





USA / HEADQUARTERS



**The H-J Family of Companies** is a global leader in manufacturing and supplying products and solutions for the heavy electrical industry. These components support the **transformer, switchgear, regulator, recloser** and **breaker industries**, along with specialties in the utility market.

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## CHINA



## MEXICO



**Founded in 1969**, H-J is headquartered outside of St. Louis, Missouri, USA. The company maintains a global presence with offices operating in Brazil, Canada, China, Colombia, India, Mexico, the Philippines, Spain, Germany, the Netherlands, and throughout the United States, all which allow H-J to serve domestic and international customers. The H-J Family of Companies conducts business in more than 70 countries across all continents. The international operation as well as the multicultural company environment gives H-J a comprehensive understanding into the challenges of its global customers.

In addition to the two facilities just outside the St. Louis, Missouri area, H-J also has manufacturing facilities in Tianjin, China and Leon, Mexico.

H-J employs state-of-the-art manufacturing technology to produce a wide range of insulating components and non-ferrous castings such as brass, bronze, copper, and aluminum. As an engineered solutions company, H-J has a vast expertise in designing and manufacturing custom products to meet customer needs.

The H-J Family of Companies was founded on the very principles that set it apart in the industry today – the desire to supply its worldwide customers with high-quality products, delivered on time and at a competitive price. H-J is a vertically integrated manufacturer with in-house resources for product

development from concept to design, to testing and final production. These resources include electrical, mechanical and material flow simulation software, full tool and die design and manufacture, and a fully-equipped test lab for all electrical, mechanical, chemical and environmental test requirements. Continuous investment in operations and personnel has given H-J a worldwide reputation as a leader in the transformer and switchgear OEM markets.

In addition to component design and manufacturing, H-J offers a broad portfolio of products and strategic partner brands serving the transformer and switchgear OEM markets. H-J products are not only limited to bushings, connectors, and insulators, but also include fuses, breakers, switches, tap changers, valves, instrumentation and capital equipment for core and winding manufacturing. This is a tremendous advantage for customers that aim to simplify their supply chain process by purchasing all that they need from a single, reliable, and established company.

With thousands of available products in our portfolio and a willingness to customize solutions for our customers needs, The H-J Family of Companies truly is a one-stop source for the transformer and switchgear OEM markets.

**How can we make your life easier?**



BERLIN, GERMANY



BELO HORIZONTE, BRAZIL



MUNICH, GERMANY



LOUISVILLE, KENTUCKY, USA



GREATER NOIDA, INDIA



PORDENONE, ITALY



MEDELLIN, COLOMBIA



MEXICO CITY, MEXICO



SHANGHAI, CHINA



NOVI, MICHIGAN, USA



SAN SALVADOR, EL SALVADOR



DUBAI, UAE



DALLAS, TEXAS, USA

## H-J SOLUTIONS PORTFOLIO COVERS A VAST LIST OF PRODUCTS

- Bushings
- Insulators
- Connection equipment
- Mechanical protection
- Electrical protection
- Switching
- Valves
- Hardware
- Forgings and castings
- Machinery for transformer oems
- Transformers and switchgear
- Insulation components
- Consulting services
- Testing services
- And many more



## SERVICES

We take great pride in our team of highly skilled professionals, who are proficient in a wide array of fields, enabling us to offer an extensive range of services to our esteemed customers.

## MAINTENANCE

**The H-J Family of Companies** has a certified technical team trained to provide retrofit solutions, spare parts consultation, remote technical assistance, and preventive and corrective maintenance to ensure our customers can concentrate on their core business needs.

## TESTING SERVICES

Our laboratory allows H-J to stay at the forefront of our industry and further advance our product offerings through high-quality research and development.



## CONSULTING

- Protection coordination for distribution transformers (CSP and Pad-Mounted)
- Transformer components selection
- Transformers production line implementation
- Recommendation on machines to produce transformers
- Introduction to Pad-Mounted transformer design, production, and testing
- IEEE standards application for transformers
- Amorphous core implementation, including design, testing, and production support
- Design of distribution and small power transformers up to 50 MVA, 69 kV
- High-temperature component recommendation for 155°C class transformers in ester oil
- Transformer failure analysis
- Load analysis of transformers in operation.
- ***Wide range of standard insulation products for many switchgear applications. We specialize in consultation with OEMs and repair/maintenance suppliers to provide custom insulation product designs to meet the needs of their specific applications***

## TESTING CAPABILITIES

- Wet AC withstand
- Dry AC withstand
- Radio interference voltage
- Partial discharge
- Power factor
- Impulse
- Temperature rise
- Current rating
- Thermo cycling
- Tension
- Compression
- QUV accelerated weathering
- Differential scanning calorimetry
- Thermal imaging
- Contact resistance
- Cantilever
- X-Ray imaging
- Insulation resistance
- Glass transition temperature (T<sub>g</sub>)
- Torsion
- Bending
- Moisture content
- Density
- Viscosity
- Gel time

# H-J SOLUTIONS



## BUSHING & CONNECTION SOLUTIONS

As the leading worldwide bushing manufacturer and supplier, **The H-J Family of Companies** offers a complete range of bushing and connection solutions for transformers and switchgears. We manufacture bushings using porcelain, epoxy and thermoplastic insulation options for a wide array of distribution transformer, power transformer and switchgear applications. Our proprietary epoxy insulator materials can operate from -40°C to 155°C, depending on the material selected. This product line includes bushings, terminals and connectors and separable connectors.



10

## INSULATOR SOLUTIONS

H-J offers a complete line of NEMA A20 and A30 strength class switch and bus insulators from 5 kV through 46 kV class. We also manufacture a wide range of miscellaneous insulator solutions including customer proprietary insulators designed to customer specifications.



22

## PROTECTION SOLUTIONS

H-J can help you properly select and size the electrical and mechanical protective devices needed in your transformer designs. From fuse-breaker coordination to buchholz relay and pressure relief valve sizing.

Our electrical protection solutions include expulsion and current limiting fuses, breakers, and arresters. In contrast, the mechanical protection solutions include components with or without contacts, such as thermometers, oil level indicators, pressure-vacuum indicators, buchholz relays and much more.



25

## SWITCHING SOLUTIONS

**The H-J Family of Companies** offers various accessories for switching and regulating transformers and other electrical equipment.

Load-operated switches and tap changers for de-energized operation are selected according to the voltage level and current magnitude required for the equipment.



36

## VALVES, HARDWARE & LABEL SOLUTIONS

Explore H-J's valves, labels, and hardware options for transformer tanks and switchgear. These solutions enable our customers to deliver end products that meet technical specifications and improve their productivity. We can also develop custom solutions.



40

## PRODUCTIVITY SOLUTIONS FOR TRANSFORMER OEMS

The H-J Family of Companies can provide different lines of machines and tooling for transformer OEMs, such as: core cutting machines, coil winding machines, cold welders, oxygen – hydrogen welding systems, and more.



45

## SERVICE SOLUTIONS

The H-J Family of Companies is well known for providing various service solutions for our customers. We offer the following services:

- Testing services
- CNC machining services
- Designing of customized products



52

## RAW MATERIAL SOLUTIONS

The H-J Family of Companies can source your raw material needs, helping you avoid shortages of critical components.



