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AUTHORIZED DISTRIBUTOR

# Cable & Harness Solutions





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# The Specialist in Electronic Component Distribution

## Why Choose TTI?

### Why Buy from TTI?

Founded in 1971, TTI has steadily grown to become a world leading specialist distributor of electronic components. The company was founded on the premise that passive component purchasing could be made more efficient by offering product specialisation, customer-driven service and proprietary supply chain solutions.

### Product Knowledgeable Experts

Our unique specialisation enables us to provide significantly better product knowledge to support manufacturing from design chain to supply chain. TTI's commitment to this specialty and our customers is as dedicated today as always.

### Broader and Deeper Inventories

TTI maintains extensive inventories, stocking more than 2M part numbers globally - that's more connector, passive, electromechanical, discrete, sensor and power supply inventory available than from any other source.

### Leading Edge Technology Products

TTI partners with manufacturers that lead the industry in new component technologies and can help solve any design challenge. We ensure the very latest and most technologically-advanced products are readily available from stock.

### Supply Chain Excellence

From technical application advice to customised logistical solutions; TTI can add value throughout the supply chain by reducing acquisition costs, improving material flow through

forecast analysis, provide safety stock and reduce receipt handling through consolidated shipments. We provide the BOM coverage necessary to deploy comprehensive supply chain solutions that reduce total cost of ownership and mitigate line down risk.

### Global Distribution Centres

Our European headquarters is located just outside of Munich, Germany in Maisach-Gernlinden. In total, we have more than 35,000m<sup>2</sup> of dedicated warehouse space and local sales and technical support in over 40 locations across Europe.

TTI has more than 120,000m<sup>2</sup> of automated warehousing in North America, Europe and Asia. All are linked into a global warehouse management system that provides superior customer service and overall business efficiencies. Wherever you are in the world, TTI can support you.

### Quality and Reliability

TTI is the first distributor to have all global warehouse locations ISO registered and certified to ISO 9001 and ISO 14001 Standards. TTI Europe is also certified to EN9120/EN9100, IECQ-CECC and ISO/IEC 27001 Standards. Additionally, all of our European sales branches are ISO 9001 certified. TTI has one global documentation system that ensures that every TTI branch and warehouse in the world follows the same processes.

Year after year, customers rate our inventory availability, on-time delivery and accuracy among the very best in the industry - contact us today to find out what a true specialist has to offer.



**Global Distribution Centres** with more than **120,000m<sup>2</sup>** of automated warehousing in North America, Europe and Asia.



## Integrated Harness Systems and Components

These systems have been developed for a wide range of defense and industrial applications. Each system consists of compatible components, including cable jackets, heat-shrinkable components and adhesives.



All components are tested separately and as part of an assembled system. Typically a system consists of seven components:

- primary wire and cable
- heats-shrinkable tubing
- back shell adapter
- moulded parts
- adhesives
- cable jackets
- marker sleeves

### How to select the components?

- Step 1 Select the right application appropriate for the operating conditions and right environment and "follow the wire"
- Step 2 Select the adhesive system appropriate for the material system selected in Step 1
- Step 3 Determine the level of EMI shielding
- Step 4 Select the components

## Harness Systems and Their Components

Applications/Industry Sectors	Electrical Vehicles, Engineering and Fire Departments	Diesel Resistant (DR) Construction Vehicles, Oil Rigs & Chemical Processing Plants	Rail, (ZH Zero Halogen), Airports and Public Sector Buildings	High Temperature
Systems	System 10 System 25 System 100 System 300	25	100	300
Wire series	44	44	99, 100A, 100G	
Tubing series	Versafit	DR25	ZHTM	RT555
Adapter material and plating finish chosen for compatibility with the connectors.				
Moulded part	-3, -4, -71	-25	-100	-55/-125
Preinstalled Rayaten moulded part	-35	-25S	-100S	-
Adhesive	S1017,	S1048,	S1030,	S1255-04
	S1030	S1125	S1125	
Precoated adhesive	/42, /180	/86, /225	/180	-
Conductive adhesive	-	S1184	S1184	-
Cable jacket	Thermorad	FDR-25	Zerohal	RT555
Marker sleeve	TMS-SCE	TMS-SCE	HX-SCE	TMS-SCE

## Belt Heater for Heat Shrink Tubing – Model 19

- RAY 714529-000, CE approved for worldwide use
- Latest generation of reliable and versatile process heaters for heat shrinkable products
- Two sets of timing belts grip the assemblies and carry them through a closed-loop infrared heating zone, and through a fan-cooled zone
- Consistent temperatures (ambient to 700°C) are thermocouple controlled
- Belt speed selection using a 3-digit thumbwheel
- Minimal skills required, operator only has to centre assembly and tubing
- Heater is designed to process a wide range of Raychem parts, up to 25mm diameter and 178mm in length



\*Further ovens are available in different sizes of cable harnesses. Besides, there is also a bubble tester (Seal Test Equipment AD3050) to check if the tubing after installation is tight and waterproof (necessary for Dual Wall Tubings).

TTI Europe offers value added cable and wire services

We can re-spool cable and wire from TE Connectivity to meet the customers desired length (in meters).



