

Saving time by using TE Connectivity's Panel Labels

A TE Connectivity white paper

Panel builders and industrial installers can use printed labels rather than traditional engraved plates to save minutes per label when identifying components on electrical panels

by: Philippe Contri, Product Manager for TE's label products, Grenoble

The labels on electrical panels and other equipment must stick fast to powder coated surfaces and remain legible after mechanical abrasion. Traditionally, engraved plates were used but these can now be replaced with adhesive labels. This takes the creation and application of each label from minutes to seconds and allows flexibility by making it possible for labels to be used on curved surfaces.

Philippe Contri, Global Product Manager for identification labels, explains why TE has developed a range of Panel Labels for industrial manufacturers such as panel builders and how these can simplify the marking and identification of panel components, switches and indicators.



PRINTED LABELS FOR FASTER IDENTIFYING COMPONENTS ON ELECTRICAL PANELS

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Electrical panels and identification

Electrical panels are used widely to house power distribution, process automation, and monitoring & control equipment. They contain switchgears, meters, controllers, indicators, switches and other equipment.

It's important that panels as well as individual components inside them are clearly identifiable. This enables operators to find them quickly – whether to check plant status or to operate a switch.

Identification markers must be tough enough to withstand mechanical abrasion as operators push buttons and press switches.

They also need to stay in place permanently on the powder-coated surface of the panels. This requirement is challenging for many labels, as many adhesives are not well suited to the task.

TE has introduced a new printable label designed to stay in place on powder coated surfaces. It can be used on panels as well as other industrial plant and equipment, such as the curved bodies of pumps and valves.

Finding a less costly alternative to engraved plates

Traditionally, panel builders and installers have used engraved plates to identify cabinets, panels and components.

These are based on rigid polymer sheets made up of two layers in contrasting colors. When a component needs to be marked, letters and numbers are engraved through the top layer so that the name or function of the component can be seen clearly. The plate is then fixed to the panel with screws or adhesive.

While the material itself is costly, the process of creating and installing engraved plates is time consuming, adding to the overall cost of the installation. It typically takes minutes per plate, with the exact time depending on the size and complexity of the label. Another drawback is the plates themselves are brittle and inevitably some will be broken during a project, and must be duplicated.

Many panel builders and industrial firms are searching for an alternative option that takes only seconds to install. This will free up their time to focus on the technicalities of delivering the electrical installation.

This is why TE took the opportunity to develop its Panel Labels. Customers can print and apply labels singularly or in batches within seconds – not just to panels and cabinets, but also curved surfaces of mechanical parts.



Engraved plate



Panel label

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Role of identification systems

The role of any industrial identification system is to remain in place and readable for as long as required – and this is often the same as the lifetime of the equipment it identifies. In the case of an electrical panel, a label may remain in place for decades.

Choosing the wrong product could mean that labels do not remain in place or lose their markings. The result could be lost time in production, introduction of new risks in the operating environment and loss of reputation for the panel builder. Therefore, it's worth choosing the right labels.

Choosing the right product can seem daunting because of the huge number of identification solutions available on the market. Each product type has been developed to meet the specific requirement of an industrial environment.

Focusing on labels alone, there are options for labels in different materials that can be applied to flat surface or wrapped around cables or pipes. The simplest are pressure sensitive labels that will carry data such as serial numbers and power ratings on products. Others have 'high tack' adhesives for rough surfaces or improved levels of chemical or moisture resistance or will show whether a product has been tampered with. There are also dedicated labels for printed circuit boards, which have high resistance to the heat of soldering on nearby components during manufacturing

The job of installers and buyers of identification solutions is finding the right label to meeting the specification required for the job.

Developing Panel Labels

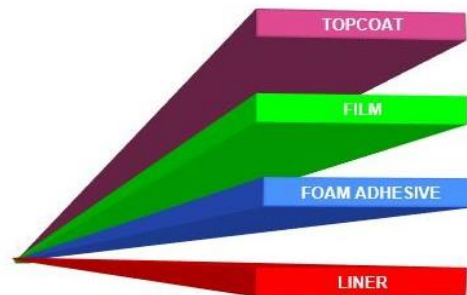
TE's Panel Labels have been designed as an alternative to engraved plates on electrical panels and other powder-coated equipment.

In terms of performance, the optimum combination of materials is needed for a label to stay in place and remain legible for the lifetime of the labelled equipment. In addition, TE also considered what format would help installers work more efficiently and effectively.

As a result, TE labels are suitable for indoor applications and will stick firmly to electrical panels, cabinets and similar surfaces, while remaining intact and legible despite mechanical abrasion.