57



# **BUSHINGS & CONNECTION SOLUTIONS**









# **BUSHINGS**

## **SOLID/BULK BUSHINGS**

A bulk or solid bushing consists of a central conducting rod available in copper or aluminum, which is encased by an insulator. The surrounding insulator can be manufactured from porcelain, epoxy or thermoplastic materials. The general voltage and current ranges are:

### **LOW VOLTAGE BUSHINGS UP TO 5kV CLASS**

This product line features a wide variety of bushings designed for use on the low-voltage side up to 5 kV class for liquid-filled transformer applications.

#### **PORCELAIN & THERMOPLASTIC LV BUSHINGS**

This product line offers voltage classes from 1.2 kV to 5 kV, with basic insulation levels from 30 kV BIL to 75 kV BIL and current ratings from 110 A to 7,500 A. Based on the application, insulator materials are available in epoxy, porcelain, and thermoplastics. Operating temperatures range from -50°C to 150°C. Internally (threaded shank) or externally clamped designs are available, depending on the application. A wide variety of internal and external terminal connectors are available like studs with nuts, washers, eyebolts, double eyebolts, spades from 1 to 24 holes and more. Standard conductor plating options are tin and silver. Consult factory for custom plating requirements. The terminal connectors can be adapted to suit customer requirements for easy installation in existing equipment. Conductor materials are available in copper and aluminum. Just as with our standard low voltage bushings, our metric versions come in similar options.

#### **EPOXY LV BUSHINGS**

This product line is designed for use as secondary bushings in liquid-filled transformer applications. Conductor materials are available in copper and aluminum. For the copper conductors, the bushings are constructed of C110 electrolytic grade copper with silver brazed connections for maximum conductivity.

#### **THERMOPLASTIC LV BUSHINGS**

These bushings are used in pad mounted transformers with typical application being a one-hole spade with 5/8" or 1" threaded stud.



# BUSHINGS

## SOLID/BULK BUSHINGS

### HIGH VOLTAGE BUSHINGS UP TO 34.5 KV CLASS

High-voltage bushing assemblies are offered from 8.7 kV to 30/34 kV and from 75 kV BIL to 200 kV BIL.

These bushings are provided with a clamp or a spring grip nut for internal mounting. Different types of terminals can be requested such as eyebolts or spades.

### POWER CLASS BUSHINGS / PORCELAIN

Power class bushings are offered from 8.7 kV to 46 kV and from 95 kV BIL to 250 kV BIL. These bushings have an integral flange that is used for mounting to the transformer.

### APPARATUS BUSHINGS / EPOXY

This series is made for use in both liquid-filled transformer and switch-gear applications in ambient temperatures ranging from -40°C to 105°C and voltage classes from 5 kV to 46 kV. These bushings are constructed of C110 electrolytic grade copper for maximum conductivity. The insulation is cycloaliphatic cast epoxy, rated for enclosed or outdoor applications. A wide range of products are available for various applications. Please consult your H-J representative to discuss your custom application.

### AIR TO AIR BUSHINGS

Our Air to Air bushing lines are offered in both cycloaliphatic epoxy or porcelain insulation options. Epoxy options cover 5 kV, 60 kV BIL through 46 kV, 250 kV BIL class with current ratings up to 6000 A in air. Porcelain bushing options are available from 15 kV, 110 kV BIL through 38 kV, 200 kV BIL class with current ratings up to 3000 A. Epoxy bushings are provided with integral mounting flange options for both stud mount and insert mounting. Porcelain designs are provided with an external mounting clamp for stud mounted applications. Epoxy bushings at 15 kV and above are coarse graded designs with internal ground shields for control of the electric field. Porcelain bushings are bulk designs using external semi-conductive shielded areas for mounting of CT's and control of the electrical field. Conductors are mainly constructed using C110 copper, but other options can be provided as needed. Terminations can be designed to customer requirements.



# **BUSHINGS**

## **PLUG-IN BUSHINGS / FOR SEPARABLE CONNECTORS**

Plug-in devices made for easy connection during replacements, testing, or maintenance. A variety of devices can be provided in different materials.



## **BUSHING WELLS**

200 AMP bushing wells are designed to improve the reliability of pad-mount transformers. The "Tuf Ex-Well" is the first bolted-design bushing well capable of being mounted directly onto the transformer without the use of a metal clamp ring. The gasketing system features positive gasket stops to ensure controlled gasket compression for maximum seal life.



## **DEADBREAK - INTEGRATED BUSHINGS**

Integrated bushings meet all the requirements of ANSI/IEEE Standards 386 Separable Insulated Connector Systems and combine the advantages of reliable one-piece designs with the operating features required for underground distribution switching. The bushing is designed for pad-mounted transformers, switchgear and other apparatus filled with transformer oil. We can provide integrated bushings for 200, 600 and 900 A, all in different materials depending on the applications.



## **SHEDMOUNT BUSHINGS**

Our design flexibility is reflected in the line of "Shedmount" bushings rated 200 A and 600 A with unlimited design variations. Electrical ratings: 200/600 A, 8.3 kV through 21.1 kV, 95 kV BIL through 150 kV BIL.



## **TEST BUSHINGS**

Elastomeric test bushings are designed for indoor production line testing, not outdoor or permanent installation. These are not suitable for partial discharge testing and must be kept clean to prevent interface and surface flashover. The test bushings require silicone dielectric grease on the interface, with a max installation torque of 180 in. lbs.



## **CIRCUIT BREAKER BUSHINGS**

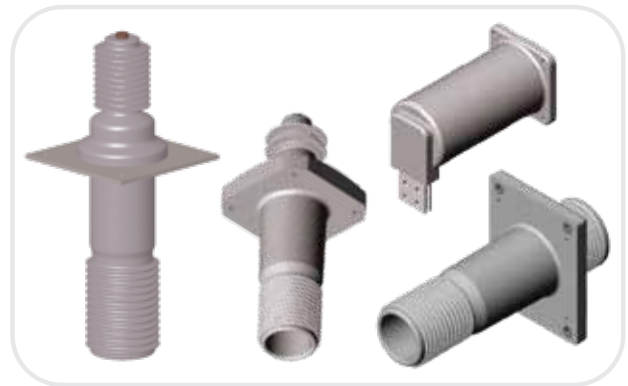
Circuit breaker bushings are designed for use in new, replacement and retrofit circuit breaker applications. We manufacture a comprehensive range of bushing designs for replacement and conversion applications for virtually all original equipment manufacturers. We specialize in the development of designs for any custom requirement.



## **PRIMARY DISCONNECT BUSHINGS**

Primary disconnect bushings are designed for use in switchgear applications ranging from 15 kV through 38 kV. All designs are manufactured using cycloaliphatic epoxy materials and are capacitive graded.

The disconnect bottle houses an integrally cast ground shield and a high voltage shield to control the electrostatic field. The internal shielding provides excellent partial discharge and stable power factor characteristics in comparison to the external coatings required on older porcelain designs. Access to internal ground shields is provided through flange mounting inserts or sleeves, eliminating the need for cumbersome external leads. The one-piece design provides rugged performance which is typically required in primary disconnect applications. H-J specializes in the custom development of replacement primary disconnect bottles for obsolete designs from all OEM's.



