual over-mold connectors, Endurance cable assemblies provide increased strength and enhanced performance.

CCXC

FireWire™

GigE Vision®

Camera Link®

Power over
Camera Link®

Northwire Makes Endurance Visibly Better.



An Industry-First Design

Rugged connectors, combined with Northwire's exclusive cable, are proven to exceed 10 million flex cycles, providing reliable connectivity. Cables employ Northwire TPE elastomer jacketing material, making them ideal for applications requiring:

- Abrasion resistance
- Flame retardance
- High and low temperature stability (high temperature rating of 80°C and low temperature of -50°C)
- Sunlight/UV resistance
- Water resistance
- Weld flash resistance

As a result, the cable assemblies will endure the most rugged industrial and outdoor uses. All are certified to be RoHS compliant.



Your Connection to Performance

Northwire Endurance connectors are internally shielded for greater durability. Screw-lock connectors use combination Phillips/slot screws—providing security against accidental disconnect—unlike thumbscrews. Low profile right angle connectors are configured for either “up” or “down” cable exit. And the rugged connector design features a unique rigid internal construction with a soft strain relief.

Passing the Flex Test

All Endurance cables are designed for high-flex life. Some have passed 20 million cycles on Northwire's Standardized Flex Test Protocol (NSFTP), Mode A (tick-tock bending test) and Mode B (rolling/torsion flex).*

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/fix



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Select from Durable, High-Performance Products.

CCXC High-Grade, Industry-Standard Analog Camera Cable Assemblies

Northwire was the first company to produce a high-flex life CCXC cable.

- Cables meet accepted industry standards for analog CCD cameras
- Cable has surpassed 30 million flex cycles of NSFTP testing in both Mode A and Mode B*
- Bulk cable and CCXC connectors available for customer assembly or finished product

MVC-800 FireWire™ IEEE 1394a and b Cable Assemblies

- Meets or exceeds IEEE 1394a and b standards
- Our standard FireWire™ cable is an extended-length/extended-life cable suitable for use up to 7 meters (23 feet) 1394b 800 Mbps
- Rough-service, industrial-strength AWM-style cables are UL approved and CSA certified
- Surpassed 11 million flex cycles in rigorous NSFTP Modes A and B testing*
- Optimal shielding—100 percent coverage foil/polyester tape shield with two drain wires and an overall tinned copper braid

GEV-1000 Gigabit Ethernet Cable Assemblies

Northwire designed and manufactured the cable especially for industrial-duty GigE Vision® systems.

- Screw-lock vertical and horizontal connectors available—screwdriver provided
- Ring boot over connector to protect the locking tab and prevent snags when pulling through bundles or openings
- Built for flexing applications. Exceeds 12 million flex cycles in NSFTP mode A testing*
- Meets AIA standards for GigE Vision® cable assemblies
- Dual-shield construction with a 100 percent foil and 65 percent TC braid shield

Camera Link® Cable Assemblies

Northwire was the first company to produce a high-flex life Camera Link® cable, designed specifically for vision systems.

- Industrial grade for cameras and frame grabbers
- Standard and PoCL® (Power over Camera Link) versions available
- Assemblies meet both Appendixes D and E requirements of the Camera Link® specification
- Passed 19 million cycles in NSFTP mode A testing*
- Dual-shield construction with a 100 percent foil and 65 percent TC braid shield

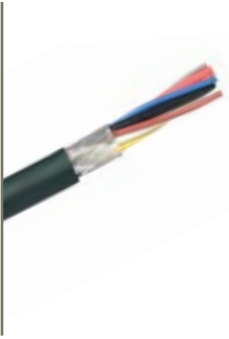
*For Northwire Standardized Flex Test Protocol (NSFTP), go to www.northwire.com/flx.

Mode A—Tick-Tock Bending Test

The cable is flexed 180° over nylon blocks that have a 3" (76.2 mm) radius. There is 1 lb. (0.454 kg) of weight hanging on the cable as it is flexed at just under 30 cycles per minute.

Mode B—Rolling/Torsion Flex Test

The cable is pulled approximately 18" (457.2 mm) over a 3" (76.2 mm) radius wheel and twisted 360°. All of the twisting takes place in the 18" (457.2 mm) between the grip and the wheel with a 9-lb. (4.082 kg) weight hanging on the cable as it is twisted.



Endurance

CCXC Analog Video Assemblies

- Cables meet accepted industry standards for analog CCD cameras
- Cable has surpassed 30 million flex cycles of NSFTP testing in both Mode A and Mode B*
- Bulk cable and CCXC connectors available for customer assembly or finished product

SPECIFICATIONS

CABLE

Part Number : # FAWM248C-002

Outer Diameter : 0.275" (6.985 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested > 30 Million Cycles Northwire Standardized Flex Test Protocol Modes A and B*

Compliance : UL recognized AWM Style
CSA certified
RoHS compliant

Flame Test : VW-1, FT-1

ASSEMBLY

Length Tolerance : +5%/-0%

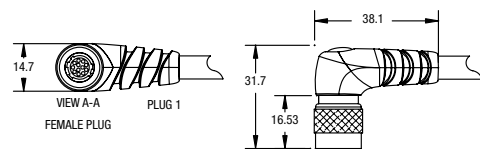
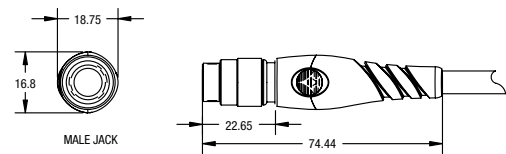
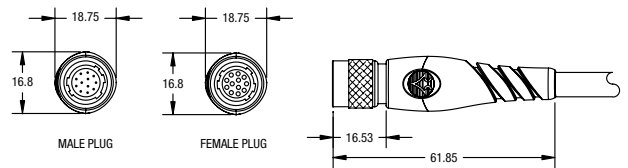
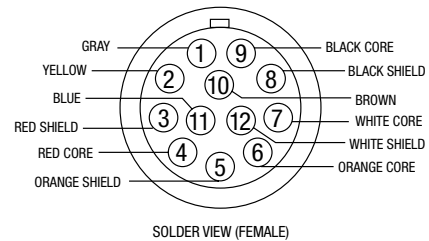
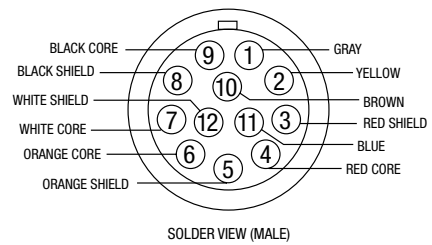
Connector : CCXC – Northwire Type, Plug and jack,
12 pin Internally Shielded

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



PINOUT AND DIMENSIONS



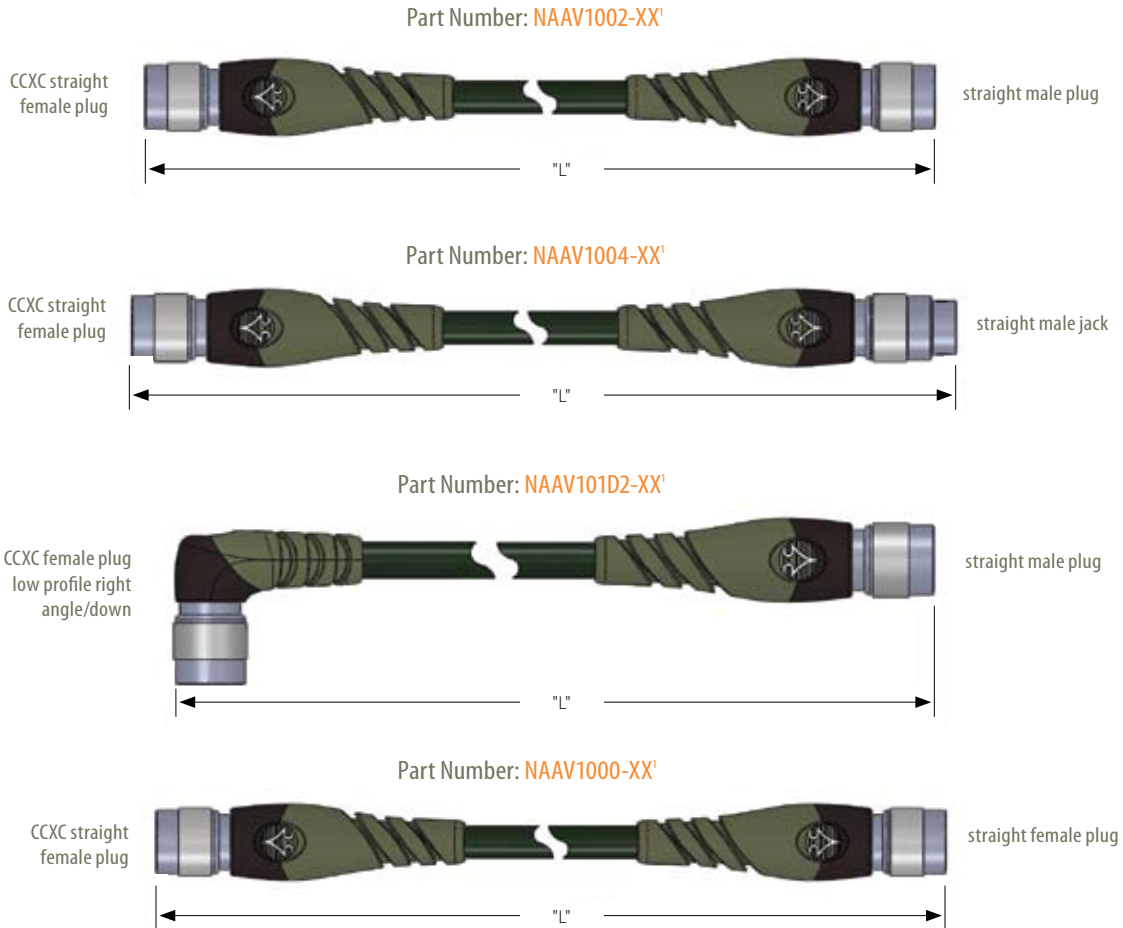


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CONNECTOR CONFIGURATION

Cable exceeds 30 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Modes A and B*



CCXC straight male or female plug



CCXC straight male or female jack



CCXC male or female plug, low profile right angle

Custom Orientations Available

¹XX = Length in meters, maximum length is 40 m.

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx



Endurance

IEEE 1394 FireWire™ Cable Assemblies a to a

- Meets or exceeds IEEE 1394a and b standards
- Our standard FireWire™ cable is an extended-length/extended-life cable suitable for use up to 7 meters (23 feet) 1394b 800 Mbps
- Rough-service, industrial-strength AWM Style cables are UL recognized and CSA certified
- Surpassed 11 million flex cycles in rigorous NSFTP Modes A and B testing*
- Optimal shielding—100 percent coverage foil/polyester tape shield with two drain wires and an overall tinned copper braid

SPECIFICATIONS

CABLE

Part Number : # FAWM226C-008

Outer Diameter : 0.285" (7.239 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested >11 Million Cycles Northwire Standardized Flex Test Protocol Modes A and B*

Compliance : Meets or Exceeds the Electrical Specifications per IEEE 1394a
 UL recognized AWM Style
 CSA certified
 RoHS compliant

Flame Test : FT1

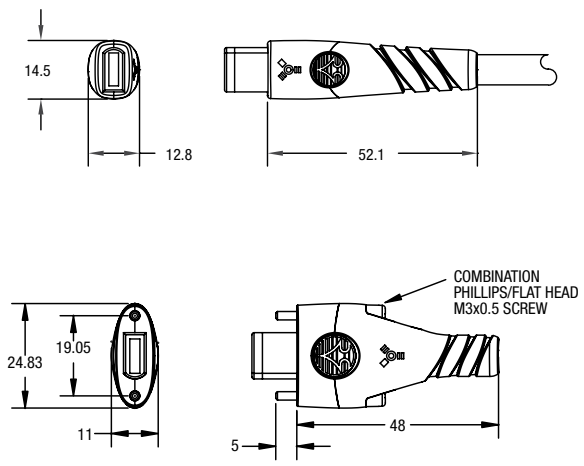
ASSEMBLY

Length Tolerance : +5%/-0%

Connector : IEEE 1394a, Internally Shielded, 6 pin

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/fix

DIMENSIONS



Screwdriver included with screw locking assemblies

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:





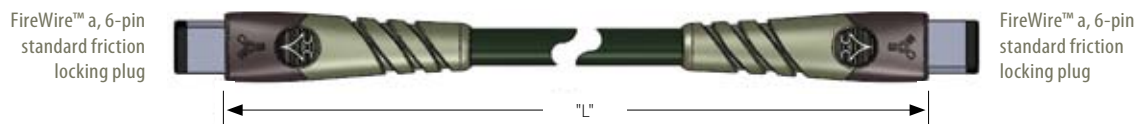
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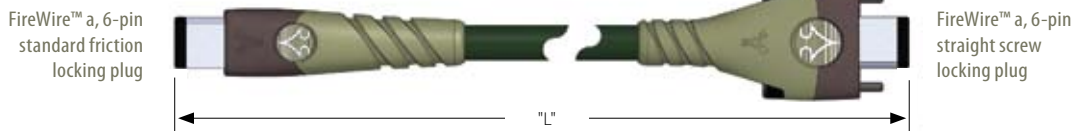
CONNECTOR CONFIGURATION

Cable exceeds 11 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Modes A and B*

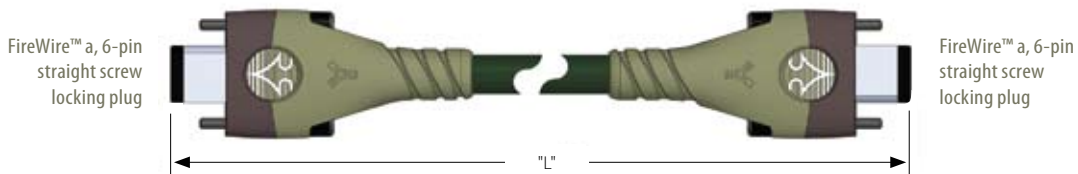
Part Number: **NAFW1300-XX¹**



Part Number: **NAFW1302-XX¹**



Part Number: **NAFW1322-XX¹**



FireWire™ a, 6-pin
standard friction
locking plug



FireWire™ a, 6-pin
straight screw
locking plug

¹XX = Length in meters, maximum length is 12 m.