Cable Type		Properties		Rating U max.	Size mg/w mm <sup>2</sup>	Operating Temp. °C	Market Segment Coverage	Civil Commercial License	Military License
Rugged Environment	44A	<ul style="list-style-type: none"> <li>Dual wall construction</li> <li>Small size</li> <li>Light weight</li> </ul>	<ul style="list-style-type: none"> <li>Resistant to most chemicals</li> <li>Electrical arc tracking</li> </ul>	2500V	0,26...3,26	65 to +150	<ul style="list-style-type: none"> <li>Universal</li> <li>Defense</li> <li>Aerospace</li> </ul>		<ul style="list-style-type: none"> <li>W-81044</li> <li>MIL-C27500</li> <li>VG95218</li> </ul>
	55A	<ul style="list-style-type: none"> <li>Resistant to electrical arc tracking in wet or dry conditions</li> <li>Single or dual wall constructions</li> </ul>	<ul style="list-style-type: none"> <li>Small size</li> <li>Ultra lightweight</li> <li>Exceptional chemical resistance</li> </ul>	600V	0,26...3,26	65 to +200	<ul style="list-style-type: none"> <li>Aerospace</li> <li>Motorsports</li> </ul>	<ul style="list-style-type: none"> <li>Boeing13-48</li> <li>BS3G233</li> <li>ABS0820-0826</li> <li>CAA E11749</li> <li>FAR25</li> <li>ESA 3901/011 and 3901/012</li> <li>VDE 9426-9428</li> <li>NFC-939-524</li> </ul>	<ul style="list-style-type: none"> <li>SAE AMS 22759, 27500</li> <li>Defence Std DSP61-12 Part 21,29,33/1</li> <li>VG 95218 20-23</li> <li>PAN 6843-6845</li> </ul>
Special Cable	99M	<ul style="list-style-type: none"> <li>Low flammability</li> <li>Low smoke generation</li> <li>Small size</li> </ul>	<ul style="list-style-type: none"> <li>Lightweight</li> <li>Low toxicity index</li> <li>Low generation of corrosive gases</li> </ul>	1000V	0,41...2,1	55 to +125	<ul style="list-style-type: none"> <li>Rail</li> <li>Marine closed compartments</li> </ul>		
	Zerohal/ Wire 100A	<ul style="list-style-type: none"> <li>Halogen free</li> <li>Low smoke</li> <li>Highly flame retardant</li> <li>Flexible</li> </ul>	<ul style="list-style-type: none"> <li>Easy to install</li> <li>Small size</li> <li>Lightweight</li> </ul>	600V	0,51...2,6	30 to +125	<ul style="list-style-type: none"> <li>Rail</li> <li>Marine closed compartments</li> </ul>	<ul style="list-style-type: none"> <li>IEC 684-2</li> <li>EC332-1&amp;3</li> <li>IEC1034</li> <li>IEC754-2</li> <li>IEC811-1-1</li> </ul>	<ul style="list-style-type: none"> <li>EN50306</li> <li>VG95218-20 Type E</li> <li>95218-28 Type C</li> </ul>
	Zerohal/ Wire 100G	<ul style="list-style-type: none"> <li>Meets requirements of VG 95218-20 Type E</li> <li>Halogen free</li> <li>Low smoke</li> <li>Highly flame retardant</li> </ul>	<ul style="list-style-type: none"> <li>Flexible</li> <li>Easy to install</li> <li>Small size</li> <li>Lightweight</li> </ul>	1300V	0,51...2,6	30 to +125	<ul style="list-style-type: none"> <li>Rail</li> <li>Marine closed compartments</li> </ul>	<ul style="list-style-type: none"> <li>EN50306-2</li> <li>EN50306-3</li> <li>EN50306-4</li> </ul>	
	Zerohal/ Wire 100E	<ul style="list-style-type: none"> <li>Halogen free</li> <li>Low smoke</li> <li>Highly flame retardant</li> <li>Flexible</li> </ul>	<ul style="list-style-type: none"> <li>Easy to install</li> <li>Small size</li> <li>Lightweight</li> </ul>	500V	0,81...4,1	55 to +125	<ul style="list-style-type: none"> <li>Rail</li> <li>Marine closed compartments</li> </ul>		

Cable Type		Properties	Rating U max.	Size mg/w mm <sup>2</sup>	Operating Temp. °C	Market Segment Coverage	Civil Commercial License	Military License
Industrial Cable	FlexLite DW	<ul style="list-style-type: none"> <li>• Non-melting insulation material</li> <li>• Thin-wall product size and weight savings</li> <li>• Excellent chemical resistance</li> <li>• Dual-wall construction for increased mechanical performance</li> </ul>	600V	0,32...5,2	45 to +125	• Industrial	UL Style 3584	–
	FlexLite TW	<ul style="list-style-type: none"> <li>• Thin-wall product for size and weight savings</li> <li>• Tough insulation material</li> <li>• Excellent chemical resistance</li> </ul>	600V	0,20...2,6	55 to +135	• Industrial	UL Style 10208	–
	FlexLite HT	<ul style="list-style-type: none"> <li>• Exceptional chemical resistance</li> <li>• Thin-wall for size and weight savings</li> <li>• Tough fluoropolymer insulation material</li> <li>• Excellent stripping and handling</li> </ul>	600V	0,41...4,1	55 to +200	• Industrial	UL Style 3557	–
Coax Cable	Cheminax Coaxial	<ul style="list-style-type: none"> <li>• Lightweight</li> <li>• Small size</li> <li>• Low capacitance and attenuation</li> </ul>	600V	0,26...2,1	55 to +200	• Aircraft; • Aerospace Industries		–
Power Cable	ZHPCG Series	<ul style="list-style-type: none"> <li>• Rail approved zero halogen power cables, available as 750v or 1800v rated</li> <li>• ZHPCG cables are all halogen free, flexible, water resistance and with good oil</li> </ul>	3300V	6...400	65 to +115	• Rail Industries	<ul style="list-style-type: none"> <li>• EN45545-2</li> <li>• DIN5510-2</li> <li>• TE WSD1265</li> </ul>	–
Automotive	ACW Series	<ul style="list-style-type: none"> <li>• Unique bonded composite wall insulation system</li> <li>• Tough fluoropolymer outer jacket</li> <li>• Super fluid resistance compared to cross linked polyolefins</li> </ul>	50V	0.35...10	40 to +150	• Automotive	<ul style="list-style-type: none"> <li>• TE WSD 1223</li> <li>• FORD Motor Company Global Wire Specification ES-AU5T-1A348-AA</li> <li>• ISO 6722 CLASS D</li> <li>• Fiat Group Automobiles normazione 9.91107</li> <li>• Jaguar Land Rover – Engineering Test Procedure TPJLR.18.007</li> <li>• GM Europe – GM Europe Engineering Standards GME14022</li> <li>• FORD Motor Company – Engineering Specification WSK1A348-A4</li> </ul>	–

# TE Connectivity's Raychem Tubing Products



- Single wall tubing gives optimum flexibility and space savings, along with mechanical protection and chemical resistance
- Dual wall tubing, with inner walls of adhesive or encapsulant, also reliably seals out moisture
- Elastomeric tubing products are specifically designed for use in applications where resistance to abrasion, chemicals and other fluids, and flexibility over a wide range of temperatures is required
- Heavy duty tubing products are intended for use in the most rugged environments



Whether your application is commercial, industrial, or military, TE's Raychem tubing products are available to help meet your precise needs.