## **PORCELAIN INSULATORS FOR BUSHINGS**

We offer a wide range of electrical porcelain insulators from 1.2 kV LV bushing insulators for transformer applications to 750 kV hollow core porcelain typically used in instrument transformers or gas circuit breaker applications. Porcelain is available in grey or brown color and in C110 and C120 strength classes. Available porcelain bushing insulator designs are available for applications such as LV/HV transformer bushings, power class transformer bushings. Other miscellaneous porcelain designs are available for applications such as Cutouts, Arresters, Capacitors and Regulators. Contact your H-J representative to discuss custom requirements.



## **CT JUNCTION BLOCKS**

CT Junction Blocks are offered in various lead configurations. Several body styles are available including the option to be internally or externally clamped. Variable lead lengths with end terminations are also available.



# **BUSHINGS**

## **BUSHING HARDWARE**

Along with the complete assemblies, we offer several individual components as well. The nuts, gaskets, clamps, washers and more are available in most sizes.

### **SPRING-GRIP NUTS**

We offer special spring grip nuts used for internal fixation and internal installation of the transformer bushings for high and low voltage.

### **CLAMPS**

We provide different types of clamps for the correct installation of bushings. According to the isolation material or the product lines, we can offer one or two-piece clamps, round or square, and also in different materials according to your needs.

### **GASKETS**

Gaskets are supplied with most bushing assemblies. They are available in a wide range of materials to meet specific application requirements such as high or low temperature, environmental conditions etc.

### **NUTS/WASHERS**

Installation and assembly hardware is available for most of our bushing assemblies. Hardware is available in a variety of materials to meet the specific needs of the application. In most cases, hardware can be supplied in imperial or metric sizes.

### **ANTI-TRACKING DEVICES**

Anti-tracking kit is used on high voltage transformer bushings in contaminated areas made of 302 stainless steel with a nickel-plated brass grommet.



# **BUSHINGS**

## **TERMINALS AND CONNECTORS**

The H-J Family of Companies offers a wide variety of terminals and connectors for bushings and tanks, with customizable products tailored to the customer's needs. Ground connectors, eyebolts and lead blocks made of bronze, are available in an extensive range of cable sizes, from 10 AWG to 4/0 MCM, with external or internal threads and 2 or 4-way connections. All the terminals and connectors can be tin-plated if required.

### **AERIAL LUGS**

Aerial lugs are available in bronze and pure copper alloys. A wide range of configurations are available such as stud to cable, stud to flat and cable to flat. Cable size ranges from 6 AWG to 2000 MCM and stud sizes up to 4". Tin or silver plating are available. Many custom solutions are available. Consult your H-J representative for further information.

### **GROUNDING LUGS**

Grounding lugs are offered with various configurations such as 2-way or 4-way orientation, internal or external threads, eyebolt or vise style and metric or imperial dimensions.

### **SPADES**

Our spade terminals are offered in a variety of lengths, widths and thicknesses. Standards run from 2 holes up to 20 holes, but larger sizes are available. We also offer in-line or "G" spade styles, with or without tangs (an anti-rotation device), and imperial or metric dimensions. We can also produce blank terminals without any holes.

### **EYEBOLTS / TAP LUGS**

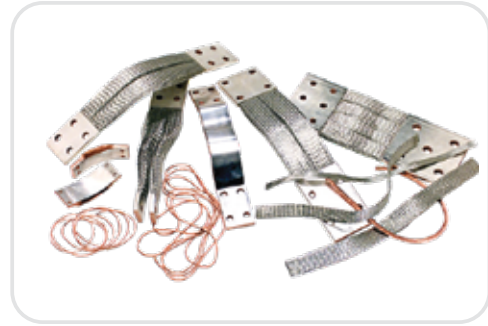
Eyebolts are a type of fastener that has a threaded shank with a circular loop or "eye" at one end. This eye allows for a secure attachment point for various applications.

The eye of the eyebolt can vary in size and shape. Some eyebolts have a plain circular eye, while others might have a more elongated or rectangular shape. The shape of the eyebolts can affect how it is used and what kind of connections it can accommodate.



## **FLEXIBLE CONNECTORS**

We offer flexible connectors for different applications such as: flexible links, flexible tinned copper braids, annealed copper stranded wire, laminated shunts and prefabricated braids.



## **LEAD BLOCKS**

Lead blocks are available in aluminum or copper and can be threaded or non-threaded.



## **SET SCREW BARS**

The set screw bars are devices used to make connections to the transformer bushings with cables of different sizes.



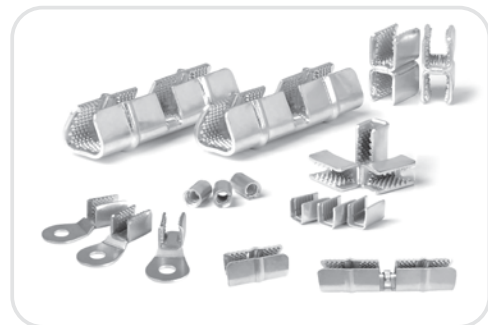
## **BUSHING TEST TERMINALS**

The H-J Bushing Test Terminal is designed to allow the isolation of electrical equipment for test purposes, without disconnecting the bushing from the circuit. Manufactured for compatibility with a wide range of bushings on equipment like transformers, circuit breakers, and similar apparatus, The H-J Bushing Test Terminal easily attaches to any standard apparatus stud or terminal.



## **COPPER & ALUMINUM CONNECTORS**

We offer connectors designed to join wires of different cross-sections, shapes, and materials. Available in a wide variety of types, they are compatible with any cable within their application range. They can connect all enamelled copper or aluminium wires—whether profile or round—and, when used according to the relevant guidelines, are also suitable for single-strand and multi-strand uninsulated wires.



## SEPARABLE CONNECTORS

H-J offers a wide range of separable connectors for various underground or surface applications. Of special note, H-J has developed separable connector designs with features specifically targeting renewable energy applications. These applications present special conditions requiring design features that mitigate the electrical and environmental challenges of these applications.

Our voltage ratings depend on the application required while meeting the IEEE Std. 386 and EN-50180, EN50181 & IEC 60502 standards for separable connectors.

## SILICON GREASES

Our silicon greases are lubricants that aid installation for test bushings and separable connectors while avoiding flashovers.

## BUSHING INSERTS

The H-J Family of Companies provides a wide range of bushing inserts that meet the standard IEEE Std 386, with voltage class ratings from 15 kV to 38 kV. We can provide a feed thru version, which provides the connection between the wells and the elbows in underground or pad-mounted applications. Voltage ratings depend on the application required and meeting the IEEE Std. 386 and EN-50180, EN50181 & IEC 60502 standards for separable connectors.

## ELBOWS AND T-CONNECTORS

Load break elbows and T-connectors are provided to offer a reliable connection on dead front pad-mounted equipment. Current ratings are from 200 to 900 A with voltage class ratings from 15 kV to 35 kV, depending on the interfaces in IEEE Std. and from 250 to 1,250 A with voltage class ratings of 24 kV to 42 kV, depending on the interfaces in applicable standards.