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx



Endurance

IEEE 1394 FireWire™ Cable Assemblies a to b

- Meets or exceeds IEEE 1394a and b standards
- Our standard FireWire™ cable is an extended-length/extended-life cable suitable for use up to 7 meters (23 feet) 1394b 800 Mbps
- Rough-service, industrial-strength AWM Style cables are UL recognized and CSA certified
- Surpassed 11 million flex cycles in rigorous NSFTP Modes A and B testing*
- Optimal shielding—100 percent coverage foil/polyester tape shield with two drain wires and an overall tinned copper braid

SPECIFICATIONS

CABLE

Part Number : # FAWM226C-008

Outer Diameter : 0.285" (7.239 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested > 11 Million Cycles Northwire Standardized Flex Test Protocol Modes A and B*

Compliance : Meets or Exceeds the Electrical Specifications per IEEE 1394a and b
 UL recognized AWM Style
 CSA certified
 RoHS compliant

Flame Test : FT1

ASSEMBLY

Length Tolerance : +5%/-0%

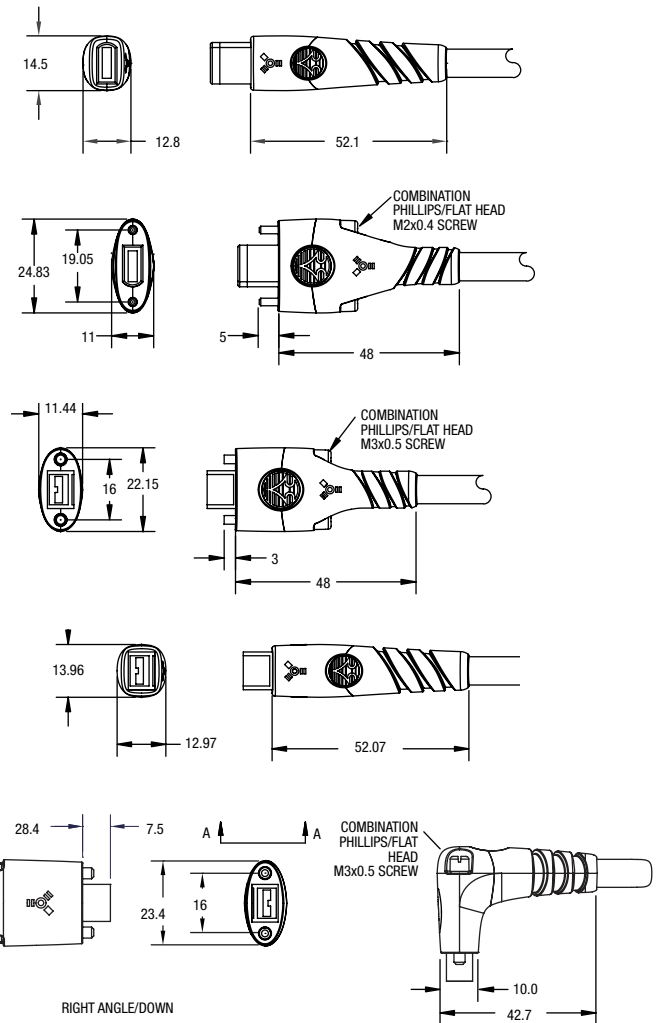
Connector : IEEE 1394a and b, Internally Shielded, 6 and 9 pin

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/fix

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



DIMENSIONS



Screwdriver included with screw locking assemblies

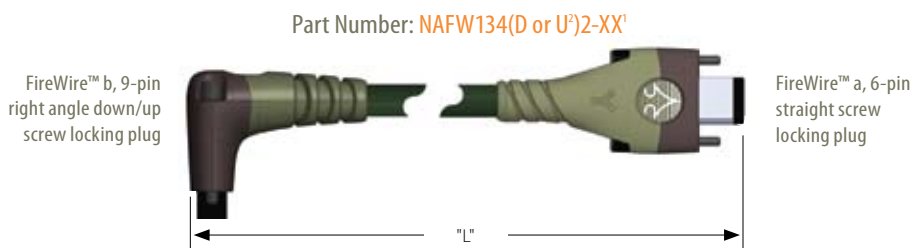
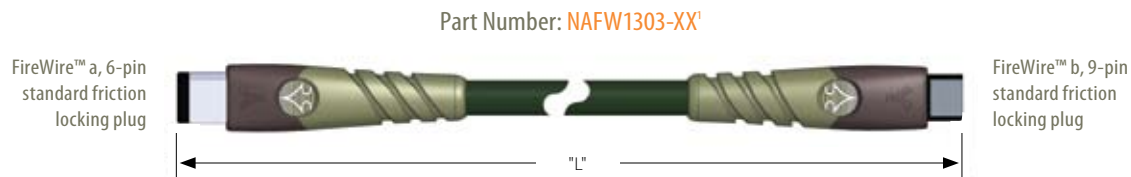
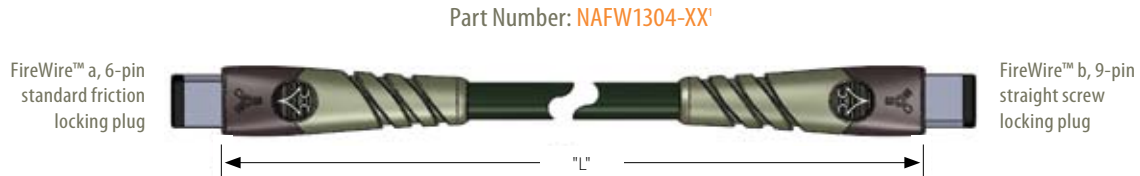


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CONNECTOR CONFIGURATION

Cable exceeds 11 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Modes A and B*



¹XX = Length in meters, maximum length is 12 m. ²D=down, U=up

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx



Endurance

IEEE 1394 FireWire™ Cable Assemblies b to b

- Meets or exceeds IEEE 1394a and b standards
- Our standard FireWire™ cable is an extended-length/extended-life cable suitable for use up to 7 meters (23 feet) 1394b 800 Mbps
- Rough-service, industrial-strength AWM Style cables are UL recognized and CSA certified
- Surpassed 11 million flex cycles in rigorous NSFTP Modes A and B testing*
- Optimal shielding—100 percent coverage foil/polyester tape shield with two drain wires and an overall tinned copper braid

SPECIFICATIONS

CABLE

Part Number : # FAWM226C-008

Outer Diameter : 0.285" (7.239 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested > 11 Million Cycles Northwire Standardized Flex Test Protocol Modes A and B*

Compliance : Meets or Exceeds the Electrical Specifications per IEEE 1394a and b
 UL recognized AWM Style
 CSA certified
 RoHS compliant

Flame Test : FT1

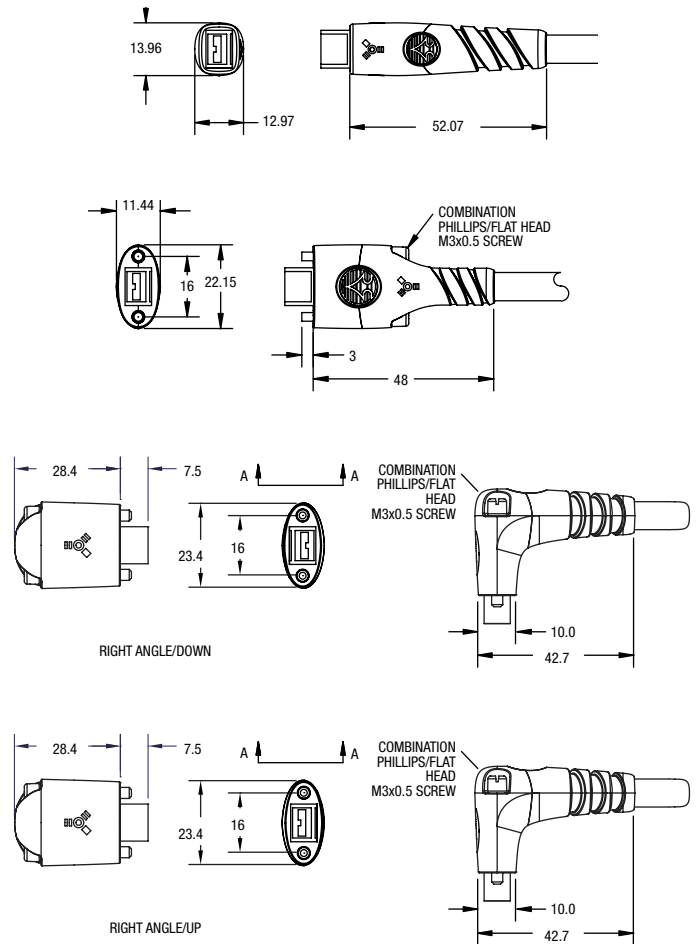
ASSEMBLY

Length Tolerance : +5%/-0%

Connector : IEEE 1394b, Internally Shielded, 9 pin

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx

DIMENSIONS



Screwdriver included with screw locking assemblies

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



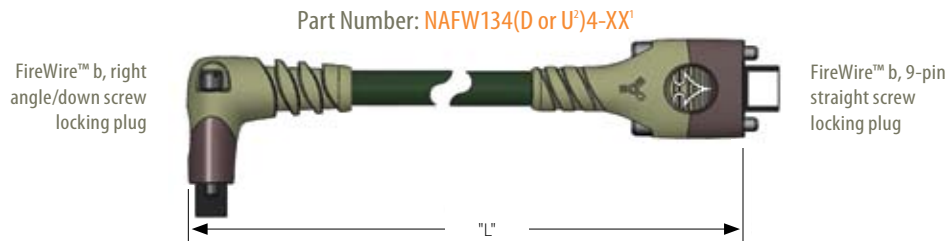
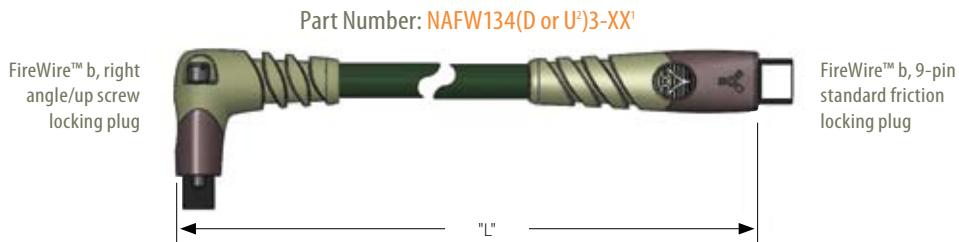
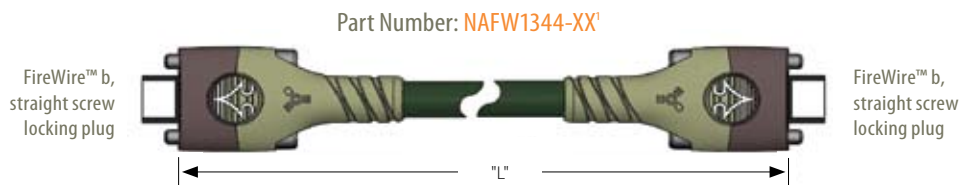
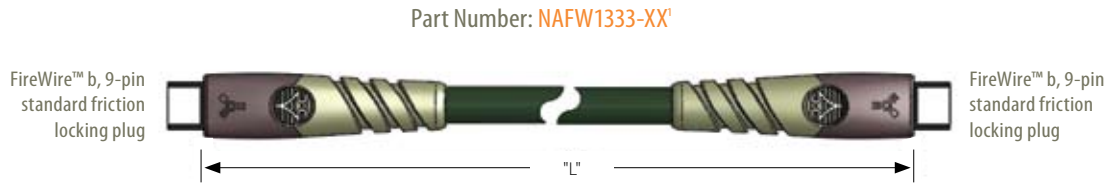


CONNECTOR CONFIGURATION

Cable exceeds 11 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Modes A and B*

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FireWire™ b, 9-pin standard friction locking plug



FireWire™ b, 9-pin straight screw locking plug



FireWire™ b, right angle down/up² screw locking plug

¹XX = Length in meters, maximum length is 7 m. ²D=down, U=up

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx



Endurance

GigE Vision® Cable Assemblies

Endurance Vision Cable Assemblies are designed and built to exceed motion and vision system application requirements. Engineered with the industry's first industrial-grade dual over-mold connectors, Endurance cable assemblies provide increased strength and enhanced performance.

SPECIFICATIONS

CABLE

Part Number : # FAWM248-034

Outer Diameter : 0.245" (6.223 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested > 12 Million Cycles Northwire Standardized Flex Test Protocol Mode A*

Compliance : UL recognized AWM Style
 CSA certified
 RoHS compliant
 Certified to perform to CAT5e patch specification up to 60 meters

Flame Test : FT1

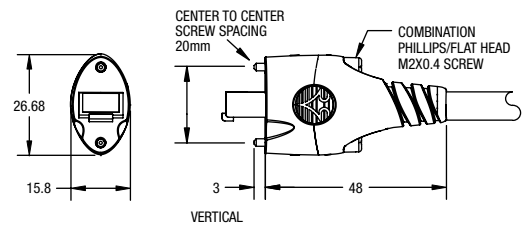
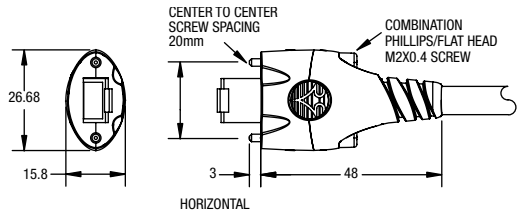
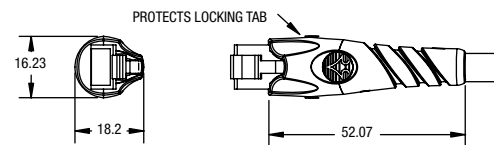
ASSEMBLY

Length Tolerance : +5%/-0%

Connector : TIA/ EIA 568 A, Molded RJ-45, Internally Shielded

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/fix

DIMENSIONS



Screwdriver included with screw locking assemblies

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:





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CONNECTOR CONFIGURATION

Cable exceeds 11 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Modes A and B*



RJ 45 straight molded connector



RJ 45 straight screw locking molded plug/horizontal



RJ 45 straight screw locking molded plug/vertical

¹XX = Length in meters, maximum length is 60 m.

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx



Endurance

Camera Link® Cable Assemblies

- Industrial grade for cameras and frame grabbers
- Standard and PoCL® (Power over Camera Link) versions available
- Assemblies meet both Appendixes D and E requirements of the Camera Link® specification
- Passed 19 million cycles in NSFTP mode A testing*
- Dual-shield construction with a 100 percent foil and 65 percent braid shield

SPECIFICATIONS

CABLE

Part Number : # FAWM2822-05

Outer Diameter : 0.355" (9.017 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested > 19 Million Cycles Northwire Standardized Flex Test Protocol Mode A*

Compliance : Meets the Requirements of Appendix D of the Camera Link® Specification
 UL recognized AWM Style
 CSA certified
 RoHS compliant

Flame Test : VW-1, FT1

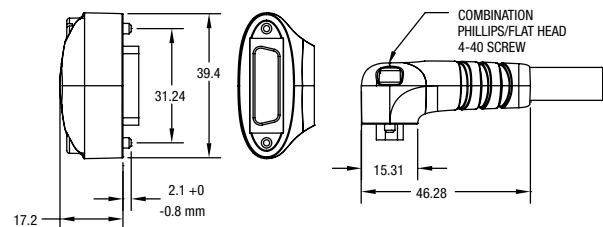
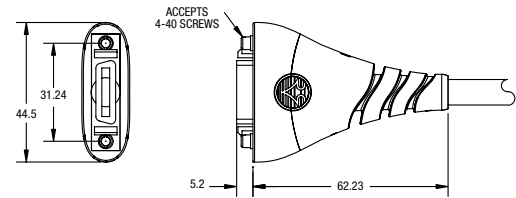
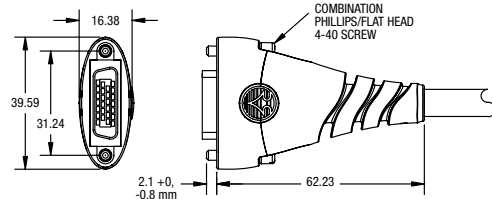
ASSEMBLY

Length Tolerance : ≤9m : +5% / -0%
 10m : +0% / -5%

Connector : Camera Link Specified, Internally Shielded 360°

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/fix

DIMENSIONS



Screwdriver included with screw locking assemblies

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:



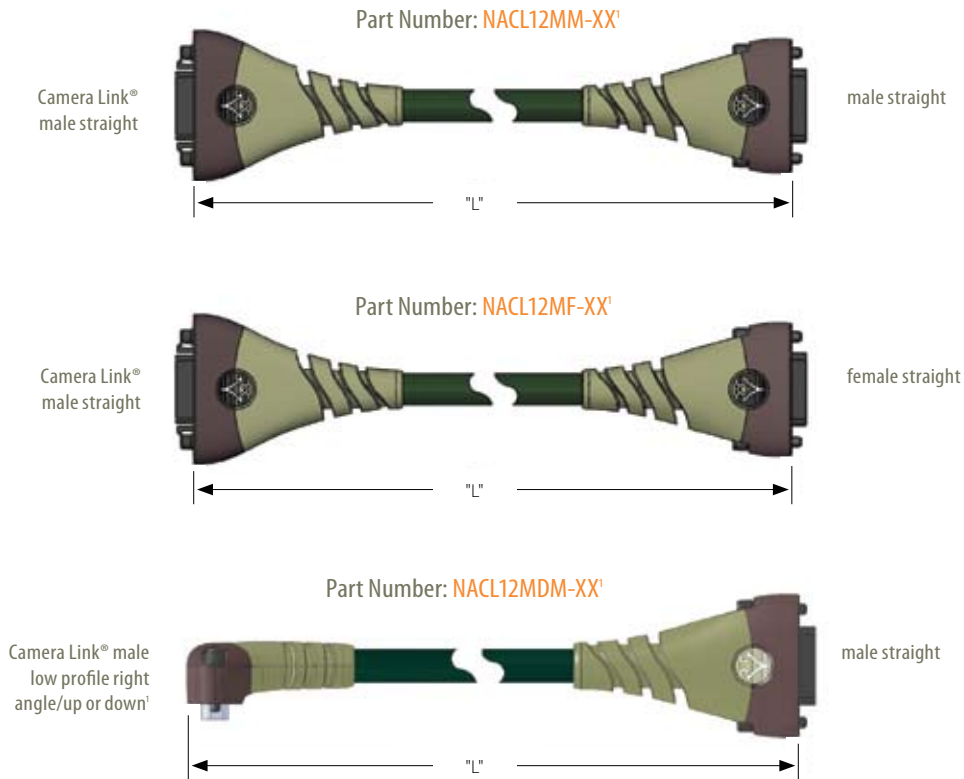


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CONNECTOR CONFIGURATION

Cable exceeds 19 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Mode A*



Camera Link® male straight



Camera Link® female straight



Camera Link® male low profile right angle/down²

¹XX = Length in meters, maximum length is 10 m. ²Compass arrow on logo points in connector-up direction.