Key Benefits	
	<p>Polyolefin tubing is widely used to provide insulation and strain relief of wire terminations and connections.</p> <ul style="list-style-type: none"> <li>• The tubing is cost effective and with its low shrink temperature, installs quickly</li> <li>• Flexible, but does not easily wrinkle when bent</li> </ul> <ul style="list-style-type: none"> <li>• Flame retardant tubing is available in a wide range of sizes and colours</li> <li>• Most polyolefin tubing products meet UL and CSA standards for a wide range of commercial applications as well as military specifications</li> </ul>
	<p>Raychem single wall tubing products allow you to bundle wires to create very flexible, lightweight harnesses that can stand harsh environments. Elastomeric tubings are intended for use in the most rugged harnessing applications where abrasion and temperature resistance as well as resistance to chemicals and fluids are required.</p> <ul style="list-style-type: none"> <li>• Where space saving is important, very-thin-wall tubing allows you to pack components tightly</li> </ul>
	<ul style="list-style-type: none"> <li>• Many tubing products offer excellent protection for cables and harnesses that are dragged along the ground, flexed frequently, or subjected to abrasion during installation</li> <li>• For example, HFT5000 heat-shrinkable fabric tubing is designed to provide mechanical protection for components such as rubber hoses, plastic pipes and harness wiring bundles</li> <li>• Semi-rigid tubing products provide strain relief to ensure that delicate connections will be protected from damage during use</li> </ul>
	<p>High-shrink-ratio tubing products environmentally protect connector-to-cable transitions. The adhesives used in dual wall tubing products bond to a wide variety of plastics, rubbers and metals.</p> <ul style="list-style-type: none"> <li>• High-shrink-ratios accommodate large size differences between cables and cable connectors and backshells, thus simplifying cable repair</li> <li>• Medium wall for increased mechanical protection</li> <li>• Available in flexible, semi-rigid, or flame retardant materials</li> </ul>
	<p>Rugged, adhesive-lined tubing protects wiring and components from the corrosive effects of moisture, engine fuels and lubricants.</p> <ul style="list-style-type: none"> <li>• Provides one-step electrical insulation and moisture sealing</li> <li>• When adhesive-lined flexible polyolefin tubing is used both the tubing and adhesive are flexible, creating a moisture seal that accommodates bending</li> </ul> <ul style="list-style-type: none"> <li>• In more rugged applications, specially formulated hot-melt adhesive forms an effective barrier against fluids and moisture</li> <li>• Dimensions of some tubing products are engineered to accommodate multiple wire splices</li> </ul>
	<p>Heat-shrinkable end caps fully encapsulate or seal terminations and protect them from dust, dirt and moisture. The encapsulant or adhesive lining in the caps melts and flows to fill surface irregularities in the substrate.</p> <ul style="list-style-type: none"> <li>• End caps inexpensively insulate and encapsulate or seal crimped electrical connections</li> <li>• Caps resist abrasion, vibration and flexing</li> <li>• End caps' splash resistant, moisture resistant coverings provide environmental protection</li> </ul>
	<p>Heavy duty tubing products were designed for applications where strength and durability are needed, such as underground splice sealing, high ratio back end connector sealing, battery terminal insulation and mechanical protection for wiring systems.</p> <ul style="list-style-type: none"> <li>• Thick wall tubing is highly resistant to impact and abrasion and provides a high level of strain relief</li> <li>• Flame retardant and halogen-free tubing products available</li> <li>• Resistant to chemicals, moisture and oils</li> </ul>

The diesel resistant DR-25 series is particularly resistant to fluids like aviation and diesel fluids, hydraulic fluids or lubrication oils. When used in conjunction with "System 25" heat shrinkable moulded shapes and S1125 high performance adhesives, these products provide a complete harness system.

