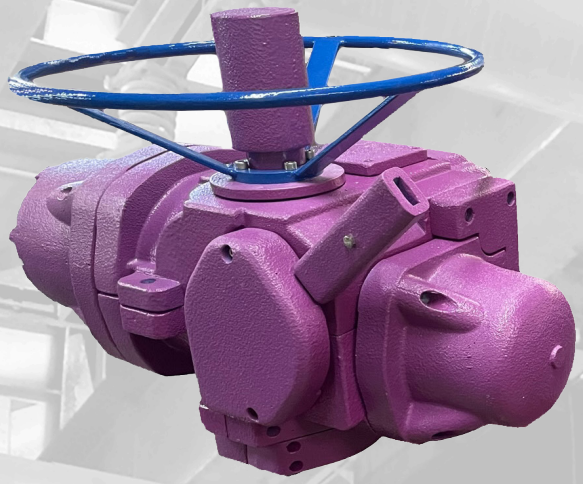
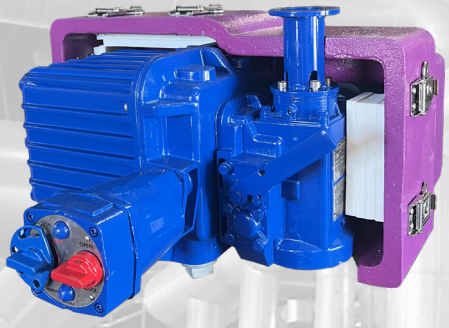
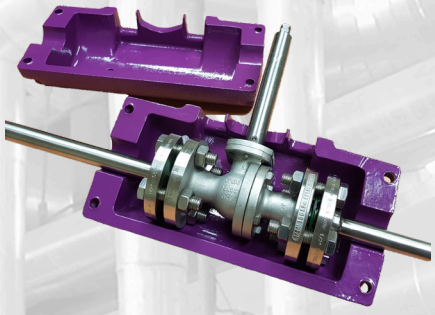
K-MASS®

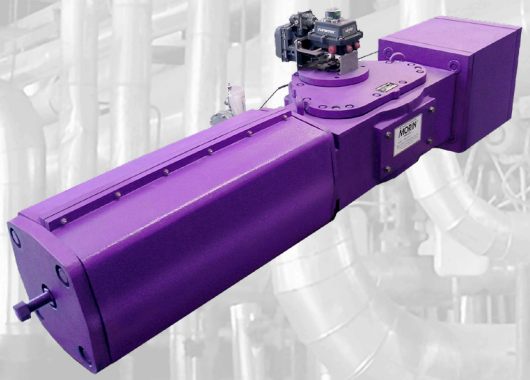
By Thermal Designs®

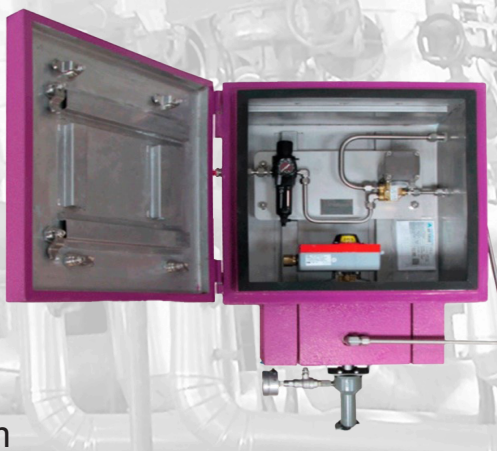
PASSIVE FIRE PROTECTION FOR CRITICAL PROCESS CONTROL EQUIPMENT











tdikmass.com

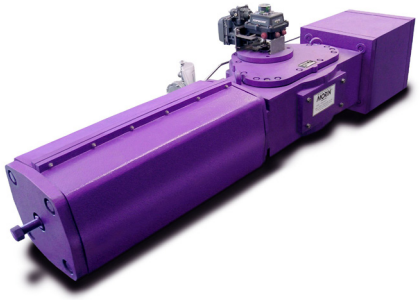
K-MASS® *DB*

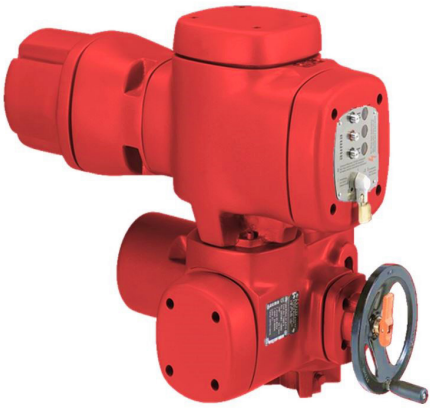
Factory Installed, Directly Bonded K-MASS Fireproofing