*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/flx



Endurance

Power Over Camera Link® (PoCL) Cable Assemblies

- Industrial grade for cameras and frame grabbers
- Standard and PoCL® (Power over Camera Link) versions available
- Assemblies meet both Appendixes D and E requirements of the Camera Link® specification
- Passed 19 million cycles in NSFTP mode A testing*
- Dual-shield construction with a 100 percent foil and 65 percent braid shield

SPECIFICATIONS

CABLE

Part Number : # FAWM2824-002

Outer Diameter : 0.355" (9.017 mm)

Outer Jacket : Northwire EnduroFLEX® I TPE Dark Matte Green

Max. Temperature Rating : 80°C

Max. Operating Voltage – UL : 30V

Flex Life : Tested > 19 Million Cycles Northwire Standardized Flex Test Protocol Mode A*

Compliance : Meets the Requirements of Appendixes D and E of the Camera Link Specification
 UL recognized AWM Style
 CSA certified
 RoHS compliant

Flame Test : VW-1, FT1

ASSEMBLY

Length Tolerance : ≤9m : +5% / -0%
 10m : +0% / -5%

Connector : Camera Link specified. Internally Shielded 360°. Assemblies also Available with 30 and 32 AWG Conductors.

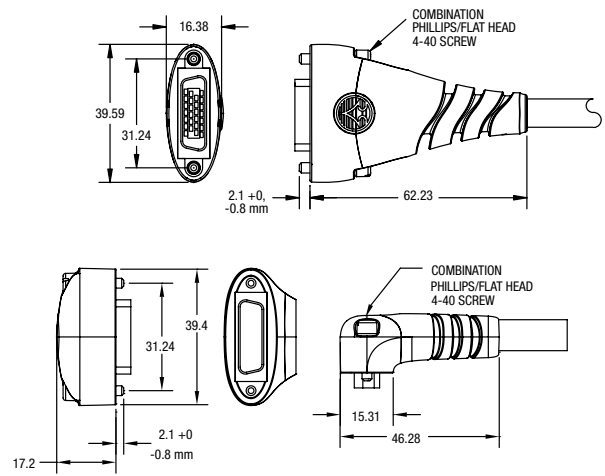
*For Northwire Standardized Flex Test Protocol, go to www.northwire.com/fix

STANDARDS, AGENCY AND ENVIRONMENTAL COMPLIANCE:

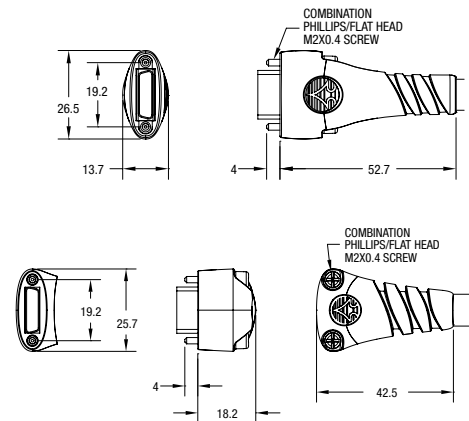


DIMENSIONS

Camera Link PoCL



MiniCL PoCL



Screwdriver included with screw locking assemblies

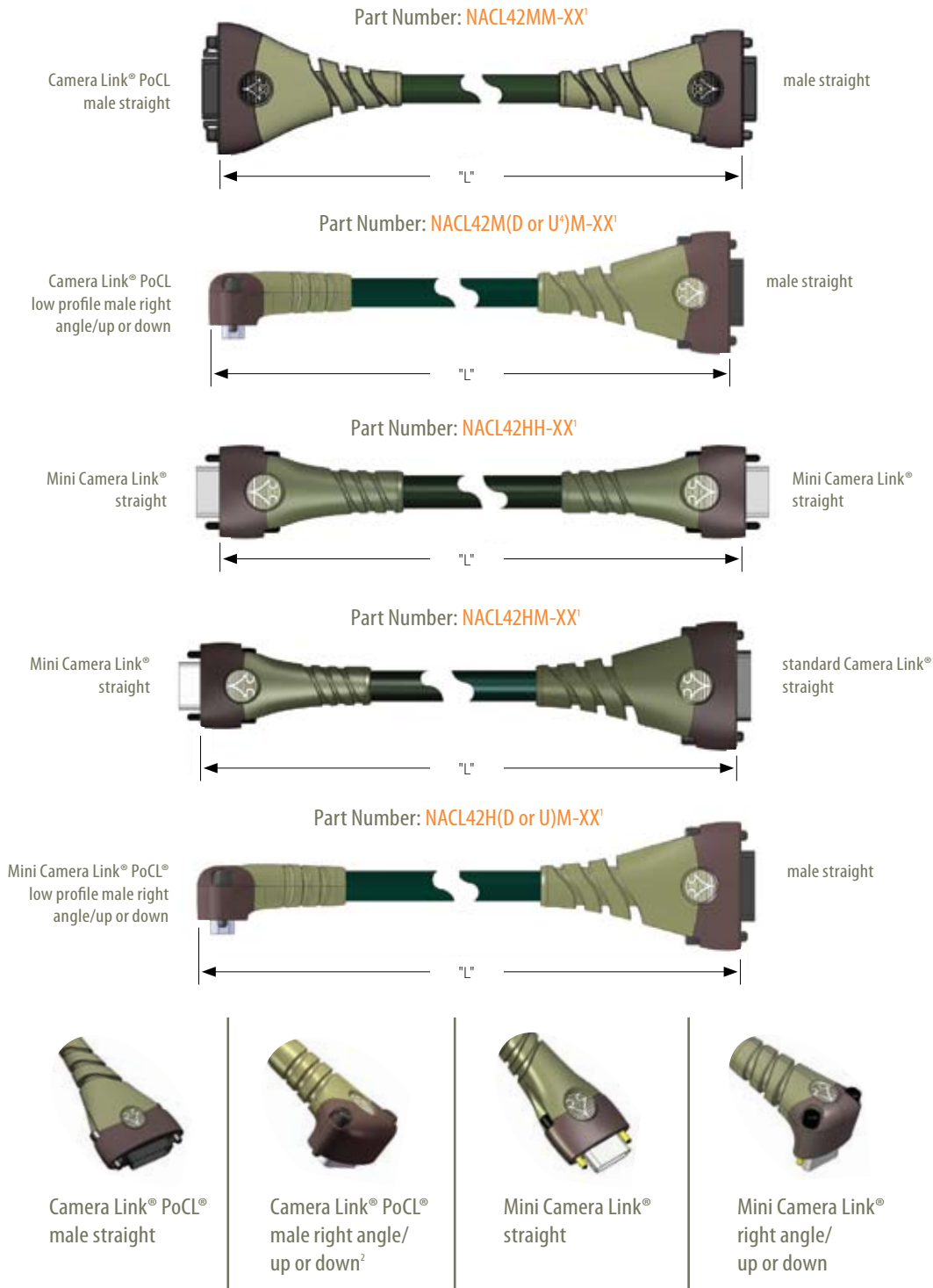


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Cable exceeds 19 million cycles on Northwire Standardized Flex Test Protocol (NSFTP) Mode A*



¹XX = Length in meters, maximum length is 19 m. ²Compass arrow on logo points in connector-up direction.

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nwi Lab 360°

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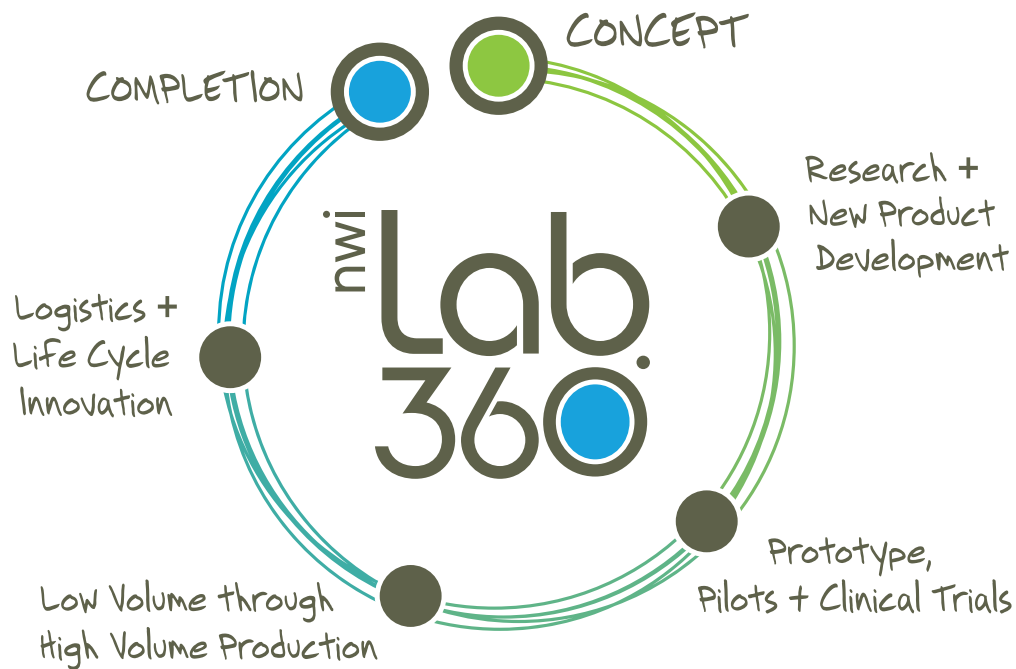


➔ POWERED BY NORTHWIRE from *Concept to Completion*, NWI Lab360 is your premier partner for design, original equipment design, and contract manufacturing of your custom technical products for diverse applications. NWI Lab360 leverages professional certifications in Six Sigma®, Lean, Project Management and the American Society for Quality to optimize design, manufacturing and quality to achieve highest quality and shortest lead times for any volume.

- Same day custom products
- Any Volume
- Quotes in 24 hours or less
- Rapid prototyping
- Personalized service

Your idea. Done.

To ensure that your requirements are translated into exact product specifications, our engineers will engage with you through every process phase from *“concept to completion.”*



Our Capabilities

Design

- SolidWorks 3D parametric modeling
- SolidWorks 3D parametric simulation and design validation
- AutoCAD 2D drafting
- SolidWorks 3D, Plastic Mold Flow Modeling
- Injection Molding
- SolidWorks 3D, Finite Element Analysis

Injection Molding Equipment

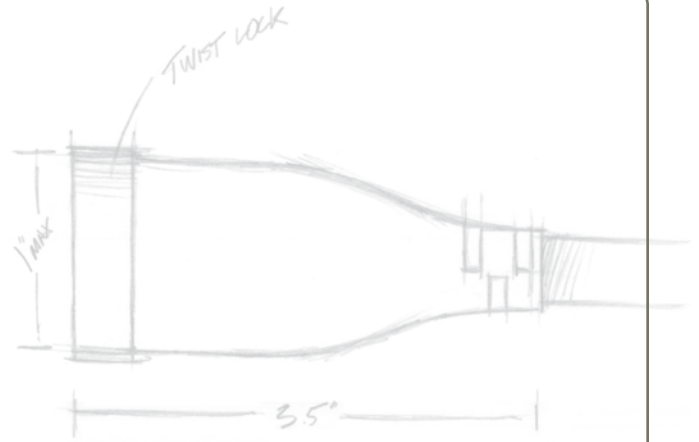
- Pyramid 10 ton shuttle table
- Gluco 10 ton shuttle table, 2 ounce shot, vertical injection, vertical clamp
- Toshiba, 190 ton clamp, 16 ounce shot, horizontal injection, horizontal clamp

Assembly

- Schleuniger, computer controlled cut and strip cable machine
- Artos, computer controlled cut and strip machine
- AM All-around jacket strippers
- Schleuniger Insulation strippers
- Label printers
- Shrink tube printers
- Molex K-presses
- AMP K-presses
- Cirris programmable electrical testers

Concept

Contact us with your 3D drawings or the thinnest thread of an idea—our professionally certified team will ask the right questions.



- 1) Voice of the Customer
- 2) Understand Strategy
- 3) Project Charter
- 4) Project Management Plans

Integration	Human Resources
Scope	Communications
Schedule	Risk
Cost	Procurements
Quality	

> Project Review and Customer Approval

"We listen, then translate your idea into design specifications."

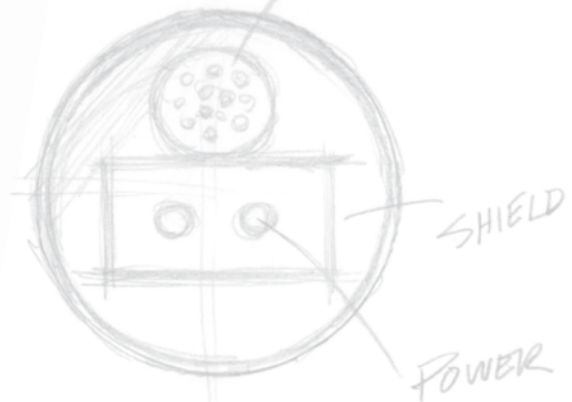
TOOLS

- Affinity Diagrams
- Alternatives Analysis
- Critical-to-Quality Characteristics (CTQC)
- Work Breakdown Structures
- Requirements Traceability Matrix



PREMOLD
AROUND PINS

METAL HOUSING



Research

"Our research assures your idea has the appropriate alignment of technology, design and process."



- 1) Research Technology
- 2) Technology Development

> Project Review and Customer Approval

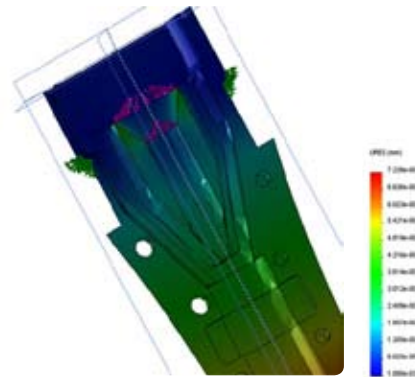
TOOLS

- "Jazz of Innovation"
Creative Chaos & Improvisation
within a Guiding Structure



New Product Development

"We leverage the right technology to create the optimal design."



- 1) Define
- 2) Concept
- 3) Design

> Project Review and
Customer Approval

TOOLS

- Design of Experiments (DOE)
- Hypothesis Testing
- Design Failure Mode Effects Analysis (DFMEA)
- Design for Manufacturing and Assembly (DFMA)
- Design for Six Sigma® (DFSS)



Prototype

- 1) Validate
- 2) Optimize
- 3) Verify

> Project Review and Customer Approval

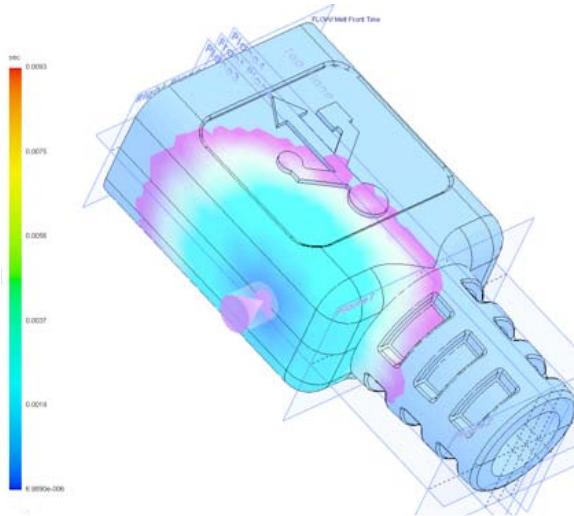
TOOLS

- Simulation
- Rapid Prototyping
- Process Failure Mode Effects Analysis (PFMEA)



"We validate the design and confirm it's the best solution for your needs."

Pilots + Clinical Trials



- 1) Pre-production Readiness
Initial Manufacturing Process Design
Initial Build
Optimize

- 2) Simulated Production Run
Validation

> Project Review and Customer Approval

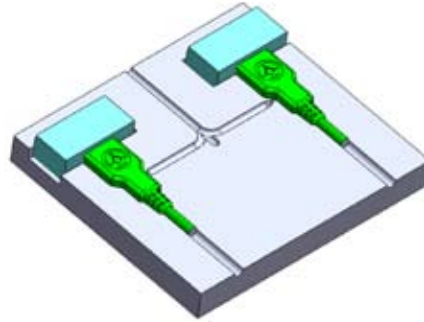
TOOLS

- Value Stream Mapping
- Work Flow Analysis
- Process Mapping
- Poka Yoke



"We optimize the design for manufacturing, then create a manufacturing plan and process to deliver your product needs."