# TE Connectivity's Raychem Tubing Products



Single wall					
Operating Temp. °C	Product Name	Shrink Ratio	Product Description	Features & Benefits	Typical Applications
-40 to +135	CGPT	2:1 3:1	Single-wall flame retardant polyolefin tubing	<ul style="list-style-type: none"> <li>Tough and flexible with good chemical resistance</li> <li>Flame retardant (except clear)</li> </ul>	<ul style="list-style-type: none"> <li>Suitable for a wide range of applications including electrical insulation, strain relief, cable bundling, colourcoding, and mechanical protection</li> </ul>
-40 to +125	LSTT	2:1	Low-shrink temperature single-wall non-flame polyolefin tubing retardant	<ul style="list-style-type: none"> <li>Low shrink temperature for fast recovery</li> <li>Meets FMVSS 302 standard for flammability</li> <li>Flexible</li> </ul>	<ul style="list-style-type: none"> <li>Electrical insulation, colour-coding, covering of temperature-sensitive devices, cosmetic coverings and mechanical protection</li> </ul>
-55 to 135	<b>RNF-100 (Preferred product)</b>	2:1	Flexible, flame retardant, general purpose polyolefin tubing	<ul style="list-style-type: none"> <li>Excellent physical, chemical and electrical properties</li> <li>Abrasion and solvent resistance superior to that of many polyolefin tubings</li> <li>Wide range of sizes and colours</li> </ul>	<ul style="list-style-type: none"> <li>Insulation and strain relief of wire terminations and connections</li> <li>Jacketing wire bundles and harnesses where superior abrasion resistance is a plus</li> <li>Colour coding and identification</li> <li>Protection of wire markers (clear)</li> </ul>
-55 to 135	RNF-3000	3:1	Flexible, high-shrink-ratio, flame retardant, general purpose polyolefin tubing	<ul style="list-style-type: none"> <li>3:1 shrink ratio easily accommodates irregular shapes</li> <li>Few sizes cover a wide range of diameters</li> <li>Flame retardant (colours only)</li> </ul>	<ul style="list-style-type: none"> <li>Insulation and strain relief of wire terminations and electrical connections</li> <li>Electrical and mechanical protection of components with irregular dimensions</li> </ul>
-55 to 135	RT-3	2.5:1	Semirigid, flame retardant polyolefin tubing	<ul style="list-style-type: none"> <li>Excellent mechanical properties; transfers flex stress away from typically weak points</li> <li>Tightly controlled expanded diameters; well suited for semiautomated installation</li> </ul>	<ul style="list-style-type: none"> <li>Strain relief, insulation and mechanical protection of soldered or crimped connections, wire splices and terminations. Mechanical protection</li> </ul>
55 to 135	VERSAFIT	2:1	Highly flame retardant, very flexible, low shrink-temperature polyolefin tubing	<ul style="list-style-type: none"> <li>Meets AMS-DTL-23053/5, Cl. 1 and 3 as well as UL and CSA standards</li> <li>UL/CSA VW-1 flame rating</li> <li>Low shrink temperature for fast installation</li> </ul>	<ul style="list-style-type: none"> <li>Insulation and protection of in-line components, wire splices and terminations. Very flexible light-duty military and commercial harnessing</li> <li>Use where a UL/CSA VW-1 flame rating is needed and rapid installation is desirable</li> </ul>
-55 to 135	VERSAFIT-3X	3:1	Highly flame retardant, very flexible, high shrink-ratio, low-shrink temperature overexpanded polyolefin tubing	<ul style="list-style-type: none"> <li>UL/CSA VW-1 flame rating</li> <li>Low shrink temperature for fast installation</li> <li>3:1 shrink ratio easily accommodates irregular shapes</li> <li>Few sizes cover a wide range of diameters</li> </ul>	<ul style="list-style-type: none"> <li>Insulation and protection of in-line components, wire splices and terminations</li> <li>Very flexible light-duty harnessing</li> <li>Use where larger expansion ratio and UL/CSA VW-1 rating are needed</li> </ul>
Dual Wall					
Operating Temp. °C	Product Name	Shrink Ratio	Product Description	Features & Benefits	Typical Applications
-55 to 75	DWTC	4:1	Clear adhesive-lined polyolefin tubing	Limited number of sizes cover a full range of irregular shapes and widely varying dimensions. Clear tubing offers excellent clarity for protection of substrates needing inspection during service.	<ul style="list-style-type: none"> <li>Environmental sealing of components where mechanical toughness or split resistance are needed</li> </ul>
-40 to 80	TECT	3:1	Semiconductive, adhesive-lined polyolefin tubing	Conductive polyolefin jacket lined with conductive adhesive.	<ul style="list-style-type: none"> <li>Electrical grounding of coated automotive fuel lines</li> </ul>
-30 to 80	CGAT	3:1	Adhesive-lined, flexible polyolefin tubing	General-purpose adhesive-lined tubing for the commercial marketplace. Offers good adhesive bonding to a variety of substrates to provide environmental sealing.	<ul style="list-style-type: none"> <li>Environmental protection of electrical components</li> <li>Sealing of wire breakouts and cable jackets</li> </ul>
-40 to 85	RPPM	4:1	Clear adhesive-lined polyolefin tubing	Tough outer jacket offers excellent mechanical strength. High shrink ratio allows use on a range of substrate diameters. Black has a high gloss finish. Clear has excellent optical clarity allowing inspection of substrates after installation.	<ul style="list-style-type: none"> <li>Use the black for cosmetic applications where a high gloss finish is desired</li> <li>Use the clear where optical clarity is desired for later inspection</li> </ul>
-55 to 110	ATUM	3:1 & 4:1	High-shrink-ratio, adhesive-lined polyolefin tubing	3:1 and 4:1 shrink ratios allow for connector-to-cable sealing. Medium wall provides increased mechanical protection. ATUM adhesive bonds to a wide variety of materials.	<ul style="list-style-type: none"> <li>Sealing and protection of connector backshells, breakouts and connector-to-cable transitions</li> <li>High shrink ratio allows for repair of damaged cable jackets without removing connectors</li> </ul>
-40 to 125	<b>DSPL (Preferred product)</b>	4:1	High-shrink-ratio, adhesive-lined semi-rigid polyolefin tubing	4:1 shrink ratio allows a few sizes to cover a wide range of applications. Excellent environmental sealing. Mechanically tough providing protection from flexing and abrasion. Flame retardant (except clear).	<ul style="list-style-type: none"> <li>Environmental sealing, electrical insulation and mechanical protection of wire splices, terminals and other components</li> </ul>
-55 to 125	HTAT	4:1	Semi-flexible, high-shrink-ratio, adhesive-lined polyolefin tubing	4:1 shrink ratio allows for connector-to-cable sealing. Medium wall provides increased mechanical protection. High-temperature adhesive forms a strong bond to a variety of materials.	<ul style="list-style-type: none"> <li>Sealing and protection of back-shells, breakouts and connector-to-cable transitions at elevated temperatures</li> <li>High shrink ratio allows superior environmental protection to a wide range of shapes with irregular dimensions</li> </ul>

# TE Connectivity's Raychem Tubing Products



## Heavy Duty

Operating Temp. °C	Product Name	Shrink Ratio	Product Description	Features & Benefits	Typical Applications
-55 to 110	RMW	3:1	Medium wall, general purpose polyolefin tubing	Highly resistant to impact, abrasion, chemicals and moisture. Adhesive-lined version provides a moisture-proof seal.	<ul style="list-style-type: none"> <li>Insulation and protection of cable joints as well as cable repair. Uncoated RMW provides insulation and strain relief</li> <li>Adhesive-lined RMW also provides an environmental seal</li> </ul>