- **K-MASS** intumescent epoxy directly bonded to the actuator
- Specifically designed for Critical Process Control Equipment (CPCE)
- No opportunity for fireproofing to be left off during maintenance
- Maintains actuator manufacturers ATEX Directive 2014/34/EU and ICEX certification
- Eliminates Corrosion Under Insulation (CUI)
- Lasts the lifetime of the equipment
- Controls remain accessible

K-MASS *DB* Advantages

- Formulated by Thermal Designs specifically for CPCE with lower critical failure temperatures compared to structural steel
- Extensively tested on operational equipment from multiple manufacturers and complied with ANSI/UL1709 fire test curve
- No on site fitting required, eliminating additional transport and fitting costs
- Approved for use by the majority of actuator manufacturers
- Specified by asset owners and engineering companies





- Compatible with SIL 3 actuators
- Impossible to be left off during equipment maintenance
- **K-MASS** is an intumescent epoxy directly bonded to the equipment and adds an extra layer of corrosion protection
- Does not promote CUI
- Full access to equipment with no special tools required
- The **K-MASS** is directly bonded leaving no is space to retain spills between the equipment and fire protection
- Chemicals have little or no effect on **K-MASS**
- Does not affect the flame paths on explosion proof actuators and the ATEX Directive 2014/34/EU and ICEX approval is maintained
- Lasts the life of the actuator if the paint is properly maintained

- Typically applied to new equipment
- Prior to a fire, it does not act as an insulator and does not affect motor sizing (electrical rating)
- No need to open door to access controls in most applications
- Smallest footprint of any fire protection on the market
- **K-MASS** *DB* is people-proof fireproofing because it cannot be removed or left off during equipment maintenance
- This is not hand applied or sprayed on fireproofing that may lead to unacceptable variations in material thickness
- Our molding process precisely controls the thickness and shape of the coating
- People-proof design is always available for service
- Low K-factor of **K-MASS** in virgin its state dissipates heat
- Minimal space required
- Low weight
- High corrosion resistance
- Easily accessible for operation or maintenance
- Best expected working life
- Proven and verifiable performance

K-MASS® *FI*

Factory or Field Installable K-MASS Fireproofing

Making procurement ***EASY***

Maintains full ***FUNCTIONALITY***

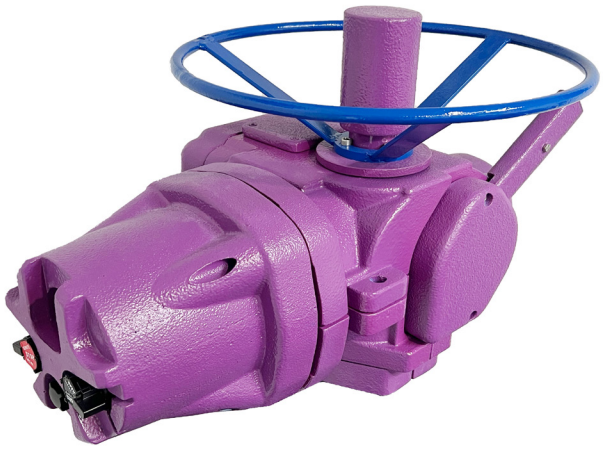
With proven **K-MASS *PERFORMANCE***

EASY

- **K-MASS** *FI* is stocked in the US, UK and Canada
- Ships in less than two weeks if not off the shelf
- No need to ship the actuator for coating
- You choose when and where to install
- Quick installation - 30 minutes with one person
- Includes parts for multiple wiring configurations
- All hardware including spares are included
- No special tools required

FUNCTIONAL

- **K-MASS** *FI* provides same protection as **K-MASS** *DB*
- Install in the factory or in the field
- Does not affect functionality or usability
- All controls accessible on exterior of fireproofing for many actuators
- Intumescent glass provides visibility and IR device functionality
- No doors or hatches to be left open for many actuators
- Complete kits or individual parts available from stock
- Minimal space required for installation
- Easy to retrofit existing, in-service actuators
- Reusable