Low Volume Production



- 1) Product and Project Audits
- 2) Quality Systems Verification
Assurance
Control
- 3) Continual Improvements
- 4) Process Improvements

> Project Review and Customer Approval

"This phase validates the entire manufacturing plan."

TOOLS

- Process Failure Mode Effects Analysis (PFME)
- Control Plans
- Control Charts
- Quality Metrics
- Performance Baseline Measurements
- Supplier Scorecard



High Volume Production

- 1) Requirements Fulfillment
- 2) Monitoring and Controlling

> Project Review and Customer Approval

"We meet your quality, cost, and delivery requirements."

TOOLS

- Control Plans
- Control Charts
- Quality Metrics
- Performance Baseline Measurements
- Supplier Scorecards



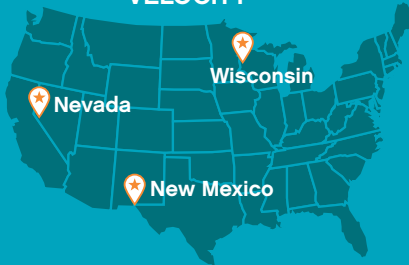
Logistics

"Quick. Cost-effective. Convenient."

VELOCITY

- 1) Packaging
- 2) Inventory
- 3) Just-In-Time
- 4) Delivery

> Interim Project Review
and Customer Approval



TOOLS

Certifications	Operational Platforms
ISO 13485:2003	Design for Six Sigma®
ISO 9001:2008	Six Sigma®
ISO 17025 Qualified	Lean
	Project Management
	American Society for Quality



Life Cycle Innovation

"We work with you to extend your product's Life Cycle."

- 1) Next Generation Product and Processes

> Project Review and Customer Approval

Completion

With an enterprise comprised of 3 regional locations, 200,000 sq/ft of manufacturing and engineering services, combined with more than 40 years of experience building custom products in the US, our team looks forward to delivering your specifications from *Concept to Completion.* *Your idea. Done.*

Talk directly to an expert

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Linda – Design Engineer

Your idea. Done.

Tool Box

Pleased to Provide You with Tools to Get the Job Done Quickly. Can't Find It? Contact Our Engineers – Design, Electrical, Mechanical, Chemical and Process.

We Look Forward to Working with You!

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CHART A: AMPACITY FOR NON-LISTED TYPES

Current Carrying Capacities of Copper Conductor

Amperes(A) of Single Conductor in Free Air 30°C Ambient Temperature

AWG	Polyethylene, Neoprene, TPU, PVC 80°C	Polypropylene, HD Polyethylene 90°C	PVC/Nylon 105°C	Kynar, XLPE, Thermoplastic Elastomer 125°C	Teflon®, Kapton, Tefzel®, Silicone 200°C
32	1	2	2	2	2
30	2	3	3	3	4
28	3	4	4	5	6
26	4	5	5	6	7
24	6	7	7	8	10
22	8	9	10	11	13
20	10	12	13	14	17
18	15	17	18	20	24
16	19	22	24	26	32
15	23	27	30	36	39
14	27	30	33	40	45
12	36	40	45	50	55
10	47	55	58	70	75
8	65	70	75	90	100
6	95	100	105	125	135
4	125	135	145	170	180
2	170	180	200	225	240

CHART B: AMPACITY

Adjustment Factors for Multi-Conductor Cables

Number of Conductors	Derating Factor
2 to 5	0.8
6 to 15	0.7
16 to 30	0.5

CHART C: COPPER CONDUCTORS, DIMENSIONS AND RESISTANCE

AWG 36-18

AWG	Stranding	Diameter		Area			Conductor Resistance	
		[in]	[mm]	CMA	[in ²]	[mm ²]	[Ω/Mft]	[Ω/km]
36	7x44	0.006	0.152	28.00	0.00002	0.014	387.4	1271.0
34	7x42	0.008	0.191	43.75	0.00003	0.022	236.8	777.0
32	solid	0.008	0.203	39.75	0.00005	0.032	174.0	571.0
32	7x40	0.009	0.236	67.27	0.00005	0.034	164.0	538.0
32	19x44	0.010	0.241	76.00	0.00006	0.038	136.6	448.0
30	solid	0.010	0.254	100.50	0.00008	0.051	111.3	365.0
30	7x38	0.012	0.300	112.00	0.00009	0.057	103.3	339.0
30	19x42	0.012	0.305	118.80	0.00009	0.060	87.4	286.7
28	solid	0.013	0.330	158.80	0.00012	0.080	70.7	232.0
28	7x36	0.015	0.381	141.75	0.00011	0.072	64.9	213.0
28	19x40	0.015	0.373	182.59	0.00014	0.093	56.7	186.0
27	7x35	0.018	0.457	219.52	0.00017	0.111	54.6	179.0
26	solid	0.016	0.409	252.80	0.00020	0.128	43.6	143.0
26	7x34	0.019	0.483	277.83	0.00022	0.141	37.2	122.0
26	10x36	0.019	0.472	250.00	0.00020	0.127	41.8	137.0
26	19x38	0.019	0.480	304.00	0.00024	0.155	34.4	113.0
24	solid	0.020	0.511	404.00	0.00032	0.205	27.2	89.4
24	7x32	0.023	0.584	448.00	0.00035	0.227	14.1	46.4
24	10x34	0.023	0.584	396.60	0.00031	0.202	26.1	85.6
24	19x36	0.024	0.599	475.00	0.00038	0.242	21.1	69.2
24	41x40	0.023	0.592	384.40	0.00030	0.196	25.6	84.0
22	solid	0.025	0.643	642.50	0.00050	0.324	16.9	55.3
22	7x30	0.030	0.762	700.00	0.00055	0.355	14.8	48.4
22	19x34	0.028	0.780	754.11	0.00060	0.384	13.7	45.1
22	26x36	0.030	0.762	650.00	0.00051	0.331	15.9	52.3
20	solid	0.032	0.810	1024.00	0.00080	0.519	10.5	34.6
20	7x28	0.038	0.965	1111.00	0.00087	0.562	10.3	33.8
20	10x30	0.035	0.889	1000.00	0.00079	0.510	10.3	33.9
20	19x32	0.037	0.940	1216.00	0.00096	0.620	8.6	28.3
20	26x34	0.036	0.914	1031.94	0.00082	0.526	10.1	33.0
20	41x36	0.035	0.889	1025.00	0.00081	0.520	10.0	32.9
18	solid	0.047	1.200	1624.00	0.00128	0.823	6.6	21.8
18	7x26	0.048	1.219	1769.60	0.00140	0.902	5.9	19.2
18	16x30	0.047	1.194	1600.00	0.00126	0.815	6.5	21.3
18	19x30	0.049	1.245	1900.00	0.00150	0.969	5.5	17.9

AWG 18-2


AWG	Stranding	Diameter		Area			Conductor Resistance	
		[in]	[mm]	CMA	[in ²]	[mm ²]	[Ω/Mft]	[Ω/km]
18	41x34	0.047	1.194	1627.30	0.00128	0.829	6.4	20.9
18	65x36	0.047	1.194	1625.00	0.00128	0.828	6.4	21.0
16	solid	0.051	1.290	2581.00	0.00203	1.310	4.2	13.7
16	7x24	0.060	1.524	2828.00	0.00223	1.440	3.7	12.0
16	19x29	0.058	1.473	2383.50	0.00203	1.310	4.0	13.2
16	26x30	0.059	1.499	2600.00	0.00205	1.324	4.0	13.1
16	65x34	0.059	1.499	2580.00	0.00204	1.315	4.3	14.0
16	105x36	0.059	1.499	2625.00	0.00207	1.338	4.0	13.1
14	solid	0.064	1.630	4110.00	0.00322	2.080	2.6	8.6
14	7x22	0.073	1.854	4480.00	0.00354	2.284	2.3	7.6
14	19x27	0.073	1.854	3830.40	0.00302	1.950	2.7	8.9
14	41x30	0.074	1.880	4095.00	0.00322	2.080	2.5	8.3
14	105x34	0.074	1.880	4167.50	0.00329	2.120	2.5	8.2
12	solid	0.081	2.050	6529.00	0.00513	3.310	1.6	5.4
12	7x20	0.096	2.438	7168.00	0.00513	3.310	1.5	4.8
12	19x25	0.093	2.362	6087.60	0.00566	3.650	1.7	5.6
12	65x30	0.095	2.413	6500.00	0.00481	3.100	1.7	5.7
12	165x34	0.095	2.413	6549.00	0.00513	3.310	1.6	5.2
10	solid	0.102	2.590	10380.40	0.00815	5.260	1.0	3.4
10	37x26	0.115	2.921	9353.80	0.00739	4.770	1.1	3.6
10	49x27	0.116	2.946	9878.40	0.00780	5.030	1.1	3.6
10	105x30	0.116	2.946	10530.00	0.00832	5.370	1.0	3.2
8	49x25	0.147	3.734	15700.00	0.01240	8.000	0.7	2.2
8	133x29	0.147	3.734	16984.50	0.01342	8.660	0.6	2.0
8	655x36	0.147	3.734	16625.00	0.01313	8.470	0.6	2.0
6	133x27	0.180	4.572	26812.80	0.02119	13.670	0.5	1.5
6	259x30	0.184	4.674	25900.00	0.02046	13.200	0.4	1.3
6	1050x36	0.184	4.674	26250.40	0.02074	13.380	0.4	1.3
4	133x27	0.232	5.8900	42613	0.0337	21.730	0.249	0.8
4	259x27	0.232	5.89	52214	0.0413	26.620	0.248	0.8
4	1666x36	0.232	5.89	41650	0.0329	21.240	0.249	0.8
2	133x23	0.292	7.41	67936	0.0537	34.640	0.157	0.5
2	259x26	0.292	7.41	65475	0.0518	33.390	0.156	0.5
2	665x30	0.292	7.41	66500	0.0526	33.910	0.156	0.5
2	2646x36	0.292	7.41	66150	0.0523	33.730	0.157	0.5

AWG TABLE CHARTS

Tool Box

CHART D: COLOR EXAMPLES

Standard:

	Red
	Pink
	Orange
	Yellow
	Green
	Blue
	Light Blue
	Violet
	Brown
	Black
	Light Gray
	Medium Gray
	Dark Gray
	White

Special:





BRILLIANT

	Baja Wave
	Citrus Lime
	Cotton Candy
	Double Shot
	Lemon Twist
	Purple Tang
	Tangerine Tart

SHEEN

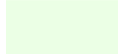
	Titanium Tight
	Hot Flash

GLITTER

	Coral Razz
	Cosmic Blue

Glow-in-the-Dark:



	Sapphire Blue
	Citrine Green

Unique photoluminescent technology glows for 22+ hours after exposure to a light source

CHART E: PIN NUMBER, CONDUCTOR COUNT AND COLOR MATRIX COMMON FOR SENSOR APPLICATIONS

CONDUCTOR COUNT														
Pin Number	2	3	4	5	6	7	8	9	10	11	12	16	19	25
1	Brown	Brown	Brown	Brown	Brown	White	White	White	White	White	White	White	White	White
2	-	-	White	White	White	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
3	Blue	Blue	Blue	Blue	Blue	Green	Green	Green	Green	Green	Green	Green	Green	Green
4	-	Black	Black	Black	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
5	-	-	-	Gray	Gray	Gray	Gray	Gray	Gray	Gray	Gray	Gray	Gray	Gray
6	-	-	-	-	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink	Pink
7	-	-	-	-	-	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue
8	-	-	-	-	-	-	Red	Red	Red	Red	Red	Red	Red	Red
9	-	-	-	-	-	-	-	Black	Black	Black	Black	Black	Black	Black
10	-	-	-	-	-	-	-	-	Violet	Violet	Violet	Violet	Violet	Violet
11	-	-	-	-	-	-	-	-	-	Gray/ Pink	Gray/ Pink	Gray/ Pink	Gray/ Pink	Gray/ Pink
12	-	-	-	-	-	-	-	-	-	-	Red/ Blue	Red/ Blue	Red/ Blue	Red/ Blue
13	-	-	-	-	-	-	-	-	-	-	-	White/ Green	White/ Green	White/ Green
14	-	-	-	-	-	-	-	-	-	-	-	Brown/ Green	Brown/ Green	Brown/ Green
15	-	-	-	-	-	-	-	-	-	-	-	White/ Yellow	White/ Yellow	White/ Yellow
16	-	-	-	-	-	-	-	-	-	-	-	Yellow/ Brown	Yellow/ Brown	Yellow/ Brown
17	-	-	-	-	-	-	-	-	-	-	-	-	White/ Gray	White/ Gray
18	-	-	-	-	-	-	-	-	-	-	-	-	Gray/ Brown	Gray/ Brown
19	-	-	-	-	-	-	-	-	-	-	-	-	White/ Pink	White/ Pink
20	-	-	-	-	-	-	-	-	-	-	-	-	-	Pink/ Brown
21	-	-	-	-	-	-	-	-	-	-	-	-	-	White/ Blue
22	-	-	-	-	-	-	-	-	-	-	-	-	-	Brown/ Blue
23	-	-	-	-	-	-	-	-	-	-	-	-	-	White/ Red
24	-	-	-	-	-	-	-	-	-	-	-	-	-	Brown/ Red
25	-	-	-	-	-	-	-	-	-	-	-	-	-	White/ Black

CHART F: CONDUCTOR COLORS

1-33

Number	Base Color	1st Stripe	2nd Stripe	3rd Stripe
1	Black	–	–	–
2	Red	–	–	–
3	White	–	–	–
4	Green	–	–	–
5	Orange	–	–	–
6	Blue	–	–	–
7	Brown	–	–	–
8	Yellow	–	–	–
9	Violet	–	–	–
10	Gray	–	–	–
11	Pink	–	–	–
12	Tan	–	–	–
13	Red	Green	–	–
14	Red	Yellow	–	–
15	Red	Black	–	–
16	White	Black	–	–
17	White	Red	–	–
18	White	Green	–	–
19	White	Yellow	–	–
20	White	Blue	–	–
21	White	Brown	–	–
22	White	Orange	–	–
23	White	Gray	–	–
24	White	Violet	–	–
25	White	Black	Red	–
26	White	Black	Green	–
27	White	Black	Yellow	–
28	White	Black	Blue	–
29	White	Black	Brown	–
30	White	Black	Orange	–
31	White	Black	Gray	–
32	White	Black	Violet	–
33	White	Black	Black	–

34-66

Number	Base Color	1st Stripe	2nd Stripe	3rd Stripe
34	White	Red	Black	–
35	White	Red	Red	–
36	White	Red	Green	–
37	White	Red	Blue	–
38	White	Red	Brown	–
39	White	Red	Violet	–
40	White	Green	Black	–
41	White	Green	Red	–
42	White	Green	Green	–
43	White	Green	Blue	–
44	White	Green	Brown	–
45	White	Green	Violet	–
46	White	Blue	Black	–
47	White	Blue	Red	–
48	White	Blue	Green	–
49	White	Blue	Blue	–
50	White	Blue	Brown	–
51	White	Blue	Violet	–
52	White	Brown	Black	–
53	White	Brown	Red	–
54	White	Brown	Green	–
55	White	Brown	Blue	–
56	White	Brown	Brown	–
57	White	Brown	Violet	–
58	White	Violet	Red	–
59	White	Violet	Green	–
60	White	Violet	Blue	–
61	White	Black	Red	Green
62	White	Black	Red	Yellow
63	White	Black	Red	Blue
64	White	Black	Red	Brown
65	White	Black	Red	Orange
66	White	Black	Red	Gray

67-100

Number	Base Color	1st Stripe	2nd Stripe	3rd Stripe
67	White	Black	Red	Violet
68	White	Black	Green	Yellow
69	White	Black	Green	Blue
70	White	Black	Green	Brown
71	White	Black	Green	Orange
72	White	Black	Green	Gray
73	White	Black	Green	Violet
74	White	Black	Yellow	Blue
75	White	Black	Yellow	Brown
76	White	Black	Yellow	Orange
77	White	Black	Yellow	Gray
78	White	Black	Yellow	Violet
79	White	Black	Blue	Brown
80	White	Black	Blue	Orange
81	White	Black	Blue	Gray
82	White	Black	Blue	Violet
83	White	Black	Brown	Orange
84	White	Black	Brown	Gray
85	White	Black	Brown	Violet
86	White	Black	Orange	Gray
87	White	Black	Orange	Violet
88	White	Black	Gray	Violet
89	White	Red	Black	Green
90	White	Red	Black	Yellow
91	White	Red	Black	Blue
92	White	Red	Black	Brown
93	White	Red	Black	Orange
94	White	Red	Black	Gray
95	White	Red	Black	Violet
96	White	Red	Green	Yellow
97	White	Red	Green	Blue
98	White	Red	Green	Brown
99	White	Red	Green	Orange
100	White	Red	Green	Gray