## Special Purpose

Operating Temp. °C	Product Name	Shrink Ratio	Product Description	Features & Benefits	Typical Applications
-30 to 105	ZH-100	2:1	Flexible, thin-wall, low fire hazard tubing	Low smoke emissions. Flexible, flame retardant. No added halogens.	<ul style="list-style-type: none"> <li>Jacketing wire bundles and light-duty harnesses for use in areas where low fire hazard materials are required</li> </ul>
-30 to 105	ZHTM	2:1	Flexible, thick-wall tubing with low toxicity for fire safety applications	Low smoke emissions. Flexible, flame retardant.	<ul style="list-style-type: none"> <li>Insulation and protection of cables, harnesses and electrical and electronic components in enclosed spaces, such as in ships, mass transit systems and offshore installations</li> </ul>
-55 to 110	PD Caps	3:1	Semi-rigid, encapsulant-lined polyolefin caps	End cap with meltable encapsulant inner wall for splash resistance. Permanent or temporary method to terminate wires.	<ul style="list-style-type: none"> <li>Insulation and encapsulation of crimped electrical connections, especially stub splices, providing rugged protection against abrasion, vibration and flexing</li> </ul>
-40 to 125 for 3,000 hours; -40 to 150 for 1,000 hours	HFT5000	2:1	Heat-shrinkable fabric tubing	Highly flexible for easy installation on a variety of substrates. Outstanding abrasion resistance over a wide temperature range. Heat-shrinkable to grip tightly. Resistant to harsh environments. Halogen-free.	<ul style="list-style-type: none"> <li>Abrasion protection for rubber hoses, plastic pipes, and harness wire bundles</li> <li>Provides outstanding abrasion, chafing and cut-through resistance even at high temperatures</li> </ul>
-80 to 125	SAS/SASR/TSAS	N/A	Slit adhesive sleeves made of selected adhesives	For use with single and dual wall tubings to provide additional adhesive in applications where it is needed.	<ul style="list-style-type: none"> <li>Use under single wall tubing to create a seal around a wire or splice. Use under dual wall tubing where additional adhesive is needed for consistent sealing</li> <li>Use several individual wires to create a water block at the back of a connector</li> </ul>
-75 to 150	DR-25	2:1	Flexible, chemical and abrasion resistant tubing	Long-term fluid and heat resistance. Resistance to aviation and diesel fuels, and hydraulic fluids. Flexible, flame retardant.	<ul style="list-style-type: none"> <li>Particularly suitable as a jacketing material for cables and harnesses on military ground vehicles and race cars</li> </ul>
-55 to 150	RNF-150	2:1	High-performance, flame-resistant, flexible fluoropolymer tubing	Thinner wall than most general purpose polyolefin tubings. Highly flame-resistant. Excellent physical and electrical properties after exposure to many chemicals and solvents at 50°C.	<ul style="list-style-type: none"> <li>Jacketing and bundling wires to form light-duty harnesses, especially where a low profile, abrasion resistance, and flexibility are needed. Insulation and strain relief of electrical connections and wire terminations</li> </ul>
-50 to 150	Versaflex/Versaflex-FR	N/A	Expandable, braided polyester tubing	Suitable for mechanical protection of wire harnesses where exceptional flexibility combined with superior abrasion and cut-through resistance is required. Will not trap heat or moisture. Expands easily over irregular shapes. Available in non-flame retardant or flame retardant versions.	<ul style="list-style-type: none"> <li>Mechanical protection of wire harnesses, hoses and other substrates where exceptional flexibility is needed</li> <li>Wire bundling without trapping heat and moisture</li> <li>Provides additional abrasion and cut-through resistance where required</li> </ul>
-75 to 180	SFR	1.75:1	Very flexible, flame retardant, silicone elastomer tubing	Outstanding low-temperature flexibility. Resistance to hydraulic fluids, fuel, and lubricating oil. Very good ablative characteristics.	<ul style="list-style-type: none"> <li>Cable harness protection where maximum flexibility in temperature extremes is required. Strain relief for electronic components, semiconductor leads and wire splices</li> </ul>
-65 to 200	RT555	2:1	Fluid-resistant, chemical-resistant, fluoropolymer tubing with extended temperature range	Resistant to high temperatures, solvents, corrosive chemicals, hydrocarbons, and radiation. Highly flame retardant. Low outgassing.	<ul style="list-style-type: none"> <li>Applications requiring resistance to high temperatures and resistance to a variety of chemicals and fluids</li> <li>Insulation and strain relief on appliances</li> <li>Protection of delicate electronic instruments</li> </ul>
-40 to 200	RW-200	2:1	Chemical-resistant, high-temperature fluoroelastomer tubing	Outstanding performance in severe chemical and thermal environments. High resistance to impact and abrasion.	<ul style="list-style-type: none"> <li>Insulation and protection of cables and components exposed to high temperatures and/or solvents, fuels, hydraulic fluids, lubricants and acids</li> <li>Suitable for use in engine compartments</li> </ul>
-67 to 250	TFE/TFER	1.8:1 to 3.2:1	High-temperature, chemically inert modified PTFE tubing	Provides insulation and mechanical protection in severe chemical and thermal environments. High mechanical strength and an extremely low coefficient of friction.	<ul style="list-style-type: none"> <li>Covering hydraulic hose and couplings to prevent contamination and corrosion. The high mechanical strength and extremely low coefficient of friction make it good for reducing damage to bearing shafts and similar applications</li> </ul>

# Single and Dual Wall Tubing



A guideline to make the most appropriate choice for your solution.

## Single Wall Tubing | CGPT Series (Common General Purpose Type) | -40°C to +135°C

Key Criteria	Product Type (Temp range)	Additional Criteria	Product Type (Temp range)
Def Standard / British Standard	<b>RNF-100</b> -55° to +135°C	Dual Colour	<b>DCPT</b> -55° to +135°C
Higher Shrink Ratio	<b>RNF-3000</b> -55° to +135°C	Dual Colour	<b>RP4800</b> -55° to +135°C <b>DCPT</b> -55° to +135°C
Low Fire Hazard	<b>ZH-100</b> -30° to +105°C	Increased Wall Thickness	<b>ZHTM</b> -15° to +105°C
		Cable Tie	<b>ZHCP</b> -20° to +105°C
Non-Flame Retarded Commercial	<b>BRST</b> -40° to +120°C		
Lower Shrink Temp	<b>LSTT</b> -40° to +125°C	Improved Flame Retardance	<b>VERSAFIT</b> -55° to +135°C
Higher Operating Temp	<b>RT-375</b> -55° to +150°C	Colours	<b>RNF-150</b> -55°C to 150°C <b>RW-175</b> -55° to +175°C <b>HT-200</b> -55° to +200°C <b>More Flexible</b> <b>RW-200-E</b> -55° to +200°C
UL VW1 Flammability	<b>VERSAFIT</b> -55° to +135°C		
Improved fluid resistance	<b>DR-25</b> -75° to +150°C	Higher Operating Temperature	<b>RW-200-E</b> -55° to +200°C
		Higher Temperature, Chemical Resistant	<b>TFE/TFE-R</b> -67° to +250°C
Better Strain Relief	<b>CRN</b> -55° to +135°C	Higher Operating Temperature	<b>RW-175</b> -55° to +175°C
Improved Abrasion Resistance	<b>RW</b> -175 -55° to +175°C	Higher Temperature, Improved Abrasion	<b>TFE/TFE-R</b> -67° to +250°C
Non heat shrink conduit	<b>HCTE</b> -55° to +200°C		
Ablative Silicon Tubing	<b>SRFR</b> -75° to +200°C		
Clarity	<b>RT-375</b> -55°C to +150°C		

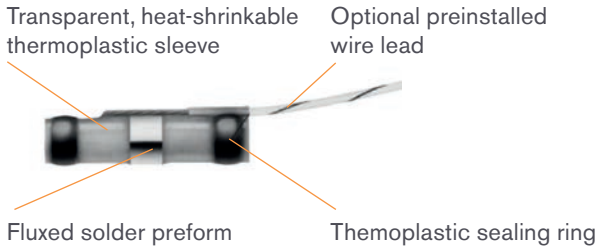
## Dual Wall Tubing | CGAT Series (Common General Purpose Type) | -30°C to + 80°C