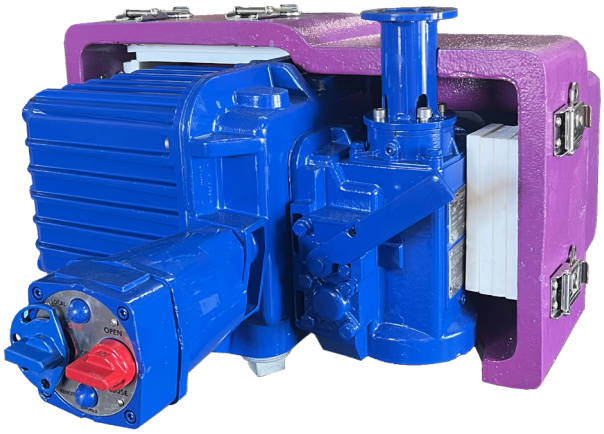


PERFORMANCE

- Utilizes our proven, often specified **K-MASS** intumescent epoxy
- Uniquely formulated and specifically designed intumescent for CPCE fire protection
- Provides superior insulation characteristics in high heat flux, rapid temperature rise hydrocarbon fires
- Complies with ANSI/API-2218 and ANSI/UL 1709 fire test curve for a minimum of 30 minutes at 1,093°C (2,000°F) with full functional tests
- Does not interfere with ATEX Directive 2014/34/EU and ICEX certification

K-GUARD

Field Installable, Custom Molded K-MASS Enclosures



K-GUARDS are field installable PFP covers, custom designed to allow field installation on existing CPCE. Constructed from molded **K-MASS** and tested in compliance with the UL1709 fire test curve, K-GUARDS provide protection for a minimum of 30 minutes when exposed rapid temperature rise, in excess of 1093°C/ 2000°F. Depending on the specific piece of equipment, levers, wheels and controls can often be extended outside the covers allowing equipment to be operated without removing the K-GUARD.

K-GUARD Advantages

- Exceeds the requirements of ANSI/API 607 for valves
- Can be installed on fully operational equipment to meet ANSI/UL 1709
- Can be retrofitted on previously installed equipment
- Available with intumescent glass or windows
- Allows testing without removal of the K-GUARD
- The split cover, clam shell design provides easy maintenance access

Rack and Pinion Actuators

Controls and Accessories

Electric and Pneumatic Actuators

Valves

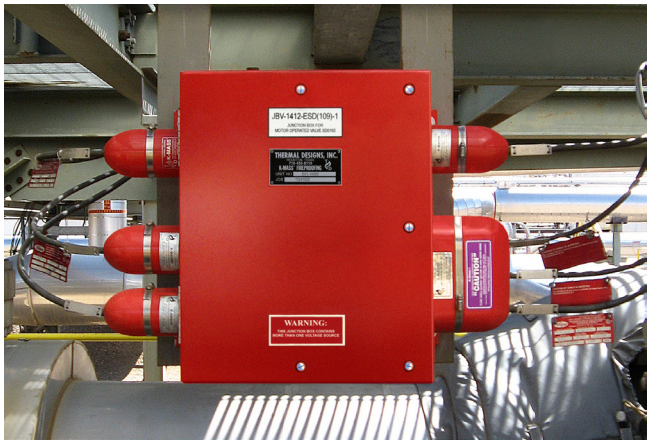
K-CABS

Directly Bonded K-MASS Cabinets

K-CABS are custom designed and fabricated **K-MASS** coated EN 1.4301 (304) grade stainless steel, instrument and electrical component cabinets. K-CABS are tested to provide a minimum of 30 minutes of protection in a 1093° C/ 2000° F hydrocarbon fire. (ANSI/UL1709 fire test curve as per ANSI/API 2218).

K-CAB and Junction Box Advantages

K-CABS and Junction Boxes are stainless-steel enclosures directly bonded with **K-MASS** intumescent epoxy and are used to protect sensitive controls for CPCE were signal and power are required for the safe shutdown of a process. K-CAB and Junction Box designs are extremely versatile and functional solutions. Our engineers will work with your team to provide custom designed, project specific fireproof enclosures.