Abrasion is important to minimize damage as operators brush across labels to push buttons as they carry out their tasks.

Typically, labels have three distinct layers- a printable top coat providing protection, a central film for stability and structure, and an adhesive foam layer. These layers are packaged on a paper or polymer liner and formatted into pre-cut labels on sheets and rolls.



Labels are made up of three layers mounted on a liner

The process of developing a new label means shortlisting different options for each of the layers before testing rigorously to narrow the search to find the ideal combination to give the best lifetime performance. The format is then developed to optimize the label dimensions and pack size and type for the needs of the market.

Customizing and tailoring labels

For customers with specific needs, TE can create customized labels by finding the optimum combination of adhesive, top coat and film.

It's also possible to create tailored versions of existing label types by varying the color, size or format, for example.

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Adhesives for powder coated surfaces

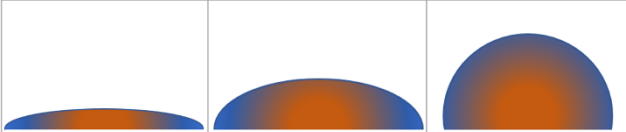
There is currently a trend in industry towards powder coatings. These are the tough and resilient coatings that protect steel structures such as cabinets, panels and pipework. However, such surfaces are resistant to most adhesives due to the material characteristic of low surface energy.

Surface energy is a measure of how readily a material will accept adhesives or printer ink and is related to the strength of the bonds between molecules. It is measured in the unit dyne per centimeter (dyne/cm), with one dyne being a force equivalent to 10 micronewtons. Materials can be classified as having either high, medium or low surface energy.

Surface energy can be observed by dropping water onto a material's surface. In materials with high surface energy, a droplet will spread out in the form of a wide and thin layer. At the opposite end of the scale, the droplet will remain as a droplet on materials with low surface energy.

Because powder coatings have low surface energy, it is challenging to find an adhesive, also known as a Pressure Sensitive Adhesive (PSA) that will stick immediately and permanently to them without peeling or dropping off. Such non-stick surfaces can be helpful in some applications but not when the goal is to attach lasting labels on industrial cabinets and panels.

As a result, selecting an adhesive was one of the most important elements of developing Panel Labels.



High surface energy		Medium surface energy		Low surface energy	
Copper	1,100	Nylon	46	Polystyrene	36
Aluminium	840	Polyester	43	Polyethylene	31
Steel	526	Polycarbonate	42	Powder coatings	
Glass	250-500	PVC	39	Teflon™	18

A water droplet indicates the surface energy of materials, which is measured in Dyne/cm

Selecting the best adhesive for Panel Labels

Each adhesive reacts differently in various conditions. Whereas some have high initial adhesion, others need around 72 hours to set fully, whereas others have high resistance to high temperatures but may ooze.

When selecting the most appropriate adhesive for its panel labels, TE shortlisted a selection of 10 adhesive compounds before extensive testing of their applicability and staying power on powder coated substances in a variety of conditions.

The most important criteria for TE's Panel Labels was compatibility with low surface energy materials and the ability to remain in place in the typical operating environment for an electrical installation, which may include exposure to cleaning fluids.

Top layer and support film

TE used its insight of materials and experience of performance of other label types to select a top layer and support film.

In the case of Panel Labels, TE adopted a top layer and carrier film that are both well proven in other label products. The polyester material is a known quantity, delivers good performance and has recently been requalified.

The top layer is a highly durable coating that provides straightforward printing, retention of the printed mark and an ability to withstand abrasion, as well as resistance to a variety of industrial solvents and bright sunlight.

System approach

With any identification solution, it's important to consider identification as a system rather than a product. Confidence in the long-term performance is only possible when the product is combined with other system elements, which are: the recommended printer, print ribbon, print settings and software.

The first reason for this is that identification systems are developed and tested as a complete system. By changing one of the variables, the product may not work as expected, with the result being that a mark may rub away or a label may peel off.

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Therefore, failing to use the correct system for a label could have the same impact as using the wrong label altogether.

A second aspect of the system approach is tight end-to-end control during manufacture. Production of polymer products can be influenced by many variables during manufacturing. Different temperatures, mixing rates, and quality of raw materials are all obvious examples – but the choice of equipment and the grain size of powder ingredients can also impact the performance of the end product.

The third trait of the system approach is testing. When a buyer opts for a label from a well-established supplier like TE, the material and printing system has been tested extensively. This gives the confidence that the label will remain in place and readable.