Key Criteria	Product Type (Temp range)	Additional Criteria	Product Type (Temp range)
4:1 shrink ratio – clear colour	<b>DWTC</b> -55°C to +75°C	Higher operating temperature	<b>RPPM</b> -40° to +85°c
Higher Shrink Ratio (6:1)	<b>PTCM</b> -40°C to +85°C		
Improved Fluid Resistance	<b>ATUM</b> -55°C to+110°C		
Heavier wall thickness (med)	<b>RMW</b> -55°C to+110°C	Thicker wall	<b>RHW</b> -55°C to+110°C
Better Strain Relief	<b>SCL</b> -55°C to+110°C		
Higher operating temperature	<b>HTAT</b> -55°C to+125°C		
End Protection	<b>PD CAP</b> -55°C to+110°C		
Bundle blocking	<b>Rayblock</b> -85 & 105		
Edge Protection	<b>RAYRIM</b> -55°C to +80°C	Military	<b>TPEM</b> -55°C to + 80°C
Commercial Splice Sealing	<b>DSPL</b> -40°C to+125°C	Stub Splice	<b>ES-CAPS</b> -40°C to+125°C

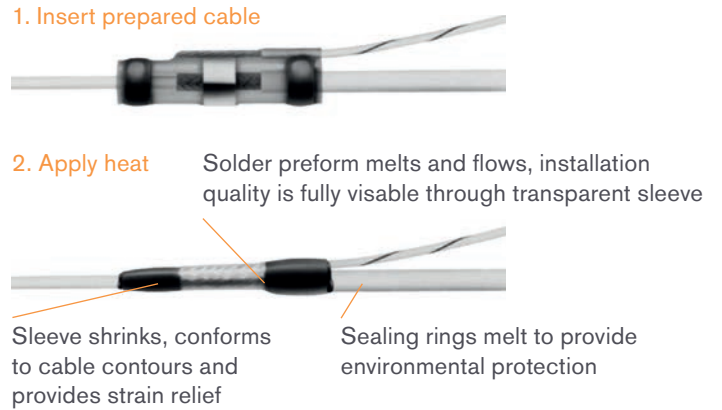
# Selection Solder Sleeve Devices & Boots



## Product selection



## Typical installation



## Typical SolderSleeve Device (illustration of shield terminator concept)

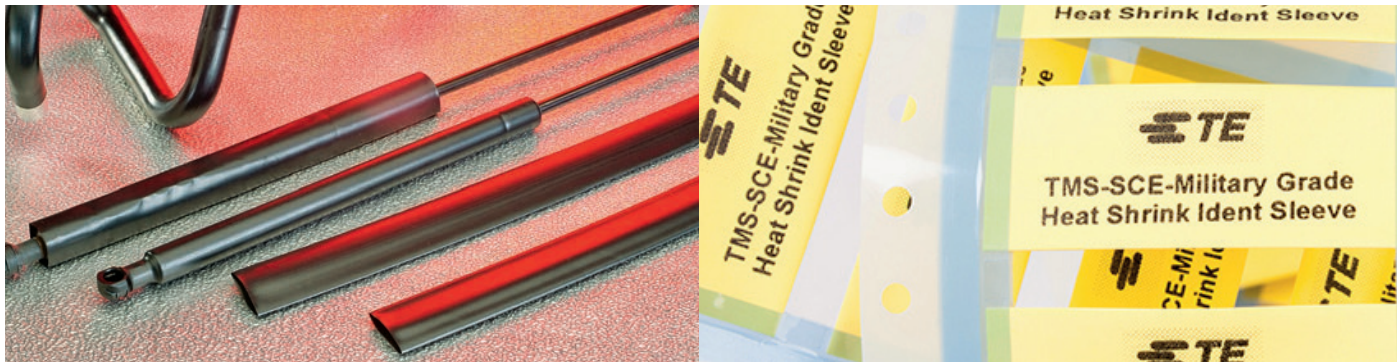
## Solder Sleeve Selection

Application Type	Connection Type	Max. Operating Temperature	Product Description	Series
Wire-to-Wire Splicing	Solder	125	SolderSleeve wire splices	B-155-900X
		150	SolderSleeve wire splices	D-100, D-1744
	Crimp	125	DuraSeal crimp splices	D-406
		125	PolyCrimp crimp splices	C-203
		150	Cold applied splices	D-436
		150	MiniSeal crimp splices	D-436 (M81824)
		200	MiniSeal crimp splices	D-200
Coil and Solder	125	SolderGrip closed end connector splices (stub)	SGRP, SGRS, SGRW-X-58	

## Boot selection

Application	Family Description	Typical Shapes
Lipped boots for use with a circular adapter	202D121 to 196 222D121 to 196 202K121 to 185 222K121 to 185 242W042 to 063	
Nonlipped boots for use directly on a circular connector	202A111 to 196 222A111 to 196	
Low-profile lipped boots for use with a circular adapter	202D211 to 299 222D211 to 299 202F211 to 274 222F211 to 285 202G211 to 253	
Lipped boots for use with a circular adapter	202D921 to 963 222D921 to 963	
Lipped boots with compressible design for use with a circular adapter	202C6111 to 663 202G611 to 653	
Adapter boots for use with D-subminiature connectors	214A011 to 052 324A011 to 071 214A311 to 352 234A111 to 152 234A611 to 671	