Features, Options and Benefits

- Meets ANSI/UL 1709 fire test curve for min 30 minutes
- Available in any size or configuration to suit your project needs
- Standard wall, stanchion and equipment mounting configurations
- Available in six standard sizes for quicker configuration and delivery
- EN 1.4301/ (304) grade stainless steel fully welded construction and hardware
- Reinforced, stiffened panel construction

- Electrical or pneumatic connections can be made using welded couplings, conduit hub type fittings, or pneumatic fittings
- Extended push buttons allows instant access to controls without opening
- Available as an ATEX Directive 2014/34/EU and ICEX approved version
- Designed to NEMA-4X/IP66 requirements
- Intumescent glass provides visibility and IR device functionality
- Hinged or latched covers
- Installation of hydraulic, pneumatic or electrical components available

K-MASS *LITE*®

Field Installable, K-MASS Coated Stainless Enclosures

K-MASS *LITE* enclosures are field installable, stainless steel enclosures manufactured by molding an expanded, open cell foam version of **K-MASS** into a 304 stainless steel frame. **K-MASS** *LITE* fireproof enclosures have been fire tested to ANSI/UL1709 fire test curve for 60 minutes.

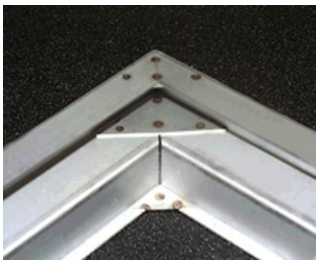
Features of Construction

- Mounts on the base, valve or actuator
- 304 stainless, welded and gusseted
- Panels use step joint design
- Welded, pass-through connections
- Hinged doors
- Durable, high-build polymer exterior coating
- Controls extend beyond fireproofing
- Optional protection to 1093°C/2000°F for 60 minutes
- Stainless identification tags (optional)

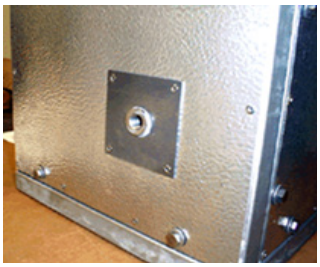
Benefits

- Install in any orientation or location
- Durable and corrosion resistant
- Seals out fire paths
- Allows connection of pipe, conduit and tube fittings 1/8” to 3” rated to 150 psi
- Superior chemical, impact, and moisture protection
- Controls accessible without opening
- Meets or exceeds ANSI/UL 1709 and ANSI/API 607 fire test requirements

Step joints seal out flame paths and provide structural rigidity for long lasting fire protection.

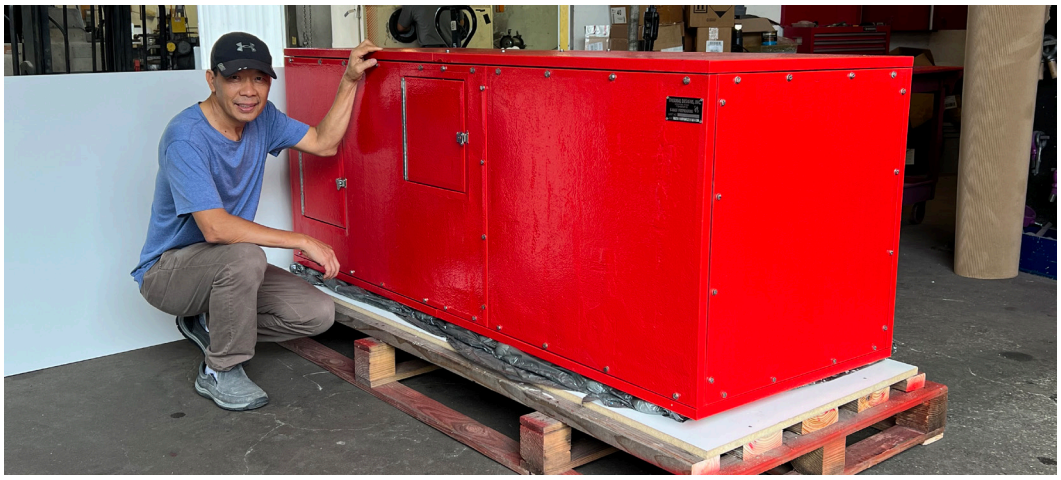


Welded, interlocking stainless steel enclosures can be designed in almost any size required.



Welded, stainless connectors available for hydraulic, pneumatic, or electrical connections.

K-MASS *LITE* enclosures are custom designed and built to provide fire protection for valves, actuators, instrumentation, pumps, heat exchangers and any other CPCE requiring fireproofing. **K-MASS** *LITE* fireproof enclosures are custom designed, removable PFP enclosures that can be manufactured in a variety of sizes,while maintaining a basic square or rectangular shape. Each panel is designed to allow process piping, actuator stem pipes and hand wheel shafts to protrude through the panel allowing the enclosure to be installed around existing field equipment.