## SEPARABLE CONNECTORS ACCESSORIES

Different types of accessories are available to complement underground connections such as caps, standoff bushings, feed-thru inserts, test rods, ground bushings and junction points.



# INSULATOR SOLUTIONS





# **INSULATOR SOLUTIONS**

## **STANDOFF INSULATORS (SWITCH AND BUS INSULATORS)**

Switch and bus insulators are used primarily as bus supports in switchgear applications, dry type transformers and other custom applications. This series is available for outdoor and enclosed applications with voltage class ratings from 5 kV through 46 kV and temperature ranges from -40°C to +130°C. Our insulators are made of cast epoxy construction with integrally cast metallic mounting inserts.

Mounting configurations are NEMA standards and are available in any insert configuration.

The deep shed design offers generous creep distances. Our conical design provides superior mechanical loading characteristics. The epoxy material is self-extinguishing when exposed to continuous arcing or a constant heat source.



## **THRU WALL WINDOW BUSHINGS**

Wall bushings are designed for usage in bus entrance and cell transition insulation in switchgear applications. Numerous window configurations are available to suit most bus sizes. Wall bushings can be used in direct mounting to conductive surfaces or in conjunction with other insulating materials for higher voltages. Styles are available for both direct flange mounting, by way of through holes in the epoxy insulation, or mounting to GPO panels, by way of assembly to the grooved epoxy bushing body. Designs are available for single and dual windows as well as integral three phase designs.



# PROTECTION SOLUTIONS





# PROTECTION SOLUTIONS

## ELECTRICAL PROTECTION

### FUSES

Fuses are safety devices used to protect electrical circuits from overloading or short-circuiting. They consist of a metal wire or strip that melts when exposed to excessive current, interrupting the circuit and preventing damage to connected devices or potential fires. Once a fuse is blown, it must be replaced to restore the circuit's functionality. Explore the fuse options we offer below, as well as fuses for special applications and spare parts.



#### CURRENT LIMITING FUSES

The current limiting fuse provides partial-range fault protection. This type of fuse is defined in IEEE C.37.40-2003 as a "backup current limiting fuse capable of interrupting all currents from the rated maximum interrupting current down to the rated minimum interrupting current". Since it is a partial-range fuse, another over-current protective device must be used in conjunction to provide protection through the complete range.



#### EXPULSION FUSES

Expulsion fuses can be used to complete the range of protection of the transformer in coordination with the secondary circuit breaker or with a current limiting fuse, depending on the application.



#### Bay-o-net Fuses

Fuse links, or bay-o-net fuses, protect distribution transformers against damaging currents and protect distribution systems from failed transformers.

Fuse links are used on single-phase conventional and self-protected distribution transformers rated through 500 kVA, and on three-phase transformers rated through 1500 kVA.



#### Oil Immersed Expulsion Fuses

We offer expulsion fuses in oil-filled applications for installation with the high voltage bushing.

## **FULL RANGE FUSES**

A full range fuse is capable of interrupting any continuous current from the minimum current that can cause melting of its elements, to its rated maximum interrupting current, all in the same sealed body.

## **FUSE HOLDERS**

Fuse holders are devices that support or contain a fuse to provide dielectric distance between the live parts of the fuse and the ground. We provide four different types.

### **Bay-o-net Fuse Holders**

Bay-o-net fuse holders are used to hold oil-immersed externally replaceable bay-o-net expulsion fuses in pad-mounted applications up to 23 kV, 150 kV BIL.

### **Drip Shield**

These devices are provided to prevent or avoid the spill of oil during the operation of the bay-o-net fuse holder while replacing the bay-o-net fuse.

### **Current Limiting Fuse Holders / Mounting Blocks**

Used to hold oil-immersed non-extractable current limiting fuses in pad-mounted applications up to 34.5 kV, 200 kV BIL.

## **PROTECTIVE LINK EXPULSION FUSE**

The protective link is an oil-immersed expulsion type fuse designed to be mounted in series with the high voltage winding of 38 kV class, delta connected, or 46 kV class, grounded wye connected transformers.



### **Dry Fuse Holders (Canister)**

A fuse-holder for dry-type or oil-immersed applications used to contain a full range current limiting fuse in pad-mount applications up to 21.1 kV. It comes in the following versions:

- Standard applications up to 21.1 kV class, 150 kV BIL.
- Submersible applications up to 21.1 kV class, 150 kV BIL.
- Load-break up to 14.4 kV 3 ph, 95 kV BIL and 15.2 kV 1 ph, 125 kV BIL.



### **OTHER FUSES**

*Couldn't find the fuse you need? Talk with our international sales representative on fuse solutions for special applications.*

### **Isolation Link**

A link is used in series with bay-o-net expulsion fuses to provide extra protection during re-fusing operations. They are designed to operate at currents that exceed the one-shot rating of the expulsion fuse used in pad or vault type transformers. The isolation link will melt during transformer failure, so the opened primary circuit of a failed transformer cannot be re-energized by the line crew.



### **NH**

NH fuse-links 800 VAC were engineered and designed specifically for photovoltaic systems. gR types are full range breaking capacity fuse links used to protect cables and equipment. They can interrupt any fault current, from overloads up to their breaking capacity, or can be used alone as protection. They are the perfect protection solution when used with DC/800 VAC solar inverters.

This fuse range is offered along with Mersen 800 VAC fuse-switch-disconnectors, for complete fuse system protection.



## **LV CIRCUIT BREAKERS AND ACCESSORIES**

*Oil-immersed secondary circuit breakers are designed for usage as part of a protection package for either single or three-phase distribution transformers. The breaker is electrically located between the transformer's low voltage coil and the low voltage bushings to provide protection against overloads and secondary faults.*



## **BREAKERS**

We offer single-phase and three-phase circuit breakers for installation on the low-voltage side of CSP type transformers to protect against external overloads and short circuits. These circuit breakers have an indicator light and a lever for external operation. These circuit breakers are coordinated with the expulsion fuses to ensure complete and selective protection. A coordination program is available on our website to select these accessories according to the characteristics of the transformer.

## **OVERLOAD SWITCHES**

Overload switches are used in oil-filled transformers. This switch turns on a light, signaling the transformer is overloaded. However, unlike a circuit breaker, it will not disconnect the transformer.

## **SIGNAL LIGHTS**

Signal lights serve as a visual that the transformer is thermally overloaded. The light will remain on until you reset the circuit breaker.

## **ARRESTERS**

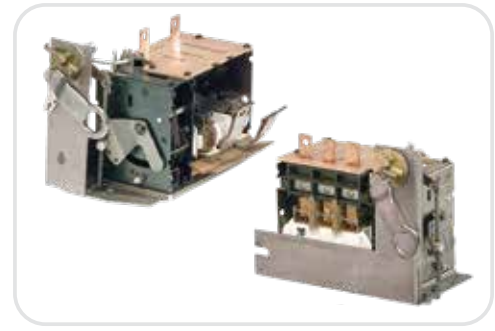
Arresters are a safety device designed to prevent or limit the potentially damaging effects of sudden voltage spikes or surges in electrical systems, such as those caused by lightning strikes or other power disturbances. It redirects excessive electrical energy away from sensitive equipment, protecting them from damage or malfunction.