Testing and standards

TE's Panel Labels have been certified against the UL PGJ12 and PGJ18 standard, which cover printed or printable labels for indoor and outdoor applications in the US and Canada.

A noteworthy part of TE's testing was evaluating resistance to abrasion. In operation, when operators push buttons next to the labels, their gloved hands will often brush over the label surface.

In turn, the testing mimicked the many thousands of repetitions of this with test rig used a rubber finger mechanism that applies a defined force.

Resistance to UV light was also tested to ensure the labels will not fade in sunlight, and adhesion was tested across the range of temperatures that can be experienced in indoor industrial applications.

Format and application

In terms of format, the Panel Labels have been developed for industrial installers such as electrical cabinet manufacturers and panel builders. With the labels being suitable for curved bodies, manufacturers of mechanical parts and equipment may also be purchasers.

These buyers tend to look for products that offer good value and are available for large-scale applications, without needing to buy new hardware.

Because they spend their working hours in a fixed workshop, they can use their existing workbench printer to produce a few labels when they need them. There is no need for the special formats and mobile printers needed by electrical contractors working on site.

To prepare their labels, panel builders will typically call off the relevant codes from a Computer Aided Design (CAD) package and print a batch. The labels can be printed using a rapid thermal transfer printing technique and they are compatible with all TE's existing printers. TE has issued a software update for all its printers so they are pre-configured with the new part numbers, dimensions and print settings.

Once printed, the installer can simply apply the labels, with no need for additional tools and no need to drill the holes required for installation.

The labels are available in 11 sizes in either white or silver, as well as an option to order custom sizes.



Label printing

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Cost savings

Depending on the size and sophistication of an electrical cabinet or control panel, an installer may need 100 labels in multiples sizes.

Making up batches of traditional engraved plates and fixing them with screws or adhesives can be a time-consuming process that can take minutes per plate.

Switching to a product such as Panel Labels will save valuable seconds for every label. These seconds will multiply over each panel, each project and each week, saving many hours of effort and speeding up output.



Panel Labels can save minutes of installation time for every component

Trial packs

However, it's important that panel builders try out the labels themselves to judge whether they will be suitable for their customers, as well as ease of use and the potential time savings that can be achieved.

Therefore, TE is happy to supply sample packs of Panel Labels in silver or white for customers to try free of charge. Customers who would like a trial should search for 'sample request' on TE.com, register or log in and then submit an order form with the relevant part number. All packs contain a roll of 150 labels.

Part numbers for sample request on TE.com

TE Part Number	TE Part Description	Sample pack details
2335991-1	SAMPLE-PL-045015-0.15-8A	27 x 8 mm (1.0 x 0.3 inches) – silver
2335992-1	SAMPLE-PL-045015-0.15-9	27 x 8 mm (1.0 x 0.3 inches) – white
2335994-1	SAMPLE-PL-060030-0.15-8A	35 x 18 mm (1.4 x 0.7 inches) – silver
2335995-1	SAMPLE-PL-060030-0.15-9	35 x 18 mm (1.4 x 0.7 inches) – white
2335982-1	SAMPLE-PL-2027013-0.15-8A	45 x 15 mm (1.8 x 0.6 inches) – silver
2335983-1	SAMPLE-PL-2027013-0.15-9	45 x 15 mm (1.8 x 0.6 inches) – white
2335985-1	SAMPLE-PL-035018-0.15-8A	60 x 30 mm (2.4 x 1.2 inches) – silver
2335986-1	SAMPLE-PL-035018-0.15-9	60 x 30 mm (2.4 x 1.2 inches) – white
2339638-1	SAMPLE-PL-100050-0.06-8A	100x50 mm (3.9 x 1.9 inches) – silver
2339639-1	SAMPLE-PL-100050-0.06-9	100x50 mm (3.9 x 1.9 inches) – white

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About the author

Philippe Contri is global Product Manager for TE's label Identification products. Based in Grenoble, he oversees the development of labels for customers who want to identify products and components in the electrical, electronic, aerospace and defense, marine, rail and industrial sectors. He has extensive experience in industrial marking systems and labelling materials.

About TE Connectivity

History of TE Connectivity

TE Connectivity's legacy in cable identification dates back to the 1950s when Raychem, which has since joined the TE Connectivity group, first used the technique of radiation chemistry to develop products. Since then, the firm has undergone a number of changes of name and structure. These include the name of Tyco Electronics, which the firm bore until March 2011 when it took the name TE Connectivity to reflect its role as a component and communications manufacturer.

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