- Tested to meet ANSI/UL1709 standards for 60 minutes
- Available in almost any size and specifically designed for each project
- All panels are independently removable so it is easy to fit equipment in the field, making maintenance is greatly simplified
- Our **K-MASS** *LITE* enclosures are designed with internal support structures. No additional support is required
- Unlike traditional fire boxes, **K-MASS** *LITE* can be drilled anywhere on the enclosure for pipes or conduit entries
- If required, **K-MASS** *LITE* enclosures can be vented to prevent pressure build up from stem leaks

K-MASS® *SP*

Factory or Field Installed Intumescent Epoxy Fireproofing for *Specialty Products*

K-MASS *SP (Specialty Products)* are custom designed solutions for your unique or unusual PFP needs. We recognize your fireproofing requirements can extend well beyond our standard product offerings. Our in-depth understanding of PFP design and compliance with applicable test certifications will result in a solution that will meet your requirements.

Our engineers will work with you to provide a solution best suited for your project. **K-MASS** *SP* can be directly bonded in our facilities or designed to be installed in the field, just as with **K-MASS** *FI*.

Limit Switches

Cable Protectors

Often overlooked, cable protectors are a vital part of a complete fireproofing solution for actuators, K-CABS and other equipment with cable entry's.

Splice Cover

K-CAB with Cable Protectors

K-MASS®

Intumescent Epoxy

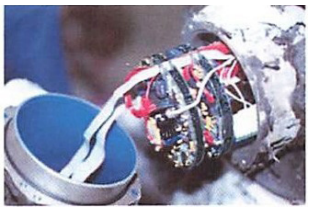
K-MASS intumescent epoxy can be directly bonded or molded for different applications. **K-MASS** *DB* is a directly bonded intumescent epoxy coating which can be bonded to a variety of materials. **K-MASS** *FI* and K-GUARDS are custom molded enclosures for actuators, valves, limit switches and cable connectors among other applications. When necessary, intumescent glass can be molded into the **K-MASS** to allow visibility and IR device control.

When considering the best materials and methods of protection, a number of factors must be considered, including:

- Adequate testing for specific applications
- Projected product life
- Cost of operation and maintenance
- Ease of installation
- Replacement cost of inventory, equipment, or facility
- These points require review prior to PFP material selection

Before the Fire

After the Fire



Post-Fire Inspection

Features

- **K-MASS** is chemically inert
- No Interference with local or remote controls
- Tested to rigid standards
- Provides 30 minutes 2000°F protection of electronics, pneumatics & hydraulics
- Segment molded coating

Benefits

- Original equipment design features available and intact
- Exceeds ANSI/API 607 and ANSI/UL 1709
- Can be applied to all components of the Critical Process Control Equipment
- Access to any part without removal of the fire protection
- Adds nothing to the fire

HOW **K-MASS** WORKS

As the fire starts

K-MASS begins to react at 85.6°C. A chemical process causes the coating to expand (intumesce). Surface evaporation takes place which also has a cooling effect. The outside then begins to build a surface char.

The fire progresses

As the surface char deepens, it reflects 80-90% of the heat back into the fire. More intumescing takes place and forms a barrier which further insulates and has an additional cooling effect.

Long term exposure

The heat will penetrate the outer layer, and the **K-MASS** below will react. The next layer reacts the same until the fire is extinguished or the material is consumed.

The K-MASS Advantage

Insulation blankets reflect heat away from the equipment being protected but may enable the heat of operation to build up inside the protected equipment. If retained heat and temperature rise or maximum surface temperature are a concern, **K-MASS** is the better solution.