## **HV OIL-IMMERSED INTERRUPTER**

Overcurrent protective device that protects the oil-immersed distribution transformer from damaging overloads and secondary faults, and is also used for switching the transformer on and off.

## **DISTRIBUTION ARRESTERS**

Distribution arresters are a protective device used in electrical distribution systems to safeguard equipment and circuits from voltage surges. It diverts excess electrical energy caused by lightning strikes or other power anomalies away from the distribution network, preventing damage to connected devices and ensuring stable operation of the system.



## ***SUBSTATION ARRESTERS***

Substation arresters provide protection against voltage surges and transients that can result from lightning strikes, switching operations, or other disturbances in the power grid. These arresters are designed to divert excessive electrical energy away from sensitive substation equipment and transmission lines, preventing damage to transformers, circuit breakers, and other critical components.

### ***Surge Counters***

Surge counters are installed with the station arrester to monitor the leakage of current over the arrester housing.



## ***UNDERGROUND ARRESTERS***

Designed to provide shielded, dead-front arrester protection for underground systems, the underground arresters limit over-voltages to acceptable levels, protecting equipment and extending service life.



## ***LOW VOLTAGE ARRESTERS***

Low voltage arresters for light duty distribution class requirements; its primary application is for protection of the secondary side of pole or pad-type distribution transformers.



## ***OIL IMMERSED ARRESTERS***

Oil immersed arresters are designed to be installed inside a distribution transformer, immersed in an insulating liquid. This arrester can be used when the maximum temperature does not exceed 125°C, and when the weighted average temperature does not exceed 90°C. The under-oil arrester is designed to limit surge voltage by discharging the surge current to ground.



# PROTECTION SOLUTIONS

## MECHANICAL PROTECTION

### OIL PRESERVATION SYSTEM

Our oil preservation system protection device was developed to be of the highest quality with the following characteristics:

- Minimized fittings for enhanced leak prevention
- NEMA 3R enclosure with durable ANSI 70 gray powder coating
- Stainless steel floor for cylinder damage prevention
- Very flexible stainless steel armored high-pressure hose
- Check valve on high-pressure hose for easy cylinder replacement
- Designed to meet IEEE C57.12.10 and C57.148 standards
- Customizable cabinet design for versatility
- 5-6 week lead times for standard single-cylinder system

### IMPACT RECORDERS

We offer an extensive range of load monitoring products adapted to your situational risks. The Monilog line of data recorders will monitor conditions during transport of your equipment worldwide.

- SE-MONIOLOG.SDC2
- SE-MONIOLOG.MSHOCK
- SE-MONIOLOG.SDC2PLUS
- SE-MONIOLOG.ENDALS
- SE-MONIOLOG.ENDAL
- SE-MONIOLOG.CALIBRATE

### WILDLIFE GUARDS

With the goal of keeping wildlife safe and electrical system reliable, The H-J Family of Companies offers a wide range of wildlife guards for use on medium voltage transformer bushings and other electrical equipment as well as lightning arresters. Our experts can guide you in selecting the wildlife guard that best suits your needs.

### INSTRUMENTS WITH CONTACTS

We offer protection and measuring devices for transformers, which increases the system's stability and confidence in the longevity of the transformer. These instruments protect and limit the risk of damage in the transformer induced by abnormal variations in current, voltage, oil level, temperature, gas generations or humidity levels.



### **OIL TEMPERATURE INDICATORS WC**

We offer bimetal thermometers complying with DIN 16160 for oil immersed distribution transformers having either one or two adjustable contacts (normally open or changeover) for alarm and/or trip signals. The thermometer can be mounted through a threaded connection available in 1/2", 3/4" or 1". This device includes a resettable indicator for maximum temperatures with an oil temperature scale from 10°C to 140°C. The thermometer's normal operation conditions have an ambient temperature between -40°C and 70°C. The bimetal thermometer body is made of diecast aluminum and coated with C4 corrosion-resistant powder coating (C5-M available per request) with protection degree IP65.



### **OIL LEVEL INDICATORS WC**

We offer magnetic oil level indicators that comply with DIN 42569 and are available in radial or axial float movements with various float lever lengths depending on the transformer design. The signaling switches are offered in one or two normally open contacts or one, two, or four changeover contacts. The oil level indicator body is made of diecast aluminum and coated with C4 corrosion-resistant powder coating (C5-M available per request) with protection degree IP65.



### **BUCHHOLZ RELAYS WC**

The Buchholz relay complies with EN 50216-2, and is available for different pipe sizes (25, 50, or 80 mm), connections (threads, round, or square flange) and oil flow rates depending on the size & the design of the transformer. The signaling connection scheme is also eligible for two or four contacts, normally open or changeover type. The relay is made of diecast aluminum housing with UV-resistant C4 powder coating (C5-M available per request) with protection degree IP65 for the highest level of UV and corrosion resistance. An optional gas sampling device is available to be installed at ground level for easier gas sampling.



### **TRANSFORMER PROTECTION RELAYS WC**

Our transformer protection relay offers installation in the cover of hermetically sealed oil-filled distribution transformers and reactors, it complies with EN 50216-3 and offers four functions in one reliable device making it an excellent cost/benefit solution.

The transformer protection relay is capable of measuring oil temperature, indicating oil level and gas accumulation and detecting the internal pressure when exceeding a set limit. All variables have contacts for signaling.

The relay features a diecast aluminum housing with UV-resistant C4 powder coating (C5-M available per request) with protection degree IP65 for the highest level of UV and corrosion resistance.



## **INSTRUMENTS WITHOUT CONTACTS**

The H-J Family of Companies is pleased to offer an extensive line of instrumentation (thermometers, pressure vacuum gauges & liquid level gauges). This line of instrumentation allows us to offer a complete package of components and accessories to our valued customers. Each instrument is made to H-J's exact specifications and is in full compliance with all existing industry standards including IEEE and ANSI. Extensive quality assurance procedures ensure the accuracy and quality of each instrument.

### **OIL TEMPERATURE INDICATORS W/O**

Our thermometers are made for indoor or outdoor applications. The system, case & bezel are all made of stainless steel. The thermometer mounting thread and standard well are constructed of brass, while a clear, molded polycarbonate is used for the lens. Magnetic coupling is used to reset the maximum indicator, which maintains the unit's seal. Each thermometer comes with a thermowell that mounts onto the transformer tank, making an oil-tight connection. Both long and short stem thermometers and wells are available.



### **VACUUM/PRESSURE INDICATORS W/O**

Our vacuum pressure gauges offer extended years of service life in both indoor and outdoor environments. Corrosion resistant materials are used on all internal mechanisms for prolonged protection. The vacuum pressure gauges includes a 3-1/2" dial with white characters on a black background for clear visibility. In addition, a breather hole on the bottom of the case allows the gauge to function accurately while being exposed to constant atmospheric pressure.