# TE Connectivity's Raychem Tubing Products



## Heat Shrinkable Marker

Product	Description	Features & Benefits	Key Selling Point	Temp. Range °C	Applications
<b>TMS-SCE</b> <b>TMS-SCE-2X</b> (Preferred product)	TMS-SCE is a heat shrinkable wire marker made from durable, flame retardant, heat shrinkable polyolefin, which is designed to meet the needs of manufacturers with high performance requirements.	<ul style="list-style-type: none"> <li>• 3:1 and 2:1 shrink ratios</li> <li>• Quick recovery for heat sensitive areas</li> <li>• Lightweight for Aerospace Applications</li> <li>• UL recognised</li> </ul>	High quality Military specification material that meets the performance standards of SAE-AMS-DTL-23053/5	-55 to +135	<ul style="list-style-type: none"> <li>• Rail</li> <li>• Aerospace</li> <li>• Mass Transport</li> <li>• Military</li> </ul>
HT-SCE	HT-SCE is a heat shrinkable wire marker, made from highly flame retardant, heat-shrinkable fluoropolymer. HT-SCE is designed for use in high temperature applications where extreme resistance to fuels, lubricants and solvents is required. Designed for space vehicle and equipment (low-vacuum outgassing).	<ul style="list-style-type: none"> <li>• 2:1 Shrink ratio</li> <li>• Space vehicle applications (Low-vacuum outgassing)</li> <li>• Fluid resistance</li> <li>• Highly flame retardant</li> </ul>	HT-SCE has the ability to operate continuously at very high temperatures	-55 to +225	<ul style="list-style-type: none"> <li>• Rail</li> <li>• Aerospace</li> <li>• Industrial</li> <li>• Space</li> </ul>
HX-SCE	HX-SCE is a heat shrinkable wire marker, designed to give low fire hazard properties, allowing this product to be used in locations where fire poses a risk to human life and property.	<ul style="list-style-type: none"> <li>• 2:1 shrink ratio</li> <li>• Zero Halogen</li> <li>• Low Toxic Fumes</li> <li>• Low Smoke</li> <li>• Self-extinguishing</li> <li>• Low heat release rate</li> </ul>	HX-SCE is formulated to give low fire hazard properties	-55 to +105	<ul style="list-style-type: none"> <li>• Rail</li> <li>• Aerospace</li> <li>• Industrial</li> <li>• Military</li> </ul>
D-SCE	D-SCE is the market leading fluid resistant heat shrinking wire marker. It is used in applications where exposure to organic fluids, especially oils, is required for long periods at elevated temperatures.	<ul style="list-style-type: none"> <li>• 3:1 shrink ratio</li> <li>• Diesel Resistant</li> <li>• Provides the wire with strain relief, insulation and protection from mechanical abuse</li> </ul>	D-SCE has high resistance to organic fluids, common fuels, lubricants and solvents	-55 to +135	<ul style="list-style-type: none"> <li>• Rail</li> <li>• Aerospace</li> <li>• Industrial</li> <li>• Military</li> </ul>
RPS	RPS is a commercial grade heat-shrinkable wire marker, designed to meet the needs of commercial and industrial customers.	<ul style="list-style-type: none"> <li>• 3:1 shrink ratio</li> <li>• Good chemical and solvent resistance</li> <li>• Configured for ease of kitting</li> <li>• UL recognised</li> </ul>	General purpose with many possible applications	-30 to +105	<ul style="list-style-type: none"> <li>• Industrial</li> <li>• Automotive</li> <li>• Electronics</li> <li>• Telecom</li> </ul>

## Cable Markers

Product	Description	Features & Benefits	Key Selling Point	Temp. Range °C	Applications
CM-SCE-TP	CM-SCE-TP is a flat non-adhesive tie-on cable marker tag, used to identify large cable and wire bundles in environments such as military and aerospace. CM-SCE-TP is applied to cables or wire bundles with cable ties. CM-SCE-TP is the thermal transfer printable version of CM-SCE.	<ul style="list-style-type: none"> <li>• Highly flame resistant</li> <li>• Highly resistant to abrasion, mechanical abuse, fluids, lubricants and solvents</li> <li>• Excellent print performance</li> </ul>	High quality Military specification tie-on cable marker that meets the performance standards of MIL STD 202	-55 to +135	<ul style="list-style-type: none"> <li>• Rail</li> <li>• Aerospace</li> <li>• Mass Transport</li> <li>• Military</li> </ul>

## Pre-Printed Markers

Product	Description	Features & Benefits	Key Selling Point	Temp. Range °C	Applications
STD Marker	STD Markers are individual snap on markers used to identify wires and small cables. Manufactured using zero halogen polyoxymethylene compound. They are installed with an applicator wand, allowing for application after wire has been installed.	<ul style="list-style-type: none"> <li>• Zero Halogen</li> <li>• UV stabilised material</li> <li>• Excellent resistance to burning and common fluids</li> </ul>	Installed using applicator wand, allowing for marker application post wire and cable installation	-40 to +106	<ul style="list-style-type: none"> <li>• Industrial</li> <li>• Electronics</li> </ul>

TTI's "Loyalty Campaign" rewards customers who order heat shrink sleeves, cable markers or adhesive labels. If you would like to learn more, ask our local TTI sales team for more details.

# TE Connectivity's Identification Products



Printer					
Product	Description	Features & Benefits	Key Selling Point	Temp. Range °C	Applications
T200-IDENT	T200 IDENT is a budget thermal transfer printer, designed to print a wide range of TE Connectivity identification sleeves, cable markers and labels. This light weight printer replaces the T212M-Printer.	<ul style="list-style-type: none"> <li>• High Accuracy Printing</li> <li>• Easy to use</li> <li>• Small footprint</li> <li>• Light weight</li> <li>• Easy to fit accessories</li> <li>• Touch Screen</li> <li>• Software version available</li> </ul>	T200 IDENT is a great quality low cost thermal transfer printer	–	<ul style="list-style-type: none"> <li>• Office environment</li> <li>• Light Industrial environment</li> </ul>
WinTotal™	WinTotal™ is a label/marker design package that makes wire marker printing simple in an industrial environment. WinTotal™ is pre-loaded with all the TE wire identification products and a 14 day trail can be downloaded for from the TE website, after that a licence or access dongle must be purchased.	<ul style="list-style-type: none"> <li>• Multi-lingual user interface</li> <li>• Pre-loaded WYSIWYG templates</li> <li>• Clipart gallery with over 1000 commonly used symbols</li> <li>• Incremental alpha and numeric fields</li> <li>• Accepts and prints data in any language</li> <li>• Multiple printers – print simultaneously</li> <li>• Advanced label design elements and tools</li> </ul>	WinTotal™ makes printing easy with live database view in fields and true print preview. Meaning that what you see, is what is printed.	–	<ul style="list-style-type: none"> <li>• Label/Marker design system</li> </ul>

Printer Accessories					
Product	Description	Features & Benefits	Key Selling Point	Applications	Available Options
1966-RIBBON	The 1966-RIBBON is an ultra-high performance black thermal ribbon for the ultimate print performance!	<ul style="list-style-type: none"> <li>• Ideal for use in environments where marker may come into contact with abrasion, solvent or chemical attack</li> </ul>	1966-RIBBON is an ultra-high quality performance ribbon, that produces superb print quality	TE3124, TE3112, T6112DS, T200 IDENT, T200 LABEL, T312M, T208M & T212M	Colour: black
TMS-RJS-RIBBON-4DSCE	TMS-RJS-4DSCE is a high performance black thermal transfer ribbon, for use on D-SCE heat shrinkable sleeves.	<ul style="list-style-type: none"> <li>• High performance black ribbon that when used with the applicable printers, produces excellent print performance</li> </ul>	TMS-RJS-4DSCE printed legends have high resistance to fluids, especially diesel	TE3124, TE3112, T6112DS, T200 IDENT, T200 LABEL, T312M, T208M & T212M	Colour: black
TMS-RJS-RIBBON-4RPSCE	TMS-RJS-4RPSCE is a high durability commercial grade black thermal transfer ribbon, for use with TMS-SCE, RPS and HS/HC heat shrinkable sleeves, SB labels, and HL cable markers.	<ul style="list-style-type: none"> <li>• High performing black ribbon that when used with the applicable printers, produces excellent print performance</li> </ul>	TMS-RJS-4DSCE printed legends have high resistance to abrasion, solvents and chemicals	TE3124, TE3112, T6112DS, T200 IDENT, T200 LABEL, T312M, T208M & T212M	Colour: black