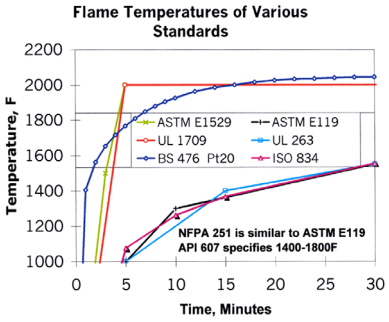
Insulation Blanket

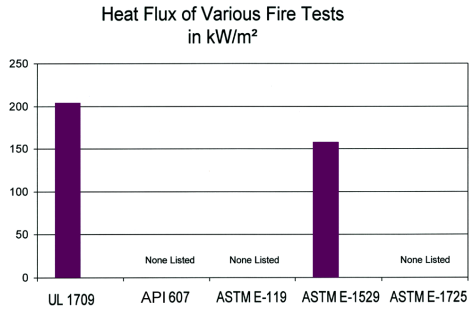
Insulation Enclosure

K-MASS Coating

Insulation materials protect by thickness inhibiting conduction. Intumescent epoxy protects by endothermic chemical reaction, heat absorption, evaporative cooling, and reflection. Insulation may break down when exposed to vibration or the elements. Differing rates of thermal expansion can cause seams to open, creating a loss of fireproofing integrity. Once the seams are opened a hot damp environment is created, providing an ideal atmosphere for corrosion. **K-MASS** directly bonded to the substrate and molded to a specified thickness providing corrosion protection as well as fireproofing. During a fire, **K-MASS** intumesces, blocking the heat and flame directing it away from the temperature sensitive equipment.

Product Tests, Characteristics and Standards





Why ANSI/UL 1709?

Determining which of the many industrial fire test standards are applicable is difficult for design and safety engineers professionals. API RP2218 is a comprehensive source of information on fireproofing practices in petroleum and petrochemical processing plants. Our engineers understand which tests apply by examining how a fire starts, what contributes to an explosion, and the critical events that occur following the explosion.

The ANSI/UL 1709 Rapid Rise Fire Test, although intended for structural steel, represents the flame temperature and heat flux that can be expected in a hydrocarbon fire, and has become the standard test for fireproofing of CPCE. Each of our products are designed to provide a minimum of 30 minutes of operation to allow a safe and orderly process shut down.

K-MASS Mechanical and Chemical Properties

Physical	Test	Value
Density	ASTM D-792	1305.5 kg/m³
		81.5 lb/ft³
Thermal Conductivity	ASTM C-177	0.41 W/m°C
Conductivity		2.84 BTU in/ ft²-hr°F
Coefficient of Thermal	ASTM D-695	
Expansion	-11°C to 31°C	40.1 x 10^{-6} cm/ cm°C
	12°F to 91°F	22.3 x 10^{-6} in/ in°F
Flame Spread Index	ASTM E84	20 (Class 1/A)
Smoke Development	ASTM E84	55 (Class 1/A)
Maximum Continuous		85.6°C/185°F
Service Temperature		
Thermal Shock Resistance		
Four 24hr Cycles from	-50°C to 30°C	Very Slight Microcracking

Mechanical	Test	Value
Tensile Strength	ASTM D-638	> 159 kg/cm²
		> 2200 psi
Comp. Strength	ASTM D-695	> 530 kg/cm²
		> 7520 psi
Impact Strength	ASTM D-256	0.13 J/cm of notch
		2.8in-lb/in of notch
Hardness	Shore D	> 75
Bond Strength	ASTM D-1002	> 124 kg/cm²
		> 1750 psi
Shear Strength	ASTM D-1002	> 119 kg/cm²
		> 1660 psi

Chemical and Corrosion Resistance

Physical	Test	Exposure	Results
Salt Fog	ASTM B-117	720 Hours	No Effect
		Bases	
20% Potassium Hydroxide		Submersion 24 Hours	No Effect
50% Sodium Hydroxide		Submersion 24 Hours	No Effect
100% Ammonium Hydroxide		Submersion 24 Hours	No Effect
		Acids	
20% Sulfuric		Submersion 24 Hours	Slight Darkening
30% Hydrochloric		Submersion 24 Hours	Slight Darkening
50% Hydrofluoric		Submersion 110 Hours	Slight Softening
Concentrated Hydrochloric			Mod. Darkening
Temp. Cycle	12-weeks	18°C to 60°C	No Effect
		0°F to 140°F	No Effect

K-MASS®
By Thermal Designs®

Company Information

Thermal Designs
Website

Thermal Designs
Brochure

Thermal Designs
FAQ

Product Sheets

K-MASS *DB*

K-MASS *FI*

K-GUARD

K-CABS

K-MASS *LITE*

K-MASS *SP*

K-MASS *FI*

K-MASS *FI*
Brochure

K-MASS *FI*
Install Manual

K-MASS *FI*
Video

PFPNet
PASSIVE FIRE PROTECTION NETWORK

LinkedIn

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