### **OIL LEVEL INDICATORS W/O**

The H-J "dual mount" liquid level gauge is composed of a dial face with minimum and maximum markings. The internal float and external indicator are separated by a solid hermetic seal and are linked and operated by means of a magnetic field, eliminating any possibility of leaking. The dial face has a black background with a white indicator and characters for clear visibility. The "dual mount" feature allows the liquid level gauge to be externally or internally mounted. For external mounting it features a flange with 4 holes on a 2-1/2" bolt circle, suitable for use with 1/4" weld studs, providing interchangeability with other leading brands. The gauge can also be mounted internally by means of a threaded case design using a standard steel hex nut. Mounting requires a standard tap changer, DV switch or LBOR switch hole. This feature eliminates the need for welded studs and the use of backup flanges, thus reducing cost and installation time. A Buna-N gasket is provided for an adequate seal. Both bent float and straight float versions are available.



**Features:**

- For use on new or retrofitted units
- External or internal mounting
- UV stabilized polycarbonate lens
- Aluminum and brass components
- Easy to read dial with white characters on black background
- Indoor and outdoor applications

**DEHYDRATING BREATHERS W/O**

The dehydrating breathers comply with DIN 42567 and 42562, and are available from 0.5 to 4.8 kg for an approximate volume of 600 - 5,400 Gal with different mounting types. Housing parts are covered with UV-resistant C4 powder coating (C5-M available under request).

**TRANSFORMER COOLING FANS**

We offer cooling solutions when requested for medium and large distribution transformers. Different technologies and options can be reviewed with our experts according to your needs.

**AC FANS**

We offer axial fans for transformers developed with asynchronous motors. They have upgraded efficiency and low noise.

**EC FANS**

Our EC fans were designed for higher technological requirements to reduce noise, energy consumption, and rates of usage.



# SWITCHING SOLUTIONS





# SWITCHING SOLUTIONS

## SWITCHES

### DUAL VOLTAGE SWITCHES

We offer accessories used for voltage change in transformers with dual voltage in the medium voltage winding. These two-position dual voltage tap changers, which can be operated without voltage, can be used in single, two or three-phase systems, with series voltages up to 35 kV, BIL 150 kV and current capacities up to 300 A.



### LOADBREAK SWITCHES

These two-position, load-operated switches can be used for wall mounting on pad-mounted transformers or cover mounted on submersible transformers. Available for single, two, or three-phase systems, with voltage ratings up to 38 kV, BIL of 150 kV and current capacity of 300 A.



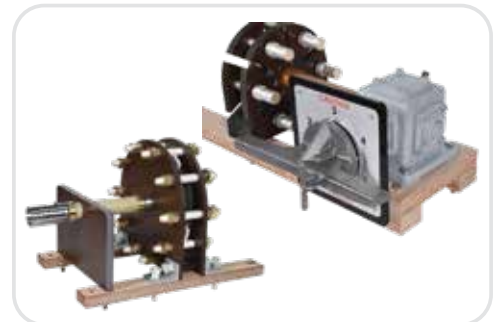
### ARRESTER DISCONNECT SWITCHES

The arrester disconnect switches are designed for use in transformers equipped with an internal under-oil arrester and are used to disconnect when testing.



### SPECIAL APPLICATION SWITCHES

If your design requires a non-standard switch, let our team of experts know and we'll help you find the ideal solution.



### SWITCHES ACCESSORIES

We offer any replacement accessories you need such as nameplates, gaskets, and others.

1. Hot stick handle
2. Lever handle
3. Handle screw
4. Locking screw
5. Indicator plate
6. Mounting nut
7. Gasket



## **DE-ENERGIZED TAP CHANGERS**

### **ROTARY TAP CHANGERS**

Our rotative tap changers have voltage levels up to 38 kV, BIL 200 kV and maximum current ratings up to 300 A (6 decks parallel applications). Available from 1 to 7 decks, these tap changers are used in distribution transformers with normal and special applications. Our team is here to help guide you on the use and benefits of this product.



### **LINEAR TAP CHANGERS**

Our linear tap changers are available in six different types that cover a range from 5 to 63 kV, 75 to 325 kV BIL, from 10 to 1,250 A, and from 2 to 11 positions, with various options such as connection diagrams delta, star, series-parallel coupling, star-delta coupling and more.



### **SPECIAL APPLICATION TAP CHANGERS**

If your design requires a non-standard tap changer, let our team of experts know and we'll help you find the ideal solution.



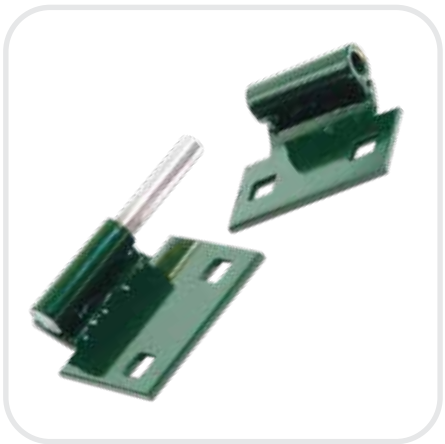
### **TAP CHANGERS ACCESSORIES**

We offer any replacements accessories you need such as nameplates, gaskets, handles and others.



**VALVES,  
HARDWARE &  
LABEL  
SOLUTIONS**





# VALVES, HARDWARE & LABELS SOLUTIONS

## VALVES

### DRAIN VALVES

We maintain a large inventory of drain valves and accessories, while offering a variety of custom-manufactured valves for transformer and switchgear applications. Valves can be ordered with "custom" installed pipe plugs, nipples and flanges.

In addition, we can furnish various pre-applied thread sealers and thread lockers on the valves, plugs and nipples. Among these products are: Vibra-Seal 516 from Loctite Corporation, SAF-T-LOK S90 from SAF-T-LOK Chemical Corporation and others.

### GLOBE DRAIN VALVES

The brass body globe sampler valves are designed for sampling, filling, or draining coolant from an electrical apparatus. The drain valve with sampler has an integral sampling device on the outlet side of the valve.

All gaskets throughout the valve are made of "Viton" for compatibility with all insulating fluids. The large port opening ensures minimum flow resistance. Drain valves with samplers are available in 1" and 2" sizes and are rated at 200 lbs. WOG. Drain valves are also available in stainless steel.

### SAMPLING DEVICES

The sampling device has a protective cap. When the cap is removed, a fitting on the drain outlet controls flow of the coolant sample. It can take the sample either directly from the sampler, or a hose extension may be attached to the 5/16" male thread on the end of the fitting. The parts are made from rod brass. The inlet is 3/8" thread.

### OTHER DRAIN VALVES

If you need additional types of drain valves according to your applications, our sales team can help.



## **SCHRADER VALVES**

Schrader valves are typically used in pad-mounted transformers and hermetically sealed transformers with a gas cushion. They are normally installed on the oil-filling plug or the oil-filling valve. They are used to pressurize the transformer with air or nitrogen after the oil-filling process.



## **RADIATOR VALVES**

Radiator valves are designed to allow the cooling liquid to flow while transporting oil-filled transformers or during repair or replacement. When the valves are in the open position, they easily allow the transformer's refrigerating liquid to flow to and from the radiators with little resistance. These valves are also used along with the Buchholz relay to allow for its disassembly in case of replacement or maintenance.



- Dual Flange
- Round Wafer
- Weld On
- Square Flange Wafer

## **TANK & ENCLOSURE HARDWARE**

### **HINGES**

We offer hinge pins for pad-mounted transformers with the possibility for customization.