CHART G: MULTI-CONDUCTOR CABLE COLORS

Reference IEEE 45 Table 8-31

- Paired cables: Numbered - black and white
- Triad cables: Numbered - black, white and red

1-33

Number	Base Color	Tracer	Tracer
1	Black	–	–
2	White	–	–
3	Red	–	–
4	Green	–	–
5	Orange	–	–
6	Blue	–	–
7	White	Black	–
8	Red	Black	–
9	Green	Black	–
10	Orange	Black	–
11	Blue	Black	–
12	Black	White	–
13	Red	White	–
14	Green	White	–
15	Blue	White	–
16	Black	Red	–
17	White	Red	–
18	Orange	Red	–
19	Blue	Red	–
20	Red	Green	–
21	Orange	Green	–
22	Black	White	Red
23	White	Black	Red
24	Red	Black	White
25	Green	Black	White
26	Orange	Black	White
27	Blue	Black	White
28	Black	Red	Green
29	White	Red	Green
30	Red	Black	Green
31	Green	Black	Orange
32	Orange	Black	Green
33	Blue	White	Orange

34-66

Number	Base Color	Tracer	Tracer
34	Black	White	Orange
35	White	Red	Orange
36	Orange	White	Blue
37	White	Red	Blue
38	Black	White	Green
39	White	Black	Green
40	Red	White	Green
41	Green	White	Blue
42	Orange	Red	Green
43	Blue	Red	Green
44	Black	White	Blue
45	White	Black	Blue
46	Red	White	Blue
47	Green	Orange	Red
48	Orange	Red	Blue
49	Blue	Red	Orange
50	Black	Orange	Red
51	White	Black	Orange
52	Red	Orange	Black
53	Green	Red	Blue
54	Orange	Black	Blue
55	Blue	Black	Orange
56	Black	Orange	Green
57	White	Orange	Green
58	Red	Orange	Green
59	Green	Black	Blue
60	Orange	Green	Blue
61	Blue	Green	Orange
62	Black	Red	Blue
63	White	Orange	Blue
64	Red	Black	Blue
65	Green	Orange	Blue
66	Orange	White	Red

67-100

Number	Base Color	Tracer	Tracer
67	Blue	White	Red
68	Black	Green	Blue
69	White	Green	Blue
70	Red	Green	Blue
71	Green	White	Red
72	Orange	Red	Black
73	Blue	Red	Black
74	Black	Orange	Blue
75	Red	Orange	Blue
76	Green	Red	Black
77	Orange	White	Green
78	Blue	White	Green
79	Red	White	Orange
80	Green	White	Orange
81	Blue	Black	Green
82	Orange	White	–
83	Green	Red	–
84	Black	Green	–
85	White	Green	–
86	Blue	Green	–
87	Black	Orange	–
88	White	Orange	–
89	Red	Orange	–
90	Green	Orange	–
91	Blue	Orange	–
92	Black	Blue	–
93	White	Blue	–
94	Red	Blue	–
95	Green	Blue	–
96	Orange	Blue	–
97	Yellow	–	–
98	Yellow	Black	–
99	Yellow	White	–
100	Yellow	Red	–

CHART H: EUROPEAN COLOR STANDARDS

ICEA Table E1 | Reference ICEA S-73-532

- Paired cables: Numbered - black and red
- Triad cables: Numbered - black, red and blue

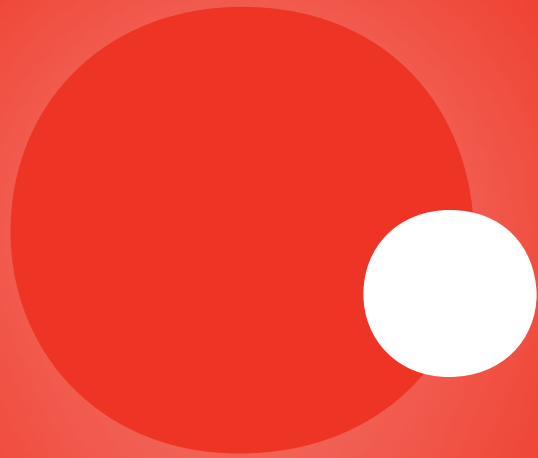
# 1-25				# 26-50			
Cond. No.	Base Color	Tracer	Tracer	Cond. No.	Base Color	Tracer	Tracer
1	Black	–	–	26	Orange	Black	White
2	White	–	–	27	Blue	Black	White
3	Red	–	–	28	Black	Red	Green
4	Green	–	–	29	White	Red	Green
5	Orange	–	–	30	Red	Black	Green
6	Blue	–	–	31	Green	Black	Orange
7	White	Black	–	32	Orange	Black	Green
8	Red	Black	–	33	Blue	White	Orange
9	Green	Black	–	34	Black	White	Orange
10	Orange	Black	–	35	White	Red	Orange
11	Blue	Black	–	36	Orange	White	Blue
12	Black	White	–	37	White	Red	Blue
13	Red	White	–	38	Black	White	Green
14	Green	White	–	39	White	Black	Green
15	Blue	White	–	40	Red	White	Green
16	Black	Red	–	41	Green	White	Blue
17	White	Red	–	42	Orange	Red	Green
18	Orange	Red	–	43	Blue	Red	Green
19	Blue	Red	–	44	Black	White	Blue
20	Red	Green	–	45	White	Black	Blue
21	Orange	Green	–	46	Red	White	Blue
22	Black	White	Red	47	Green	Orange	Red
23	White	Black	Red	48	Orange	Red	Blue
24	Red	Black	White	49	Blue	Red	Orange
25	Green	Black	White	50	Black	Orange	Red

CHART I: EUROPEAN COLOR STANDARDS

ICEA Table E2 | Reference ICEA S-73-532

- Paired cables: Numbered - black and red
- Triad cables: Numbered - black, red and blue
- Colors repeat after 36 conductors
- There are no green or white conductors or stripes

# 1-18			# 19-36		
Cond. No.	Base Color	Tracer	Cond. No.	Base Color	Tracer
1	Black	–	19	Orange	Blue
2	Red	–	20	Yellow	Blue
3	Blue	–	21	Brown	Blue
4	Orange	–	22	Black	Orange
5	Yellow	–	23	Red	Orange
6	Brown	–	24	Blue	Orange
7	Red	Black	25	Yellow	Orange
8	Blue	Black	26	Brown	Orange
9	Orange	Black	27	Black	Yellow
10	Yellow	Black	28	Red	Yellow
11	Brown	Black	29	Blue	Yellow
12	Black	Red	30	Orange	Yellow
13	Blue	Red	31	Brown	Yellow
14	Orange	Red	32	Black	Brown
15	Yellow	Red	33	Red	Brown
16	Brown	Red	34	Blue	Brown
17	Black	Blue	35	Orange	Brown
18	Red	Blue	36	Yellow	Brown



Glossary of Terms

Glossary of Terms

Abrasion resistance – Ability of cable to resist surface wear during the process of rubbing, grinding or wear and tear caused by friction.

ABS – American Bureau of Shipping - Leading marine and offshore classification society that has been commissioned to act in matters that relate directly to the safety of life and property at sea.

Acceptance testing – Testing performed on product to determine the degree of compliance with regulatory and/or specified requirements.

Accumulator – Device that accommodates the slack, without slowing down the extruder while operator changes reels.

AC Resistance – The total electrical resistance offered by a device in an Alternating Current circuit due to inductive and capacitive effects, as well as the direct current resistance.

Adhesion – Tendency of dissimilar surfaces to cling to one another by interfacial forces which may be chemical or mechanical in nature.

AG14 – Acid Gas 14% – Refers to the acid gas given off during burning of plastics used in cable. Normal PVC would produce approximately 30%, by weight, acid gas during combustion. AG14 indicates materials will produce less than 14% acid gas during combustion.

AIA – Aluminum Interlocked Armor or abbreviation for Automated Imaging Association.

Acrylonitrile Butadiene Rubber (ABR) – Thermoplastic melt processible rubber substitute that exhibits elasticity, mechanical properties and tactile quality of rubber.

Alloy – Metal formed by combining two or more different metals to obtain desirable properties.

Alternating Current (AC) – Electric current that continually reverses its direction giving a definite positive and negative waveform at fixed intervals.

Ambient Temperature – Any all-encompassing temperature within a given area.

AMD – Ammonium Dichromate - Commonly referred to as hexavalent chromium.

Ampacity – Maximum current that an insulated conductor or cable can continuously carry, without exceeding its temperature rating.

Ampere (A) – Unit of current. One ampere is the current flowing through one ohm of resistance at one volt potential.

American Wire Gauge (AWG) – Based on a circular mil system. 1 mil equals .001 inch. The standard system used for designating wire size. Some examples are as follows:

40 AWG – smaller than a hair

30 AWG – sewing thread

20 AWG – diameter of a pin

10 AWG – knitting needle

1 AWG – pencil

1/0 – “1-aught” finger

Anneal – Process of softening the copper by means of heat to make it less brittle.

ANSI – American National Standards Institute - Private non-profit organization that oversees the development of voluntary consensus standards for various products.

Antimony – Chemical used primarily in compounds for flame retardancy, generally is antimony trioxide.

Antioxidant – Substance that prevents or slows down oxygen decomposition of a material.

Antiozonant – Chemical compound that prevents or slows down material degradation of material due to ozone gas in the air.

Armor – Mechanical protection usually accomplished by a metallic layer of tape, braid or serve wires. Typically, the armor is found only over the outer sheath.

Armored cable – Cable manufactured with metal wrapped around the conductors primarily for the purpose of mechanical protection. Northwire offers aluminum interlocking armor and others.



AS9100 – Widely adopted and standardized quality management system for the aerospace industry. It was released in October, 1999, by the Society of Automotive Engineers and the European Association of Aerospace Industries.

AS-i® – Actuator Sensor Interface - Product specification for cable in network systems for the lowest field level of automation and communication technology.

ASQ – American Society for Quality - Global quality leader, offers memberships, tools, training, certifications, books and more on topics around quality assurance and improvement.

ASTM – American Society for Testing and Materials - Globally recognized leader in the development and delivery of international voluntary consensus standards.

ATEX – Atmosphere Explosive - European Directive (94/9/EC) which covers protective systems, equipment and components used on fixed offshore platforms, petrochemical plants, mines, flour mills and other areas where an explosive atmosphere may be present. The United States has a similar designation from the National Electrical Code® (NEC®), Class I Div 1.

Attenuation – Ratio of the magnitude of the signal strength in transmission between a designated distance. Attenuation is very dependent on signal frequency and distance.

Automated Imaging Association (AIA) – World's largest machine vision trade association.

AWM – Appliance Wiring Materials - UL 758 is the Standard for Safety of Appliance Wiring Material.

AWS – American Welding Society - Non-profit organization with a goal to advance the science, technology and application of welding and related joining disciplines.

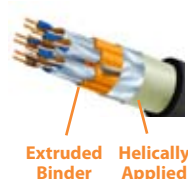
Band marking – Continuous circumferential band applied to a conductor at regular intervals for identification.

Bare copper – Appearance of a shiny new penny, utilized for sonic welding, has pure electrical signal over long distances, and withstands temperature 150°C.

Barrel-packed – Method of coiling insulated wire into a drum for shipment or further processing.

BEV – Battery Electric Vehicle.

Binder – Spirally served tape or thread used for holding assembled cable components in place awaiting subsequent manufacturing operations.



Bend radius – Radius of curvature that a wire or cable can be bent without any adverse effects.

BOM – Bill of Materials.

Braid – Fibrous or metallic group of filaments interwoven in cylindrical form to form a covering over one or more wires.



Braid angle – Smaller of the two angles formed by the shielding strand and the axis of the cable being shielded.

Braid carrier – Spool or bobbin on a braider which holds one group of strands or filaments consisting of a specific number of ends. The carrier revolves during braiding operations.

Braid shields – Conductors woven or braided around a core.



Breakdown of insulation – Failure of an insulation resulting in a flow of current through the insulation. It may be caused by the application of too high voltage or by defects or decay in the dielectric.

Breakdown voltage – Voltage at which the insulation between two conductors, or a conductor and a ground, breaks down.

Building wire – Wire used for light and power in permanent installations utilizing 600 volts or less. Usually in an enclosure and not exposed to outdoor environments.

Bunch stranding – Group of wires of the same diameter twisted together in the same direction, with the same lay, without a predetermined pattern.

Bus – Bare, tinned or insulated wire used to connect two terminals inside an electrical unit. This is a common point for electrical circuits to return.

Butt joint – Splice or connection formed by placing the ends of two conductors together and joining them by welding, brazing or soldering.

Butt wrap – Tape wrapped in an edge-to-edge manner with no overlapping between adjacent turns.

C4ISR – Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance - US Department of Defense systems, procedures and techniques used to collect and disseminate information.

Cable – A group of individually insulated conductors in twisted or parallel configuration, with or without an overall covering known as a jacket.

Cable assembly – Completed cable and its associated hardware (lugs, connectors, terminal blocks, etc.) ready to install.

Cable core – Any cabled component containing inners, twisted pairs, triads, or other twisted constructions, including jacketed subcomponent materials. Jacketed subcomponents in-and-of themselves are considered core.

Cable electrical characteristics – Properties include attenuation, capacitance, impedance and shielding.

Cable filler – Material used in multiple conductor cables to occupy the spaces formed by the assembly of components, thus forming a core of the desired shape (typically cylindrical). Filler can be paper, polyethylene or solid extruded rod (PVC, PE or PP).

Caliper – Device used to measure internal and external dimensions.

Camera LINK® – Serial communication protocol standard designed for computer vision applications based on the National Semiconductor interface Channel-link. The standard is maintained and administered by the AIA and is their registered trademark.

CANbus® – Controller Area Network Bus - Rugged, digital serial bus designed for industrial environments. Introduced by Bosch in the mid-1980s for in-vehicle communications, it is used in a myriad of applications including factory automation, building automation, aircraft and aerospace as well as in cars, trucks and buses. CAN bus replaced bulky wiring harnesses with a two-wire differential cable (the two wires carry inverted voltages to decrease interference).

CANopen® – Controller Area Network - Network technology optimized for the usage in industrial control environments, in machine internal networks and in embedded systems (any control unit deeply "embedded" in a device with electronics).

Capacitance (pF) – Property of a system of conductors, electronic components and dielectrics that allows the storage of electricity when potential differences exist between the conductors. Capacitance is a measure, expressed in picofarads per foot, which indicates how much charge the cable can store within itself.

Carbon black – Additive used in cable compounds to improve weatherability (UV exposure), color consistency and electrical conductivity.

Category cables – Standard four twisted pairs, unshielded network cables suitable for use in data and communication applications.

CC-Link® – Control and Communication Link - Open industrial network that enables devices from numerous manufacturers to communicate. It is predominantly used in machine, cell or process control applications in manufacturing and production industries, but can also be used in facilities management, process control and building automation.

CE – European Community Mark is a mandatory conformity mark for products placed on the market in the European Economic Area. With the CE Mark on a product, the manufacturer declares that the product conforms with applicable EC directives.

Cellular insulation – Expanded (“foam”) consisting of individual closed cells.

Certificate of Compliance (C of C) – Certificate which shows that the product being shipped meets the customer and/or regulatory specifications.

Certified Test Report (CTR) – Report detailing actual test data on a product. Tests are typically performed by a Quality Control Department technician and indicate that the product being shipped conforms to all requirements.

Characteristic impedance – Impedance that, when connected to the output terminals of a transmission line of any length, makes the line appear infinitely long. The ratio of voltage to current at every point along a transmission line on which there are no stranding waves.

CIP – Common Industrial Protocol - Industrial protocol for industrial automation applications. It is supported by ODVA™. Previously known as Control and Information Protocol, CIP encompasses a comprehensive suite of messages and services for the collection of manufacturing automation applications – control, safety, synchronization, motion, configuration and information. It allows users to integrate these manufacturing applications with enterprise-level Ethernet networks and the Internet.

Circuit sizes – Building wire gauge sizes 14 to 10 AWG.

Circular mil – Unit of area, equal to the area of a circle whose diameter is 1 mil (0.001 inch). Used chiefly in specifying cross-sectional areas of round conductors.

CL2 – Class 2 - UL 13 designation for 30V circuit rating, vertical tray 1685 standard flame rating, optional FT4/IEEE 1202.

CL2P – Class 2 Plenum - UL 13 designation for 30V circuit rating, NFPA-262 plenum flame rating.

CL2R – Class 2 Riser - UL 13 designation for 30V circuit rating, UL 1666 riser flame rating.

CL2X – Class 2 Limited Use - UL 13 designation for 30V circuit rating, VW-1 standard flame rating.

