Thermal Designs®
K-MASS® FIREPROOFING

Frequently Asked Questions About K-MASS® Fireproofing and It's Application

In general it can be said that all metal exposed to a hydrocarbon fire becomes a heat sink available to store and transfer heat energy.

Fireproofing is the science of reducing heat transfer to a specific rate below the failure point of the equipment being protected. Factors affecting heat transfer rates are mass, temperature difference (Delta T) and time. Heat transfer is expressed in Btu/ft²/hr.

Evaluation of what requires fire protection and what does not becomes somewhat of a practical decision once the fire zone is defined. API 2218 is a good source of information for fire zone definition. Typically critical controls are those items that operate in a control circuit allowing liquids to be shut in, de-inventoried, re-routed or removed from the fire zone during fire and are considered components of the critical control loop. These items may be actuators, valves, switches, electrical junction boxes, power cable, instrumentation, air tanks (instrument air storage), cable tray (non-fireproof cable), solenoid valves (pneumatic, hydraulic, electric), conduit, fittings, heat exchangers, pumps, vessels and other process equipment deemed critical to minimizing the loss of product, property, personnel and profits.

K-MASS® Intumescent Passive Fireproof Coating is a unique method of fire protection in that the material is molded to the critical control components requiring only a minimum amount of installed space as an insulation material. Due to the intumescent properties of **K-MASS**®, a nominal 1/2" coating becomes a 3-4" insulating char when exposed to fire. This insulating char retards the heat transfer significantly.

Thermal Designs, Inc formulates **K-MASS**® and applies it at a thickness designed and tested to provide 30 minutes of protectiom at 2000° F. **K-MASS**® is molded on to each part of the equipment being protected that may require removal for maintenance or periodic inspection. The only way to open a flame path is to remove a component. In most cases, a part removed will require shutdown of the Critical Process Control Equipment (CPCE) or the whole loop. It is for this reason the **K-MASS**® has gained a reputation as being "People Proof". If the parts remain installed, the CPCE is fireproofed.

A number of questions arise prior to, during and after **K-MASS**® coating. Provided below are several common questions and answers:.

Do all the components in a valve stack get K-MASS® Coated?

Typically, fireproofing is required on the valve stack including the valve, valve bracket, gear, gear or actuator bracket, actuator, and limit switch. The bottom of the valve-mounting bracket is not **K-MASS**® coated unless a drawing of the valve mounting or the valve is provided.

In almost all cases TDI never sees a valve. The bottom of the plate may be coated in the case of a large actuator with a Butterfly valve where the bracket is large and the valve-mounting pad is small. In a fire the **K-MASS**® will intumesce and form insulative char around the protected component.

Brackets of the square tube type require manufacture of end plates allowing the flame paths to be sealed providing protection of the valve-packing gland, valve stem adapter or extension and the bottom of the next component of the stack.

A component of the stack is never bolted directly to the **K-MASS**® coated surface of another component. All mating surfaces are left uncoated to insure proper fitment. Gears, manual overrides, and spur gears are **K-MASS**® coated, as they are typically large heat sinks available to transmit destructive heat energy to the item or the adjacent actuator or the limit switch.

Thermal Designs®
K-MASS® FIREPROOFING

Why isn't there any K-MASS® on the bottom of the Actuator Bracket or spacer plate?

The actuator is normally coated with **K-MASS®** in its entirety (top, bottom & sides). The exception is when the gear is not shipped with the actuator or bracket. If the bracket is provided with the gear normally the gear and the bracket are coated and will fit up with an approximate 1/8th inch seam between the parts. This assures the forming of the protective char to all heat sinks. Continuous coating requires stem adapter or extension provision by others.

What do I have to do if I remove K-MASS® from the actuator, gear, bracket or switch by drilling or grinding?

Thermal designs, Inc. should be contacted prior to removal of any material from the coated part. Once material is removed the exposed **K-MASS®** will require a coating of aliphatic polyurethane paint to enhance weather protection. This paint can be provided in easy to use spray cans.

What do I do about a gap between the hole in the Valve Bracket around the valve stem and the valve mounting pad?

Valve stem holes in brackets should be drilled as small as possible to reduce the number and size of available flame paths. If due to the configuration of the bonnet the hole creates a gap between the bracket and the bonnet, the gap can be sealed with Fire Barrier™ Caulk.

We have received actuators that appear to have pinholes, small cracks and irregularities. What problems do these present?

Pinholes can be the result of the mold release or dust in the paint. If pinholes are less than 1/8th inch deep and 1/8th in diameter they pose no problem to the fire protection integrity. Holes larger than this will require TDI review. For the fastest technical opinion, photographs should be e-mailed for review. Cracks, chips and gouges are most often the result of mis-handling, dropping or impact. Here the 1/8" rule also comes into play with one modification. If the crack runs to the base material TDI inspection and repair is most probable. If the chips and cracks are surface only then they can be filled in with **K-MASS®** using the **K-MASS®** Repair Kits in the pint or quart sizes, and spray-painted.

Suppose we don't want to K-MASS® coat the gear or the brackets. How long will the "stack" be protected?

The exposed (non-**K-MASS®** coated) metal has a k-factor of up to 13 times greater than **K-MASS®** in the unfired form at ambient temperature. Thermal conductivity is measured in Btu/hr/ft²/°F/ft. As indicated above the greater the unprotected mass, the higher the temperature the greater the heat transfer rate. Experience has shown that placing unprotected heat sinks (metal brackets, gears, etc.) between **K-MASS®** coated surfaces causes the **K-MASS®** to expand and char more rapidly providing a reduced protection time. The reduced time is not predictable due to the variety of valve stack config-urations, however the more metal, the higher the temperature, the shorter the protection time. Metal to metal contact will greatly reduce the effectiveness of any external fire protection.

Thermal Designs, Inc. - United States
5352 Prudence Street
Houston, Texas 77045 USA
Phone: +011 713-433-8110
ussales@tdikmass.com

Thermal Designs, Inc. - United Kingdom
The Broadway Market Lavington Devizes
Wiltshire, England UK SN10 5RQ
Phone: +44 (0)1380 813394
uksales@tdikmass.com

Thermal Designs, Inc. - Canada
Unit 1, 5220 Duncan Ave
Blackfalds, Alberta T0M 0J0
Phone: +011 403-391-1578
casales@tdikmass.com