### **LATCHES & PENTA BOLTS**

Latches and Penta bolts for pad-mounted transformers can be provided according to the standard models we have or can be customized in cases with unique dimensional requirements.



### **SOCKETS AND WRENCHES**

#### **HYDRAULIC PRESSES & HYDRAULIC HEAD**

Battery-powered hydraulic press with interchangeable hydraulic head for quick, reliable crimping of aluminum and copper connectors.



## TRI-PENTA WRENCH

### Main Uses:

- **Screwdriver** – 3/8" screwdriver for opening the primary door on 3 phase transformers
- **Removable Penta Wrench** – Designed for opening all transformers & switch gear
- **Hand Hole Lid Lifter** – Built-in design for lifting hand hole lids.

## TANK PLUGS

We offer a 3-in-1 interchangeable tank plug that is designed to fit three different tank hole sizes, eliminating the need to stock various different tank plugs. It can be used in lieu of filling a gap or void after removing a low voltage bushing, tap switch, etc. They are constructed of aluminum and furnished with the mounting cup, bolt and gaskets. The common tank hole sizes for this plug is: 1.06", 1.295", and 1.437".

## PIPE PLUGS

Pipe plugs are used as additional accessories in drain valves. Pipe plugs can be offered in brass or stainless steel, and come in 1" or 2" sizes, NPT.

## TRANSFORMERS WHEELS

Our Transformer wheels in accordance with DIN42561/EN50216-4 are used for distribution transformers. Types and diameters available are:

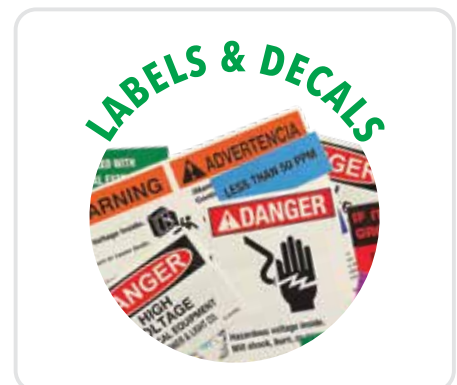
- **Flat and rail type wheels:** 125, 160, 200 mm
- **Solid type wheels:** 50, 70, 80, 90 mm
- **Load capacity available** from 1,200 kg. and up to 6,000 kg.

## LABELS & DECALS

Labels and decals are very important features of transformers. It's crucial to find the right labels and decals, made to meet the demands of a rugged world. As such, our industrial label and decal manufacturer is known as one of the world's leading harsh environment decal producers, offering long lasting and durable products. They have invested years in combining the best inks, adhesives, materials, and laminates for the highest quality of decals in the industry.

## TRANSFORMER OIL LEAK REPAIR

We offer effective solutions for leakages in the field to apply in small gaps, irregular surfaces, and big surfaces, while being cured in 24 hours.



**PRODUCTIVITY  
SOLUTIONS  
FOR  
TRANSFORMER  
OEMs**





# PRODUCTIVITY SOLUTIONS FOR TRANSFORMER OEMs

## CORE PROCESSING EQUIPMENT

### UNICORE CORE MACHINES

To improve the efficiency of transformer core technology, we are offering the best solutions for producing wound cores, Unicore, which is widely used in distribution and renewable energy transformers.

#### WOUNDED CORE CUTTING MACHINES

- Single and Three Phase
- Low Destruction Factor Cores
- DUO Cores
- Distributed Gap / DG Cores
- Cruciform
- Stepbutt
- Butt Cores
- Gapped Cores
- Uncut Core
- Straight Laminations
- Toroidal cores
- Includes Decoiler & Dust Collection System



### BRAZING & WELDING SYSTEMS

#### OXYGEN-HYDROGEN SYSTEMS

- Distilled water as fuel
- No storage of gas
- Multi-operator setups
- No high pressure tanks
- Easy to use / fully automatic
- Safe operator system
- Gas generated develops very high temps (3650 C) and can braze all non-ferrous materials quickly compared to traditional systems.
- Gas produced is perfectly mixed and does not required operator adjustment.



## **CUSTOMER CARE**

### **FIELD SERVICES**

Whether it's retrofitting for enhanced efficiency, sourcing vital spare parts, navigating complex technical challenges remotely, or implementing rigorous maintenance measures, our certified technical team is ready to keep your operations running. H-J is proud to offer services of:

- Commissioning
- Maintenance
- Training
- Trouble shooting

### **SPARE PARTS**

At H-J, we keep various common machine components on hand, ready to ship as needed. We are here to help identify spare parts, including spare parts packages.

### **RETROFITS**

Talk to our team to see how we can retrofit your older machines to improve longevity, functionality, and maximize your investment.

### **REMOTE ASSISTANCE**

We provide remote assistance for troubleshooting machine problems and issues.

## **BUSSBAR PROCESSING EQUIPMENT**

Fast and precise Cutting, bending, Drilling and Offsetting of Aluminum and Copper busbars.

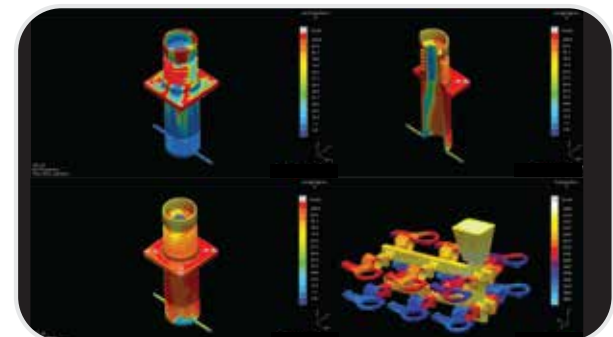
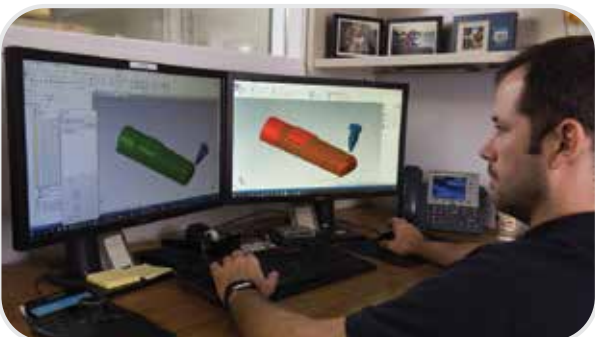
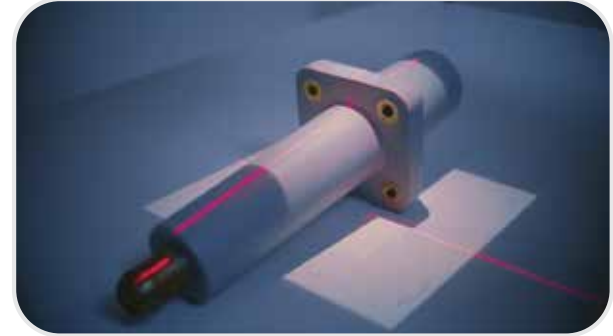
Our offer includes bending machines, bending and punching machines, guillotines, cutters, pressed nuts and complete stations for processing busbars and packages.