Labels for Asset Tracking					
Product	Description	Features & Benefits	Key Selling Point	Temp. Range °C	Applications
LEB	Yellow polyester labels. LEB labels can be used as rating labels as well as for identifying electrical facilities and devices. LEB is 80µm thick with a pressure sensitive acrylic adhesive.	<ul style="list-style-type: none"> <li>• Laser or ink jet printable</li> <li>• Comes in A4 sheet format for ease of usage</li> <li>• Extremely high aging-resistance of the printing image</li> </ul>	LEB has excellent resistance to abrasion, oil, industrial chemicals and other fluids	-40 to +150	<ul style="list-style-type: none"> <li>• Components</li> <li>• General Purpose</li> </ul>

The WinTotal™ v6 software license (RAY EC9817-000) has 2500 TE Connectivity identification products pre-installed. This makes the creation and printing of identification sleeves or labels a quick and simple task.

# TE Connectivity's Identification Products



## Labels – Laser Self Laminating

Product	Description	Features & Benefits	Key Selling Point	Temp. Range °C	Applications
CSL	Self laminating polyester labels – CSL is ideal for use on a wire or cable. CSL is supplied with white printable area, which can then be over-laminated by the translucent area of the label. CSL is 55µm thick with a strong acrylic adhesive	<ul style="list-style-type: none"> <li>Designed to withstand exposure to solvents, salts, alkalis and water</li> <li>Can be flagged or wrapped around wire</li> <li>Strong acrylic adhesive</li> </ul>	Self-laminating – which protects the printing from chemicals and frequent handling	-30 to +120	<ul style="list-style-type: none"> <li>Industrial</li> <li>Telecoms</li> <li>Electronics</li> <li>General Purpose</li> </ul>

## Labels – Self Laminating

Product	Description	Features & Benefits	Key selling point	Temp. Range °C	Applications
SBP	Self laminating vinyl labels – SBP is ideal for wire and cable identification. SBP is supplied with a white printable area, which can then be over-laminated by the translucent area of the label. SBP is 100µm thick with an acrylic adhesive.	<ul style="list-style-type: none"> <li>UL listed</li> <li>Excellent conformability to irregular surfaces.</li> <li>Withstands exposure to oil, solvents and water</li> <li>Can be supplied in various colours as non-standard</li> </ul>	Self-laminating – which protects the printing from chemicals and frequent handling	-40 to +80	<ul style="list-style-type: none"> <li>Industrial</li> <li>Rail</li> <li>Components</li> <li>Electronics</li> <li>Aerospace</li> </ul>

## Labels – Industrial

Product	Description	Features & Benefits	Key selling point	Temp. Range °C	Applications
MP	Metalised polyester labels – MP is designed for rating plates and general purpose applications that require a high durability label with metal look, such as nameplates, equipment labels, products labels and serial number plates. MP is 72µm thick with an acrylic adhesive	<ul style="list-style-type: none"> <li>UL listed</li> <li>Ideal for rating plate applications</li> <li>Metalised appearance/satin silver effect</li> <li>General purpose, highly durable label</li> </ul>	MP has a specially designed ink receptive top coat to improve mark permanence	-40 to +150	<ul style="list-style-type: none"> <li>Rail</li> <li>Industrial</li> <li>Electronics</li> <li>Components</li> <li>Telecoms</li> <li>General Purpose</li> </ul>
WP	White polyester labels – WP is designed for general purpose applications, bar coding, PCB and component labelling that requires a highly durable white label. WP is 72µm thick with an acrylic adhesive.	<ul style="list-style-type: none"> <li>UL Listed</li> <li>Excellent chemical resistance</li> <li>Excellent for use in PCB component labelling and bar coding applications</li> </ul>	WP has a specially designed ink receptive top coat to improve mark permanence	-40 to +150	<ul style="list-style-type: none"> <li>Circuit Board</li> <li>Components</li> <li>Electronics</li> <li>General Purpose</li> <li>Aerospace</li> <li>Industrial</li> </ul>

## Labels – Safety

Product	Description	Features & Benefits	Key selling point	Temp. Range °C	Applications
ESSW	Pre-printed safety and warning labels – ESSW is ideal for any safety and warning label applications, such as electrical tools, apparatuses and installations with safety and warning information. ESSW is 55µm thick with a pressure sensitive acrylic adhesive	<ul style="list-style-type: none"> <li>Laminated, soft vinyl, gloss yellow sign</li> <li>Yellow signal colour with excellent contrast</li> <li>Pre-printed sign comes in various sizes</li> <li>Comes in various different warning signs</li> </ul>	High quality safety and warning sign, with excellent resistance to industrial factors	-30 to +120	<ul style="list-style-type: none"> <li>Industrial</li> <li>Rail</li> <li>Components</li> <li>Electronics</li> </ul>
LKZ	Pre-printed vinyl electric symbol labels – LKZ is used to identify copper-rails, electrical connections or operating resources, with pre-printed electric symbol labels. LKZ is 120µm thick with a acrylic adhesive.	<ul style="list-style-type: none"> <li>Supplied on sheet for ease of use</li> <li>Dirt and stain resistant</li> <li>Resists abrasion and fluids</li> <li>LKZ is supplied in many different sizes</li> </ul>	Tough polyester over laminate provides resistance to key abrasion and fluids as well as resistance to dirt and stains	-30 to +80	<ul style="list-style-type: none"> <li>Industrial</li> <li>Rail</li> <li>Components</li> <li>Electronics</li> </ul>

## Labels – Hand Writable

Product	Description	Features & Benefits	Key selling point	Temp. Range °C	Applications
TEK & EB	Hand writable vinyl fabric labels – TEK/EB hand writable labels are designed for on-the-spot labelling, of electrical systems and articles and other general labelling purposes. TEK/EB are 20µm thick with pressure sensitive acrylic adhesive.	<ul style="list-style-type: none"> <li>Versatile label that can be used in many applications</li> <li>Portable</li> <li>Resistant against water, sea water, alcohol, engine oils, methanol and petrol</li> </ul>	TEK & EB labels can be applied on the spot as soon as the need is identified	-30 to +80	<ul style="list-style-type: none"> <li>Industrial</li> <li>Electronics</li> <li>General Purpose</li> </ul>



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