CL3 – Class 3 - UL 13 designation for 300V circuit rating, vertical tray UL 1685 standard flame rating, optional FT4/IEEE 1202.

CL3P – Class 3 Plenum - UL 13 designation for 300V circuit rating, NFPA-262 plenum flame rating.

CL3R – Class 3 Riser - UL 13 designation for 300V circuit rating, UL 1666 riser flame rating.

CL3X – Class 3 Limited Use - UL 13 designation for 300V circuit rating, VW-1 standard flame rating.

Class I, Division 2 – Defined by the NEC® (National Electrical Code) as ignitable concentrations of flammable gases, vapors or liquids are present under abnormal operating conditions.

CM – Communication Cables - UL 444 listed, Article 800 of the National Electrical Code® for cable intended for general use within buildings, 300V, vertical tray UL 1685 standard flame rating, optional FT4/IEEE 1202.

CMG – Communications General Purpose - UL 444 listed, Article 800 of the National Electrical Code® for cable intended for general use within buildings, 300V, FT4/IEEE 1202, flame rating.

CMX – Communications Residential - UL 444 listed, Article 800 of the National Electrical Code® for cable intended for general use within buildings, 300V, VW-1 flame rating.

Coating – Material (such as tin, nickel and silver) applied to the surface of a conductor to prevent environmental deterioration, facilitate soldering or improve electrical performance.

Coaxial cable – Coax cable consists of an electrically conductive wire inner surrounded by a layer of insulation material, a layer of shielding material, and an outer layer of insulation material, usually plastic. Coax cables are used for transmitting high-frequency telephone, telegraph, digital or television signals.

Cold flow – Any permanent deformation due to pressure or mechanical force without the aid of heat softening.

Cold test – Test to determine the performance of cables during and/or after subjection to a specified low temperature for a given time period. Conditioned cable wound around a specified mandrel, is examined for any breaks or cracks in the insulation and/or jacket.

Cold work – Hardening and embrittlement of metal by repeated flexing action.

Color code – Color system for circuit identification by use of solid color tracers, braids or surface printing.

Combination shields – Consist of foil and braid combined.



Common axis cabling – In multiple cable constructions, a twisting of all conductors around a “common axis” with two conductor groups then selected as pairs.

Compact stranded construction – Unidirectional or conventional concentric conductor manufactured to a specified diameter, approximately 8 to 10% below the nominal diameter of a non-compact conductor of the same cross-sectional area.

Composite cable – Cable containing more than one gauge size or a variety of circuit types.

Compound – Insulating or jacketing material made by mixing two or more ingredients.

Concentrate – Color additive.

Concentric stranding – Central wire surrounded by one or more layers of helically wound strands in a fixed round geometric arrangement.

Concentricity – Measurement of the location of the center of the conductor with respect to the geometric center of the surrounding insulations.

Conductor – Wire or combination of wires not insulated from one another, suitable for carrying an electric current.

Conductor Core – Center strand or member where one or more layers of wires or members are laid helically to form a concentric-lay or rope-lay conductor.

Conductivity – Term used in describing the capability of a material to carry an electrical charge. Usually expressed as a percentage of copper conductivity – copper being one hundred percent (100%).

Conduit – Tube through which insulated wires and cables are run.

Connector – Device used to physically and electrically connect two or more conductors.

Continuity – Continuous electrical current flow through a length of wire.

Continuity check – Test to determine whether electrical current flows continuously throughout the length of a single wire or individual wires in a cable.

Continuous length – One length of wire or cable without splices.

Continuous Vulcanization (CV) – Simultaneous extrusion and vulcanization (curing) of wire coating materials.

Contra-helical – Application of two or more layers of spirally twisted, served or wrapped materials where each successive layer is wrapped in the opposite direction of the preceding layer.

Control cable – Multiconductor cable suited for operation in control or signal circuits.

Convolute – Wire that does not have a completely round, cylindrical surface.

Copper – Most common conductor material used. One advantage of copper is its ability to be “annealed.” The conductivity of copper is 100%. It can be solid or stranded. Some stranded construction include:

Unilay – Most common type of stranding used in electronic wire and cable products. It is more than one layer of helically laid wires, with the direction and length of the lay the same for all layers.



Bunched – Formed from any number of wires twisted together in the same direction, such that all strands have the same lay length, but no specific geometric arrangement.



Cord – Small, flexible multi-conductor cable (UL 62 listed products).

Corona – Luminous discharge due to ionization of the gas surrounding a conductor where a voltage gradient exceeds a certain critical value.

Corona resistance – Time that insulation will withstand a specified level field-intensified ionization that does not result in the immediate complete breakdown of the insulation. Also, called voltage endurance.

Corona test – Test to determine the ability of a cable to withstand the formation of corona under an increasing applied voltage, and to extinguish corona when a corona-producing voltage is reduced.

COTS – Commercial Off-The-Shelf - Federal Acquisition Regulation (FAR) term defining a non-developmental item of supply that is both commercial and sold in substantial quantities in the commercial marketplace, and that can be procured or utilized under government contract in the same precise form as available to the general public.

CPE – Chlorinated Polyethylene. Can be thermoplastic or thermoset. Used as a jacket material.

Creep – Dimensional change with time of a material under load. Plastic deformation that proceeds slowly and continuously when stress is applied at elevated temperatures.

Creepage – Conduction of electricity across the surface of a dielectric

Crimp termination – End or termination that is applied by physical pressure of terminal to wire.

Crosshead – Holds tooling and directs flow of compound at extrusion.

Cross linking – Establishment of chemical bonds between polymer molecule chains.

Cross-talk – Signal interference between nearby conductors caused by pickup of stray energy. It is also called induced interference.

Cross sectional area – Area of the cut surface of an object cut at right angles to the length of the object.

Crush resistance test – Test to determine the ability of a cable to resist damage from radial compression.

CSA – Canadian Standards Association International - Independent, non-profit membership association dedicated to safety, social good and sustainability. Its knowledge and expertise encompass standards development; training and advisory solutions; global testing and certification services across key business areas including hazardous location and industrial, plumbing and construction, medical, safety and technology, appliances and gas, alternative energy, lighting and sustainability; as well as consumer product evaluation services. The CSA certification mark appears on billions of products worldwide.

CT – Computer Tomography - Method of examining body organs by scanning them with X rays and using a computer to construct a series of cross-sectional scans along a single axis.

CTQC – Critical-to-Quality Characteristic - Specific factor or attributes that are associated with a product, process or service that customers consider extremely important.

cUL – UL marking for products certified in Canada.

Current (A) – The rate of flow of electricity in a circuit, measured in amperes.

Cut-through Resistance (CR) – Ability of a given material to withstand penetration by a solid object of specified dimensions and weight.

Cycle – One complete sequence of variations in an alternating current. The number of cycles occurring in one second is called the frequency.

dB – Decibel - Logarithmic unit that indicates the ratio of a physical quantity (usually power or intensity) relative to a specified or implied reference level. It is used to express power loss in cables.

DCAA – Defense Contract Audit Agency - Agency of the United States Department of Defense under the direction of the Under Secretary of Defense. DCAA is primarily responsible for performing all contract audits for the Defense Department (and, to a lesser extent, for other agencies outside DoD), and providing cost accounting and financial advisory services regarding contracts and subcontracts to all DoD components responsible for procurement and contract administration.

DCMA – Defense Contract Management Agency - Agency of the United States federal government responsible for performing contract administration services for the Department of Defense and other authorized federal agencies.

Decibel (dB) – Logarithmic unit that indicates the ratio of a physical quantity (usually power or intensity) relative to a specified or implied reference level. It is used to express power loss in cables.

Density – Mass per unit volume.

Derating factor – Factor used to reduce a current carrying capacity of a wire when used in other environments from which the value was established.

DeviceNet™ – Network system used in the automation industry to interconnect control devices for data exchange. It uses Controller Area Network as the backbone technology and defines an application layer to cover a range of device profiles.

DFMA – Design for Manufacturing and Assembly - Combination of two methodologies; Design for Manufacture, which means the design for ease of manufacture of the parts that will form a product, and Design for Assembly, which means the design of the product for ease of assembly.

DFMEA – Design Failure Mode Effects Analysis - Application of the Failure Mode and Effects Analysis method specifically to product design. It is a paper-and-pencil analysis method used in engineering to document and explore ways that a product design might fail in real-world use.

DFSS – Design for Six Sigma® - Methodology related to traditional Six Sigma. While the tools and order used in Six Sigma require a process to be in place and functioning, DFSS has the objective of determining the needs of customers and the business, and driving those needs into the product solution so created.

DHS – Department of Homeland Security - Cabinet department of the United States federal government with the primary responsibilities of protecting the United States of America and U.S. Territories from and responding to terrorist attacks, human-made accidents and natural disasters.

Dielectric – Any electrical insulating material that is a non-conductor of electricity.

Dielectric breakdown – The voltage required to cause an electrical failure of the insulation.

Dielectric constant – Plastics, and other materials measure of dielectric loss through an insulation. The numeric value is usually given relative to a vacuum.

Direct Burial rated (DB) – Also known as Dir bur. Cable approved to be installed directly in the earth without the use of a conduit.

Direct Current (DC) – Flow of electric charge is only in one direction.

Dissipation – Loss of heat and/or energy in a circuit.

DLA – Defense Logistics Agency - Agency in the United States Department of Defense which provides supplies to the military services and supports their acquisition of weapons repair parts and other material.

DMAIC – Define, Measure, Analyze, Improve and Control - Problem solving model used in Lean Six Sigma®.

DoD – Department of Defense - Executive Department of the Government of the United States of America charged with coordinating and supervising all agencies and functions of the government concerned directly with national security and the United States armed forces.

DOE – Design of Experiments - Design of any information gathering exercises where variation is present, whether under the full control of the experimenter or not.

Drain wire – Non-insulated wire in intimate contact with a shield to provide for easier termination of shield to a ground point.



Dryer – Machine that removes moisture from materials.

Duct – Underground or overhead tube through which electrical conductors are pulled. Provides additional mechanical protection.

Durometer – A measurement device used to denote the hardness of a material.

EAR – Export Administration Regulations - Rules by which the U.S. Department of Commerce Bureau of Industry and Security regulates and controls exports of goods from the United States.

Eccentricity – Measure of the center of a conductor's location with respect to the circular cross-section of the insulation. Expressed as a percentage of displacement of one circle within the other.

ECG – Electrocardiography, also known as EKG - Transthoracic (across the thorax or chest) interpretation of the electrical activity of the heart over a period of time, as detected by electrodes attached to the outer surface of the skin and recorded by a device external to the body. It is used to measure the rate and regularity of heartbeats, as well as the size and position of the chambers, the presence of any damage to the heart, and the effects of drugs or devices used to regulate the heart, such as a pacemaker.

ECHA – European Chemical Agency - Agency of the European Union which manages the technical, scientific and administrative aspects of the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) system.

ECMO – Extracorporeal Membrane Oxygenation - Extracorporeal technique of providing both cardiac and respiratory support oxygen to patients whose heart and lungs are so severely diseased or damaged that they can no longer serve their function.

ECTFE – Ethylene Chlorotrifluoroethylene - Can be used as insulation or jacket material.

EEG – Electroencephalography is the recording of electrical activity along the scalp.

EIA – Electronics Industries Association - Former standards and trade organization composed as an alliance of trade associations for electronics manufacturers in the United States. They developed standards to ensure the equipment of different manufacturers was compatible and interchangeable. The EIA ceased operations on February 11, 2011.

EKG – Electrocardiography, also known as ECG. Refer to ECG for the detailed definition.

Elastic deformation – Change in the shape or size of an object due to an applied force.

Electrostatic meter – Meter that measures voltage, field, and charge without transferring the charge to the instrument.

Elongation – Distance a material can be stretched before it breaks. Expressed in percent (%).

Embossing – Identification by means of molded letters or numbers in the jacket surface.

EMI – Electromagnetic Interference - Also referred to as radio frequency interference or RFI when in high frequency or radio frequency is disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source.

EPA – Environmental Protection Agency - Agency of the United States federal government which was created for the purpose of protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress.

Environmental stress cracking resistance – Ability of a material to resist crack formation and crack propagation when subjected to stress within a contaminating environment.

ER – Exposed Run - Cable approved for open wire applications.

ETFE – Ethylene Tetrafluoroethylene Fluoropolymer - Can be used as an insulation or jacket material.

Ethernet – Local area network used to connect computers, printers, workstations, and other devices within the same building. Ethernet operates over twisted wire and coaxial cable.

ETL – Electronic Testing Laboratories - Now known as Intertek Group is a multinational inspection, product testing and certification company.

ETO – Ethylene Oxide - Gas used mainly in a sterilization process for medical and pharmaceutical products that cannot support high temperature steam sterilization.

EVE – Electric Vehicle Elastomer - Article 400 of the National Electrical Code® designation for electric vehicle charging systems, 600V, 60° to 105°C.

EVJE – Electric Vehicle Junior Elastomer - Article 400 of the National Electrical Code® designation for electric vehicle charging systems, 300V, 60° to 105°C.

EVJT – Electric Vehicle Junior Thermoplastic - Article 400 of the National Electrical Code® designation for electric vehicle charging systems, 300V, 60° to 105°C.

EVT – Electric Vehicle Thermoplastic - Article 400 of the National Electrical Code® designation for electric vehicle charging systems, 600V, 60° to 105°C.

Exposed Run rated (ER) – Approved cable that does not require armoring and may be installed outside of conduit or another raceway. Prior to 2005, the designation was “open wiring.”

Extrusion – Process of continuously forcing either a plastic or elastomer and a conductor or core through a die, thereby applying an insulation or jacket to the conductor or core.

Farad (F) – Unit of measure for capacitance.

Fatigue resistance – Ability of a repeatedly deformed material to resist crystallization and accompanying failure.

Fault current – Maximum electrical current that will flow in a short-circuited system prior to the actuation of any current-limiting device.

FBI – Federal Bureau of Investigation - Governmental agency belonging to the United States Department of Justice that serves as both a federal criminal investigative body and an internal intelligence agency (counterintelligence).

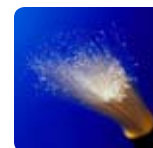
FDA – Food and Drug Administration - Agency of the United States Department of Health and Human Services, one of the United States federal executive departments. The FDA is responsible for protecting and promoting public health through the regulation and supervision of food safety, tobacco products, dietary supplements, prescription and over-the-counter pharmaceutical drugs (medications), vaccines, biopharmaceuticals, blood transfusions, medical devices, electromagnetic radiation emitting devices and veterinary products.

FEMA – Federal Emergency Management Agency - Agency of the United States Department of Homeland Security. The primary purpose of FEMA is to coordinate the response to a disaster that has occurred in the United States and that overwhelms the resources of local and state authorities.

FEP – Fluorinated Ethylene Propylene - Can be used as an insulation or jacket material.

Fibrous filler – Material used to fill interstices in cables made from fibers, such as jute, polypropylene, cotton, glass, etc.

Fiber optic – Light wave or optical communications system in which electrical information is converted to light energy, transmitted to another location through optical fibers, and is then converted back into electrical information.



There are three basic kinds of fiber optic cables:

Plastic – Uses visible light as the signal-carrying medium. Because of the long wavelengths and the relatively large size of the fiber, the light bounces around while passing down the fiber (called “dispersion”). The effect is that the signal can only go a few feet, maybe 20 or 30 feet.

Multi-mode – Made of glass and can come in various diameters. Multimode fiber uses much shorter wavelengths than plastic fiber. In multimode fiber there are two places in the spectrum which give the lowest loss and are called “windows.”

Single-mode – The king of fiber. It has two windows, they are at different wavelengths, 1300 nm and 1550 nm.

Figure 8 Cable – Aerial cable configurations in which the conductors and the steel strand supporting the cable are integrally jacketed. A cross section of the finished cable approximates the “Figure 8.”

Flame Ratings – For flammability tests, refer to regulatory agencies: *FT1, FT2, FT4, FT6, UL 1666 Riser, IEEE1202, IEC 332-3, UL 1685 Vertical-Tray, UL 1581 Section 1061, VW-1, UL 1581 Section 1060 and UL 1581 Section 1090.*

Flame resistant – Ability of a burning material to extinguish its own flame, once its flame-initiating heat source is removed.

Flame retardance – Ability of a material to prevent the spread of combustion by a low rate of travel so the flame will not be conveyed.

Flammability – The measure of the material’s ability to support combustion.

Flex life – Measurement of the ability of a conductor or cable to withstand repeated bending.

Flexibility – The ease with which a cable may be bent.

Flex test – Test to determine the ability of a cable to withstand repeated bending and twisting.

Flexible cord – Internationally recognized - Harmonized standards of the US, Canada and Mexico.