# **SERVICE SOLUTIONS**







# **SERVICE SOLUTIONS**

## **TEST LABORATORY**

### **ELECTRICAL TESTS**

**We offer various electrical tests in our test laboratory:**

- Contact Resistance: 10-200 A DC
- Insulation Resistance: 5 kV DC
- Partial Discharge: 0-125 kV
- Power Factor: 10 kV
- Impulse: 600 kV
- Current Rating: 0-20,000 A Single Phase (4-10 kV Secondary)
- Wet AC Withstand: 0-350 kV AC
- Dry AC Withstand: 0-350 kV AC
- Radio Interference Voltage: 0-125 kV

### **THERMAL TESTS**

**We offer various thermal tests in our test laboratory:**

- Thermo Cycling: -70°C - 170°C
- Thermal Imaging: -20°C - 650°C
- Glass Transition Temperature (Tg): -20°C - 650°C
- Differential Scanning Calorimetry (DSC): -70°C - 600°C
- Temperature Rise: 0 - 20,000 A Single Phase (4 - 10 V Secondary)

### **MECHANICAL TESTS**

**We offer various mechanical tests in our test laboratory:**

- Compression: 300 - 30,000 lbs
- Cantilever: 300 - 30,000 lbs
- X-ray Imaging: Digital Panel
- Tension: 300 - 15,000 lbs
- Torsion: 300 - 30,000 lbs
- Bending: 300 - 30,000 lbs

### **ENVIRONMENTAL TESTS**

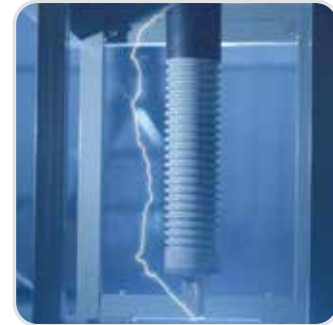
**We offer various environmental tests in our test laboratory:**

- QUV accelerated weathering: UVA - UVB irradiance control with condensation

### **CHEMICAL LABS**

**We offer various chemical tests in our test laboratory:**

- Moisture Content: For solid by weight differential
- Density: For liquids
- Viscosity: Viscosity profile vs temperature for liquids up to 100,000 cPS
- Gel Time: For polymers up to 500 F



# **DESIGN OF CUSTOMIZED PRODUCTS**

Our team of design experts are here to help tailor the perfect solution to fit your industry's needs. We offer custom designs for products for the transformer and switchgear industry. Contact us and we'll work together to build your projects.

# **CNC MACHINING SERVICES**

We utilize state of the art CNC machines and technology in the manufacture of our products to achieve the highest accuracy, precision, and finish. Talk to our team to see how our CNC services can help you.

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# **RAW MATERIAL SOLUTIONS**



# RAW MATERIAL SOLUTIONS

## ELECTRICAL INSULATOR PAPER

### KRAFT

Tertrans N is manufactured from high-grade sulphate pulp and has excellent thermal endurance properties. Tertrans E is specialized for conductor insulation in high-voltage transformers and bushings. Tertrans I is a specialized grade for extra high-voltage transformers and bushings.

### CREPE

We offer a great variety of crepe papers by adapting the physical and electrical properties of base paper used, the degree of creping, and the finish of the crepe, i.e. calendered or uncalendered. Tertrans crepe paper is available with all base papers, such as tertrans N, E, I and T.

### THERMALLY UPGRADED

Tertrans T is a thermally upgraded paper, which has a higher temperature class and therefore provides a longer lifetime in a transformer. The temperature class of tertrans T is 120°C. ANSI/IEEE C57.100 heat stability criteria are met.

### DIAMOND DOTTED PAPER

Diamond dotted paper is manufactured only on world-known tervakoski tertrans base paper with the highest purity values in the industry to meet the most demanding end-uses.

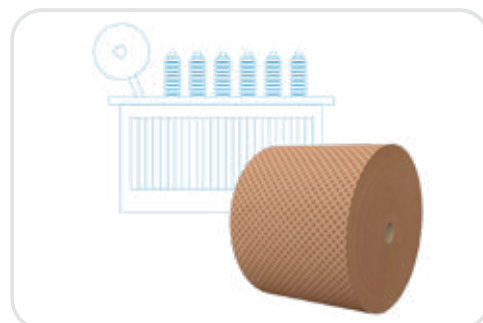
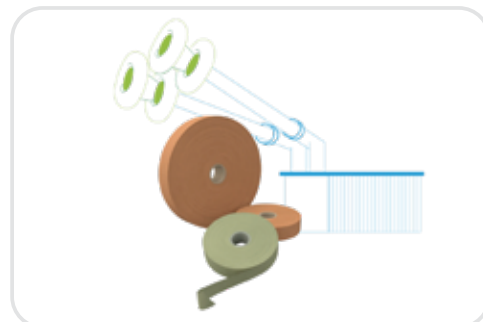
### CAPACITOR PAPER

Tercon electrolytic capacitor paper is recommended for aluminum electrolytic capacitors and other applications. Tersep KX is a special wrapping paper for high-voltage capacitors.

## ALUMINUM & COPPER CONDUCTORS

### BUSBAR

- Copper: Various sizes available
- Aluminum: Various sizes available



## FOIL

- Copper strips: Various sizes available
- Aluminum strips: Various sizes available

## WIRE

- Distribution and control core transformers machine.

## AMORPHOUS CORE

For oil-immersed and dry-type transformer manufacturers, we offer the option to optimize with the use of Amorphous Core designs. Amorphous Cores are manufactured from Metglas Inc materials (2605 A1 or 2605 HB1M), with proven consistent product quality to meet the stringent efficiency standards in today's transformer markets.

### 1. Oil Immersed

- Up 35 kV; 5,000 kVA
- Single phase pole or pad-mounted.
- Three phases, three leg or five leg core construction.

### 2. Dry type

- Up 35 kV; 6,500 kVA (3 layers, 6.5 MT)
- Three phases, three leg or five leg core construction.

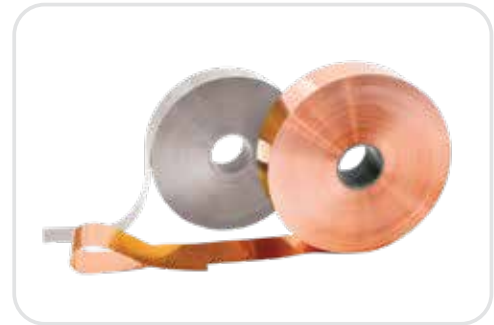
## FLUIDS

### ALPHA FLUIDS

Alpha Fluid is an ultra-pure, ultra-clean, fire-resistant insulating oil designed to enhance the fire safety of transformers. It serves as a one-step retrofill solution for upgrading the fire resistance of standard mineral oil transformers, making it an ideal choice for both retrofilling and original fills.

### BETA FLUIDS

Beta Fluid is a fire-resistant insulating oil designed for use in transformers and switchgears. Made from highly refined petroleum oils, Beta Fluid has become the industry standard for fire-resistant oils.










## OUR PROMISE

With our portfolio of solutions and services, The H-J Family of Companies will simplify the lives of our customers. We are committed to being creative, innovative, competitive, hardworking, ethical and responsive while providing outstanding customer service through our talented team.

The H-J Family of Companies is proud of our "Quality Products of International Reputation."

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