Foil shields – Simplest, price sensitive, and easiest to apply. Consist of two layers, a metal layer and a plastic substrate of polyester.



FOUNDATION™ fieldbus – All-digital, serial, two-way communications system that serves as the base-level network in a plant or factory automation environment.

FPM – Feet Per Minute - Unit of measure for speed.

Frequency – Number of alternating current (AC) cycles occurring in one second.

Frozen Jacket – Jacket that will not strip off core, because it bonded to core.

FRPE – Flame Retardant Polyethylene - Can be used as an insulation or jacket material.

GP – General Purpose - ITC product platform designation for price sensitive applications.

Ground – Conducting connection, intentional or accidental, between an electric circuit or equipment and the earth or some conducting body serving in place of the earth.

Ground potential – Zero potential with respect to the ground or earth.

Grounded neutral – Circuit operates with grounded neutral when the neutral is metallically connected to ground and there is a provision for immediate removal of a faulted element.

Grounding conductor – Conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes; typically colored green.

GSA – General Services Administration - Independent agency of the United States government, established in 1949 to help manage and

support the basic functioning of federal agencies. The GSA supplies products and communications for U.S. government offices, provides transportation and office space to federal employees, and develops government-wide cost-minimizing policies, and other management tasks.

Halogen – Chemical elements used in compound as flame resistants. Common chemicals are bromine, chlorine and fluorine. These elements release acidic and corrosive gases along with toxic smoke during a fire.

Halogen free – Common flame resistant additives that do not contain halogens include aluminum trihydrate, magnesium hydroxide and phosphorus.

HART® – Highway Addressable Remote Transducer - Protocol is the global standard for sending and receiving digital information across analog wires between smart devices and control or monitoring system.

Hash mark stripe – Non-continuous stripe applied to an insulated conductor for identification.

HDPE – High Density Polyethylene - Can be used as an insulation or jacket material.

Heat endurance – Amount of time that a material can withstand heat before failing a test.

Heat resistance – Ability of a material to maintain physical and chemical identity and electrical integrity under specified temperature conditions.

Heat shock – Test to determine stability of a material by sudden exposure to a high temperature for a short period of time.

Helix – Spiral winding.

Henry (H) – Unit of inductance in which an induced electromotive force of one volt is produced when the current is varied at the rate of one ampere per second.

Hertz (Hz) – A unit of frequency, expressed in cycles per second.

HFFR – Halogen Free Flame Retardant.

High voltage time test – Accelerated life test on a cable sample in which voltage is the factor increased.

HI-pot – Test designed to determine the highest voltage that can be applied to a conductor without electrically breaking down the insulation.

Hygroscopic – Material capable of attracting or absorbing moisture from the ambient atmosphere.

Inductance (H) – Property of a circuit or circuit element that opposes a change in current flow, thus causing current changes to lag behind voltage changed. It is measured in Henrys.

IEC – International Electrotechnical Commission - Non-profit, non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

IEEE – Institute of Electrical and Electronics Engineers - Professional association that is dedicated to advancing technological innovation and excellence.

Impedance – Total resistance that cable presents to the electrical current passing through it. Measured in Ohms.

Industrial backplanes – Circuit boards that contain sockets or expansion slots for connections to other circuit boards. There are two types of industrial backplanes: active and passive.

Ink jet printing – High-speed typing or printing process in which charged droplets of ink applied by nozzles are directed onto a material.



Insulation – Material having high resistance to the flow of electric current. Often called a dielectric.

Insulation Resistance (IR) – Resistance of an insulation to an impressed DC voltage, tending to produce a leakage current through the insulation.

Intertek – Multinationally recognized testing laboratory. Formerly known as ETL.

Insulation displacement connector – Mass termination connector with contacts that pierce the insulation in order to make contact with the conductor.



Irradiation – Process where an insulated wire or cable is exposed to an electron beam to change the chemical structure of the compound from thermoplastic to thermoset. This improves the physical properties and electrical performance of the material.

ISO 13485:2003 – Quality management system standard for medical devices and related services.

ISO 9000 Series – International Standards Organization, 9000 series is a family of standards (9001, 9002, etc.) for quality management systems and is administered by accreditation and certification bodies. ISO 9001 was the first standard that introduced a process based audit approach to improving quality management systems.

ITAR – International Traffic in Arms Regulations - Set of United States government regulations that control the export and import of defense-related articles and services on the United States Munitions List.

ITC – Instrumentation Tray Cable - UL 2250 listed, Article 727 of the National Electrical Code® for factory assembly of two or more insulated conductors, with or without grounding conductor(s), and enclosed in nonmetallic sheath or armor with an operating voltage of 150V or less and 5A or less.

Jacket – Outer covering, usually nonmetallic, mainly used for protection against the environment.



Jumper – Short length of conductor used to make a connection between terminals, around a break in a circuit, or around an instrument.

kV – kilovolt - Designation for 1000 volts.

Lab360 – NWI Engineering platform for contract manufacturing where professionally certified subject matter experts translate customer requirements through the disciplined process phases of research and development, new product development, prototyping, pilot models, clinical trials, low volume through high volume production, life-cycle innovation and logistics.

Lay – Distance along a cable occupied by one complete helix of a strand or conductor. The direction of lay (left or right hand) is the direction of the helix looking away from an observer. Also, to arrange the wires or members of a conductor either by twisting them or by forming them into one or more layers helically applied. Length of lay is the axial length of one turn of the helix of a wire or member (measured in inches or mm).

Laser – Used on wire and cable manufacturing equipment to measure and display the dimension of product.

Leaching – Loss of plasticizer or other liquid ingredient from a plastic due to heat, humidity or aging.

Legend – Indent or inkprint on inner conductor of finished jacket to identify cable.

Life cycle – Test to determine the length of time before failure in a controlled, usually accelerated, environment.

Limiting Oxygen Index – Percentage of oxygen necessary to support combustion of a specified material. Abbreviated as LOI.

LLDPE – Linear low-density polyethylene - Can be used as an insulation or jacket material.

LOI – Limiting Oxygen Index - Percentage of oxygen necessary to support combustion of a specified material.

Longitudinal shield – Tape shield, flat or corrugated, applied lengthwise with the axis of the core being shielded.

LS – Low Smoke.

LSHF – Low Smoke Halogen Free.

LSOF – Low Smoke Zero Fumes.

LSV – Low Speed Vehicles.

LSZH – Low Smoke Zero Halogen.

Magnet wire – Insulated copper or aluminum wire used in the coils of all types of electromagnetic machines and devices. It is a single-strand wire insulated with enamel, varnish, cotton, glass, asbestos, or combinations of these.



Major dimension – On flat cord, distance from side to side.

MARCORPSYSKOM – Marine Corps Systems Command.

Marker Threads – Colored strings laid parallel and adjacent to the strands of an insulated conductor to reveal information such as the conductor's manufacturer, the specification to which it was made, and its thermal capability.

Marker tape – Narrow strip of fabric, paper or plastic laid longitudinally within a cable that bears printed information such as the specification to which the cable was made and the name of the cable's manufacturer – typically used with cables where the material used for the jacket makes it difficult or impossible to print.

MC – Metal Clad - UL 1569 listed, Article 330 of the National Electrical Code® for factory assembly of two or more insulated conductors, with or without grounding conductor(s), and enclosed within interlocking armor with an operating voltage of 600V.

Messenger wire – Metallic supporting member either solid or stranded which may also perform the function of a conductor.

Micrometer – Measuring device with .0001" increments.

Migration – Loss of plasticizer from a plastic, usually due to heat or aging. It is undesirable since it can make the plastic hard and brittle. Also referred to as leaching.

mil – Unit used in measuring diameter of a wire or thickness of insulation over a conductor. One one-thousandth of an inch (.001").

Minor dimension – On flat cord, distance from top to bottom.

Moisture absorption – Amount of water that an insulation or jacket, which is initially dry, will absorb under specified conditions.

Moisture resistance – Ability of a material to resist absorbing moisture from the air or when immersed in water.

MRAP – Mine Resistant Ambush Protected - Family of armored fighting vehicles used by the United States armed forces, among others. The purpose of the design is surviving Improvised Explosive Device attacks and ambushes.

MRI – Magnetic Resonance Imaging - Medical imaging technique used in radiology to visualize internal structures of the body in detail.

MSC – Marine Shipboard Cable - UL 1309 listed and CSA 245 certified for signal, control, instrumentation and power cables for marine applications.

MSDS – Material Safety Data Sheet - Documents within a facility which explain material hazards, their proper handling and medical attention required in the event of exposure.

MSHA – Mine Safety and Health Administration - Agency of the United States Department of Labor which administers the provisions of the Federal Mine Safety and Health Act of 1977 (Mine Act) to enforce compliance with mandatory safety and health standards as a means to eliminate fatal accidents, to reduce the frequency and severity of non-fatal accidents, to minimize health hazards, and to promote improved safety and health conditions in the nation's mines.

MSDS – Material Safety Data Sheets located within the factory which explain material hazards, their proper handling and medical attention required in the event of exposure.

MTW – Machine - Tool Wires and cables - UL 1063 listed for wire and cable.

Multi-conductor – Cable consisting of many conductors and is common in control applications.

NASA – National Aeronautics Space Administration.

NEC® – National Electrical Code® (or NFPA 70) - Regionally adoptable standard for the safe installation of electrical wiring and equipment in the United States.

NEMA – National Electrical Manufacturers Association - Association of electrical and medical imaging equipment manufacturers in the United States.

NEV – Neighborhood Electric Vehicle.

NFPA – National Fire Protection Association - United States trade association that creates and maintains private, copyrighted, standards and codes for usage and adoption by local governments.

NGSI – National Geospatial-Intelligence Agency.

NISPE-1 – Non-Integral Service Parallel Elastomer 1 - UL 62 listed, Article 400 of the National Electrical Code® for pendant or portable cable, 2 or 3 conductors, 20 - 18 AWG, damp location, not hard usage, 300V, 60°C to 105°C.

NISPE-2 – Non-Integral Service Parallel Elastomer 2 - UL 62 listed, Article 400 of the National Electrical Code® for pendant or portable cable, 2 or 3 conductors, 18 - 16 AWG, damp location, not hard usage, 300V, 60°C to 105°C.

NISPT-1 – Non-Integral Service Parallel Thermoplastic 1 - UL 62 listed, Article 400 of the National Electrical Code® for pendant or portable cable, 2 or 3 conductors, 20 - 18 AWG, damp location, not hard usage, 300V, 60°C to 105°C.

NISPT-2 – Non-Integral Service Parallel Thermoplastic 2 - UL 62 listed, Article 400 of the National Electrical Code® for pendant or portable cable, 2 or 3 conductors, 18 - 16 AWG, damp location, not hard usage, 300V, 60°C to 105°C.

Nominal – Generally recognized as the aim point of a specified value.

Non-hygroscopic – Lacking the property of absorbing and retaining an appreciable quantity of moisture from the air.

NWI – Northwire, Inc., dba

Nylon – Strong polyamide polymer used for wire, cable jacketing, fillers and rope.

OD – Outside Diameter.

ODVA™ – Open DeviceNet™ Vendors Association - International organization that supports computing network technologies based upon the Common Industrial Protocol (CIP).

OFHC – Oxygen-Free, High Conductivity copper. It has no residual deoxidant, 99.95% minimum copper content and an average annealed conductivity of 101%.

Ohm (Ω) – Unit of measure for resistance such that a constant current of one ampere produces a force of one volt.

OSHA – Occupational Safety and Health Administration - Main federal agency charged with the enforcement of safety and health legislation.

Oxygen bomb test – Test to determine the ability of conductors and insulations to withstand physical and electrical change when immersed in pure oxygen gas of specified temperature and pressure for a specified time.

Pair – Two insulated wires of a single circuit associated together.

Parallel cable – Two insulated conductors in parallel in a cable.

PBT – Polybutylene Terephthalate - Can be used as an insulation material.

PE – Polyethylene - Can be used as an insulation or jacket material.

PET – Positron Emission Tomography - Nuclear medicine imaging technique that produces a three-dimensional image or picture of functional processes in the body.

PEV – Personal Electric Vehicles.

PFA – Perfluoroalkoxy - Can be used as an insulation or jacket material.

PFMEA – Process Failure Mode Effects Analysis.

PHEV – Plug-in Hybrid Electric Vehicle.

Photovoltaic (PV) – Technology which uses a device (typically a solar panel) to produce free electrons when exposed to light, resulting in the production of an electric current.

PHV – Plug-in Hybrid Vehicles.

Picofarad (pF) – Unit of measure for capacitance.

Plasticizer – Chemical agent added to plastics to make them softer and more pliable.

Plating – Any thin metallic coating applied over a metallic component such as copper.

Plenum – Air return path of a central air handling system, either ductwork or open space over a dropped ceiling.

Plenum-rated cables – Cables that are jacketed with a fire resistant plastic jacket of either a low-smoke PVC (polyvinyl chloride) or a FEP (fluorinated ethylene polymer).

PLTC – Power Limited Tray Cable - UL 13 listed, Article 725 of the National Electrical Code® for factory assembly of two or more insulated conductors, with or without grounding conductor(s), and enclosed in nonmetallic sheath or armor with an operating voltage of 300V.

Pneumatic – Moved, worked or controlled by air pressure.

PMI – Project Management Institute - Non-profit professional organization for the project management profession with the purpose of advancing project management.

PMS – Pantone Matching System - Proprietary color space used in a variety of industries.

PoCL® – Power over Camera LINK® - Standard provides power to the camera via the PoCL connection through a PoCL supported camera link cable.

Polyethylene (PE) – Thermoplastic material composed of ethylene polymers. Material is derived from the polymerization of ethylene gas.

Polymer – Material formed by the chemical union of monomers having either the same or different chemical composition.

Polypropylene (PP) – Can be used as an insulation or jacket material.

Polyvinyl Chloride (PVC) – Can be used as an insulation or jacket material.

PP – Polypropylene - Can be used as an insulation or jacket material.

Pressured – A type of extrusion where plastic is forced onto wire and cable taking a closely related shape.

Print wheel – Engraved wheel which transfers ink writing to the cable as it passes under the wheel.

PROFIBUS® – Standard for field bus communication in automation technology.

PROFINET® – Open industrial Ethernet standard of PROFIBUS® and PROFINET® International for automation.

PSI – Pounds per Square Inch - Unit of measure for pressure.

PTFE – Polytetrafluoroethylene - Can be used as a cable wrap or separator.

PUR – Polyurethane - Can be used as a jacket material.

PVC – Polyvinyl Chloride - Can be used as an insulation or jacket material.

PVDF – Polyvinylidene Fluoride - Can be used as an insulation or jacket material.

Pyrogens – Dead bacteria.

Quad – A four conductor cable.

QC/QA – Quality Control/Quality Assurance.

QPL – Qualified Product List.

RAL – Color matching system used in Europe.

Rated temperature – Maximum temperature at which an electric component can operate for extended periods without loss of its basic properties.

Rated voltage – Maximum voltage allowed for the cable during normal operating conditions.

REACH – European Union regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals - It came into force on June 1st, 2007 and replaced a number of European Directives and Regulations with a single system.

Reel – Flanged cylinder made of wood, metal or plastic that holds wire for process and shipping.

Reel tag – Label attached to reels providing a variety of information about product, including cable description, cable listing (UL and/or CSA ratings) and customer information.

Resistance (Ω) – In DC circuits, the opposition a material offers to current, measured in ohms. In AC circuits, resistance is the real component of impedance, and may be higher than the value measured at DC.

Retractable cable – Cable that returns by its own stored energy from an extended condition to its original contracted form (sometimes referred to as a coil cord).

RFI – Radio Frequency Interference - See definition for EMI.

RFID – Radio Frequency Identification - Use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking.

RG6 Coaxial Cable – RG6 is the recommended coaxial cable for distributing signals from cable TV, satellite dish or from a roof-top antenna.

RHH – Rubber (or XLPE), High Heat - UL 44 listed, general requirement of NFPA 70 for insulated building wire, 600V or 2000V, 75°C in dry and wet locations.

RHW – Rubber (or XLPE), High Heat, Water Resistant - UL 44 listed, general requirement of NFPA 70 for insulated building wire, 600V or 2000V, 75°C in dry and wet locations.

RHW-2 – Rubber (or XLPE), High Heat, Water Resistant, Wet Location Use - UL 44 listed, general requirement of NFPA 70 for insulated building wire, 600V or 2000V, 90°C in dry and wet locations.

Ripcord – Material inlaid below jacket to easily split jacket without tools during installation.

Riser – Pathways for indoor cables that pass between floors. It is typically a vertical shaft or space. A riser cable rating indicates good flammability characteristics, but not necessarily low smoke or halogen free materials.

RJ45 – Registered Jack type 45, also known as, 8 Position 8 Contact (8P8C), typically used to terminate twisted pair cable.

RoHS2 – Restriction of the use of certain Hazardous Substances - European Union regulations set maximum concentration limits on hazardous materials. The substances include lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers.

Rope Lay Conductor – Conductor composed of a central core surrounded by one or more layers of helically laid groups (members) of wire.

Root Mean Squared (RMS) – Effective value (same heating effect as a direct current or voltage of the same magnitude) of an alternating current or voltage.

RPM – Revolutions per Minute.

SAE – Society of Automotive Engineers - Global body of scientists, engineers, and practitioners that advances self-propelled vehicle and system knowledge in a neutral forum for the benefit of society.

SE – Service Elastomer - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

Self-extinguishing – Characteristic of a material whose flame is extinguished after the igniting flame is removed.

Semi-conductor – Solid material characterized by comparatively high resistivities.

Semi-rigid PVC (SRPVC) – Hard, semi-flexible polyvinyl chloride compound with low plasticizer content.

SEO – Service Elastomer Oil Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

SEOO – Service Elastomer Oil Resistant Insulation and Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

SEOOO – Service Elastomer Oil Resistant Insulation and Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

SEOW – Service Elastomer Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

Serve paper – Used as a separator to prevent jacket material from bonding to the core.

Serve – Helical wrapping applied over a wire or cable core. It may consist of wires, fibers, yarns or tapes.

Serve shields – In line or spiral serve options are available dependent on specifications.



Set-up – Preparation of production equipment before manufacturing product.

Sheath – Material, typically an extruded plastic or elastomer, applied outermost to a wire or cable. Very often referred to as a jacket, or an impervious metal covering.

Shields – Primary purpose of a shield is to contain electrical energy.

Shield coverage – Amount of cable core surface area which is covered by a shield. It is expressed as a percentage of the cable core's total surface area. It is also called braid coverage when applied to a braided shield.

Shield effectiveness – Relative ability of a shield to screen out undesirable signals or interference.

SJE – Service Junior Elastomer - UL 62 listed, Article 400 of the National Electrical Code® for insulated and jacketed cable used for small tools and appliances, 300V, 60°C to 105°C.

SJEO – Service Junior Elastomer Oil Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for insulated and oil resistant jacketed cable used for small tools and appliances, 300V, 60°C to 105°C.

SJEOO – Service Junior Elastomer Oil Resistant Insulation and Jacket - UL 62 listed, Article 400 of the National Electrical Code® for cable used in small tools and appliances, 300V, 60°C to 105°C.

SJEOOW – Service Junior Elastomer Oil Resistant Insulation and Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 300V, 60°C to 105°C.

SJEOW – Service Junior Elastomer Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 300V, 60°C to 105°C.

SJEW – Service Junior Elastomer Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for cable used for small tools and appliances, 300V, 60°C to 105°C.

SJT – Service Junior Thermoplastic - UL 62 listed, Article 400 of the National Electrical Code® for insulated and jacketed cable used for small tools and appliances, 300V, 60°C to 105°C.

SJTO – Service Junior Thermoplastic Oil Resistant Jacket- UL 62 listed, Article 400 of the National Electrical Code® for insulated and oil resistant jacketed cable used for small tools and appliances, 300V, 60°C to 105°C.

SJTOO – Service Junior Thermoplastic Oil Resistant Insulation and Jacket - UL 62 listed, Article 400 of the National Electrical Code® for cable used in small tools and appliances, 300V, 60°C to 105°C.

SJTOOW – Service Junior Thermoplastic Oil Resistant Insulation and Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for cable used in small tools and appliances, 300V, 60°C to 105°C.

SJTOW – Service Junior Thermoplastic Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for cable used in small tools and appliances, 300V, 60°C to 105°C.

SJTW – Service Junior Thermoplastic Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for cable used for small tools and appliances, 300V, 60°C to 105°C.

Skeleton Braid – A braid of widely separated wires or fibers, used to reinforce a jacket, bind a cable core, or serve as shielding for electrostatic or electromagnetic fields.

SMEI – Sales and Marketing Executives International - Worldwide organization dedicated to ethical standards, continuing professional development, knowledge sharing, mentoring students and advancing free enterprise.

Soft drawn wire – Wire that has been drawn or rolled to final size and then heated (annealed) to remove the effects of cold working.

Solar energy – Radiant light and heat from the sun that is transformed into usable power.

Spark test – Test designed to locate imperfections (pin-holes) in insulated and jacketed wire by application of an electrical potential across the material for a very short period of time while the wire is drawn through an electrode field.

SPE-1 – Service Parallel Elastomer Light Duty - UL 62 listed, Article 400 of the National Electrical Code® for two conductor cord for pendant or portable use in damp locations with or without a third conductor for grounding, 300V, 60°C to 105°C.

SPE-2 – Service Parallel Elastomer Heavy Duty - UL 62 listed, Article 400 of the National Electrical Code® for two conductor heavy cord for pendant or portable use in damp locations with or without a third conductor for grounding, 300V, 60°C to 105°C.

SPE-3 – Service Parallel Elastomer Heavier Duty - UL 62 listed, Article

400 of the National Electrical Code® for two conductor cord for refrigerators or room air conditioners in damp locations with or without a third conductor for grounding, 300V, 60°C to 105°C.

Spiral wrap – Helical wrap of a tape or thread over a core.

Solid conductor – Conductor that is made up of a single wire, less flexible than stranded conductors.

Spec. – Abbreviation for product specifications.

Spreader plate – Separates and aligns the insulated conductors at the cabling process to insure the correct color rotation and orientation.

SPT-1 – Service Parallel Thermoplastic Light Duty - UL 62 listed, Article 400 of the National Electrical Code® for two conductor light duty cord for pendant or portable use in damp locations with or without a third conductor for grounding, 300V, 60°C to 105°C.

SPT-2 – Service Parallel Thermoplastic Heavy Duty - UL 62 listed, Article 400 of the National Electrical Code® for two conductor heavy duty cord for pendant or portable use in damp locations with or without a third conductor for grounding, 300V, 60°C to 105°C.

SPT-3 – Service Parallel Thermoplastic Heavier Duty - UL 62 listed, Article 400 of the National Electrical Code® for two conductor heavier duty cord for refrigerators or room air conditioners in damp locations with or without a third conductor for grounding, 300V, 60°C to 105°C.

SRPVC – Semi-Rigid Polyvinyl chloride.

ST – Service Thermoplastic - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

Stabilizer – Ingredient added to plastics to preserve their physical, mechanical and chemical properties.

Static – Electrical interferences in the atmosphere such as lightning and corona.

STO – Service Thermoplastic Oil Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

STOO – Service Thermoplastic Oil Resistant Insulation and Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

STOOW – Service Thermoplastic Oil Resistant Insulation and Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

STOW – Service Thermoplastic Oil and Weather Resistant Jacket - UL 62 listed, Article 400 of the National Electrical Code® for multiconductor sturdy constructions used for tools and appliances, 600V, 60°C to 105°C.

Stranded conductor – Conductor composed of a group of wires, usually twisted, or of any combination of such groups of wires.

Strip force – Force required to remove a small section of plastic material from the substrate it covers.

SVE – Service Vacuum Elastomer - UL 62 listed, Article 400 of the National Electrical Code® for two or three conductors, 300V, 60°C to 105°C.

SVT – Service Vacuum Thermoplastic - UL 62 listed, Article 400 of the National Electrical Code® for two or three conductors, 300V, 60°C to 105°C.

TACOM – Tank-Automotive and Armaments Command - Part of the United States Army Materiel [SIC] Command. It generates, provides, and sustains mobility, lethality, and survivability for soldiers, other branches of the U.S. armed forces, and allies to ensure Army readiness.

Take-up – Process of accumulating wire or cable onto a reel, bobbin, or some other type of packaging. Also, the device for pulling wire or cable through production equipment.

TC – Tray Cable - UL 1277 listed and CSA 239 certified, Article 402 of the National Electrical Code® for factory assembly of two or more insulated conductors, with or without grounding conductor(s), and enclosed in nonmetallic sheath or armor with an operating voltage of 600V. For use in robotics, power generation and others.

Tear strength – Force required to initiate or continue a rip in a jacket or other insulation under specified conditions.

Tensile strength – Amount of force, measured in pound-force per square inch (PSI), which it takes to break the material.

TF – Thermoplastic PVC Fixture - UL 66 listed, Article 402 of the National Electrical Code® for insulated singles, 18-16 AWG, solid or 7 strands, 600V, 90°C dry and wet for use in luminaires and UL 1277 listed Tray Cable and UL 1569 listed Metal Clad Cables.

TFE – Tetrafluoroethylene.

TFF – Thermoplastic PVC Fixture Flexible - UL 66 listed, Article 402 of the National Electrical Code® for insulated singles, 18-16 AWG, more than 7 strands, 600V, 90°C dry and wet for use in luminaires and UL 1277 listed Tray Cable and UL 1569 listed Metal Clad Cables.

TFFN – Thermoplastic PVC Fixture Flexible Nylon Jacket - UL 66 listed, Article 402 of the National Electrical Code® for insulated singles, 18-16 AWG, more than 7 strands, 600V, 90°C dry and wet for use in luminaires and UL 1277 listed Tray Cable and UL 1569 listed Metal Clad Cables where gasoline resistance is required.

TFN – Thermoplastic PVC Fixture Nylon - UL 66 listed, Article 402 of the National Electrical Code® for insulated singles, nylon jacketed, 18-16 AWG, solid or 7 strands, 600V, 90°C dry and wet for use in luminaires and UL 1277 listed Tray Cable and UL 1569 listed Metal Clad Cables where gasoline resistance is required.

Thermal conductivity – Ability of material to conduct heat.

Thermal rating – Maximum and/or minimum temperature at which a material will perform its function without undue degradation.

Thermoplastic – Classification of resin that can be readily softened and reformed by heating and be re-hardened by cooling.

Thermocouple wire – Wire used as a sensor for measuring temperature that consists of two dissimilar metals joined together at the sensing end.

Thermoset – Cure through chemical reaction by heat and cooling.

THHN – Thermoplastic PVC High Heat Nylon Jacket - UL 83 listed, general requirements of NFPA 70 for cable, 600V, 90°C, dry and damp locations.

THHW – Thermoplastic PVC High Heat Wet Location Use - UL 83 listed, general requirements of NFPA 70 for cable, 600V, 90°C, dry and 75°C wet locations.

THW – Thermoplastic PVC Heat Resistant Wet Location Use - UL 83 listed, general requirements of NFPA 70 for cable, 600V, 75°C, dry and wet locations.

THW-2 – Thermoplastic PVC Heat Resistant Wet Location Use 2 - UL 83 listed, general requirements of NFPA 70 for cable, 600V, 90°C, dry and wet locations.

THWN – Thermoplastic PVC Heat Resistant Wet Location Use Nylon Jacket - UL 83 listed, general requirements of NFPA 70 for cable, 600V, 75°C, dry and wet locations.

THWN-2 – Thermoplastic PVC Heat Resistant Wet Location Use Nylon Jacket 2 - UL 83 listed, general requirements of NFPA 70 for cable, 600V, 90°C, dry and wet locations.

TIA – Telecommunications Industry Association - Accredited by the American National Standards Institute (ANSI) to develop voluntary, consensus-based industry standards for a wide variety of Information Communications Technology (ICT).

Tin Overcoat (TOC) – Tinned copper wire, stranded, then coated with pure tin.

Tinned Copper (TC) – Easier to solder than bare copper, corrosion resistant, and can withstand temperatures up to 150°C.

Tinsel wire – Copper or other metal wound around tiny threads of a strength material.

Tip – Extrusion tool that guides the conductor or core through the die.

Tipsters – Device used to tip material containers.

TOC – Tin overcoat - Tinned copper wire, stranded, then coated with pure tin.

Tolerance – Specified allowance designated by a standard or given dimension, weight or property.

TPES – Thermoplastic Polyester - Can be used as an insulation or jacket material.

TPR – Thermoplastic Rubber - Can be used as an insulation or jacket material.

TPU – Thermoplastic Polyurethane - Can be used as a jacket material.

Triad – Grouping of three conductors or three assemblages of conductors generally twisted together and found within a single cable.

Triboelectric noise – Noise generated in a shielded cable caused by variations in capacitance between shield and conductor as the cable is moved.

TW – Thermoplastic Wet Location Use - UL 83 listed, general requirements of NFPA 70 for cable, 60°C wet and dry locations.

TW75 – Thermoplastic Wet Location Use - CSA 75 certified for cable, 600V, 75°C, dry and wet locations.

TWN75 – Thermoplastic Wet Location Use Nylon Jacket - CSA 75 designation for cable, 600V, 75°C, dry and wet locations.

Twin cable – Cable composed of two separately insulated stranded conductors laid parallel under a common covering.

Twiner – Device for twisting together two conductors.

Twisted pairs – Consist of two insulated wires twisted together. Twisting pairs increases the rejection of noise and interference. Most frequently used for data transmission cables.



UL – Underwriters Laboratories - Global independent safety science company offering expertise across five key strategic businesses: Product Safety, Environment, Life and Health, Knowledge Services and Verification Services.

Underwrap – Wire or cable wrapping over itself.

Unidirectional conductor – Conductor constructed with a central core surrounded by more than one layer of helically laid wire, all layers having a common direction of lay, with increase in length of lay for each successive layer.

Unilay – More than one layer of helically laid wires with the direction of lay and length of lay the same for all layers.

Unshielded cable – Unshielded cable is appropriate where no noise is present, such as no crosstalk from adjacent wire. Twisted pairs, especially in data, are often unshielded.

USB – Universal Serial Bus - Industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices.

USCG – United States Coast Guard - Branch of the United States Armed Forces. The Coast Guard is a maritime, military, multi-mission service unique among the U.S. military branches for having a maritime law enforcement mission (with jurisdiction in both domestic and international waters) and a federal regulatory agency mission as part of its mission set.

USP – United States Pharmacopeial Convention - Scientific nonprofit organization that sets standards for the identity, strength, quality, and purity of medicines, food ingredients, and dietary supplements manufactured, distributed and consumed worldwide.

Velocity of Propagation (Vp) – Expressed as a percentage, the transmission speed of an electrical signal down a length of a cable compared to its speed in free air (speed of light).

VFD – Variable Frequency Drive - Type of adjustable speed drive used in electro-mechanical drive systems.

VIS – Vehicular Intercommunication System.

Volt (V) – Unit of electromotive force. One volt is the amount of potential required to produce one ampere of current through one ohm of resistance.

Voltage drop – Difference between the voltages at the transmitting and receiving ends of an electric service.

Voltage rating – Highest voltage that may be continuously applied to a wire in conformance with standards or specifications.

Vulcanization – Chemical reaction in which the physical properties of an elastomer are changed by reacting it with cross-linking agents.

VW-1 – Flammability rating established by Underwriters Laboratories for wires and cables that pass a specially designated vertical flame test, formerly designated FR-1.

Wall thickness – Measurement of insulation or jacket material thickness.

Water absorption – Ratio of the weight of water absorbed by a given material under specified conditions to the weight of that material when dry. It is generally expressed as a percentage.

WD-1A – US Military Designation - Parallel construction, HDPE insulated, steel and copper wire for use with local or common battery sound powered telephone systems.

WF-16 – US Military Designation - Parallel construction, 2 pairs, HDPE insulated, cadmium copper alloy wire for newer tone signaling field telephone equipment.

Wicking – Longitudinal flow of a liquid in a wire or cable due to capillary action.

WTTC – Wind Turbine Tray Cable - UL 2277 listed, Articles 336 and 402 of the National Electrical Code® for factory assembly of two or more insulated conductors, with or without grounding conductor(s) with an operating voltage of 600V to 1000V.

XHH – Cross-Link High Heat - UL 44 listed, general requirements of NFPA 70 for heat and moisture resistant insulated building wire, 75°C in dry and wet locations.

XHHW – Cross-Link High Heat Water Resistant - UL 44 listed, general requirements of NFPA 70 for heat and moisture resistant insulated building wire, 90°C dry, 75°C wet locations.

XHHW-2 – Cross-Link High Heat Water Resistant Wet Location Use - UL 44 listed, general requirements of NFPA 70 for heat and moisture resistant insulated building wire, 90°C dry or wet locations.

XL – Cross Link - Result of a chemical reaction to improve the molecular chain of a material.

XLFRPE – Cross Link Flame Retardant Polyethylene - Can be used as an insulation or jacket material.

XLPE – Cross Link Polyethylene - Can be used as an insulation or jacket material.

Yield strength – Lowest stress at which a material will start to deform without further increase in load.

Zero Sequence – Exhibiting no phase shift in the electrical circuit.



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