BI-TORQ® VALVE AUTOMATION

KNOWLEDGE Base

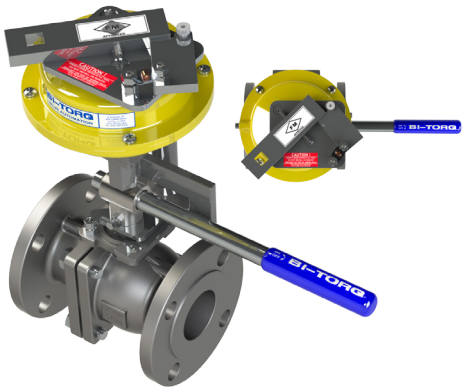
Thermal Shut-off Theory of Operation: Ball Valves

BI-TORQ® Valve Automation's fire safe thermal shut-off valves (or "fusible link assemblies") are designed for automatic shut-off in case of a fire. They are ideal for flow shut-off protection in systems conveying flammable gases or liquids, solvents, alcohols, toxic fluid or any other potentially dangerous media.

The images below show the basic operation of our FLP series fire safe valves. We also have a series of videos showing operation on our web site at www.bitorq.com/fusible.

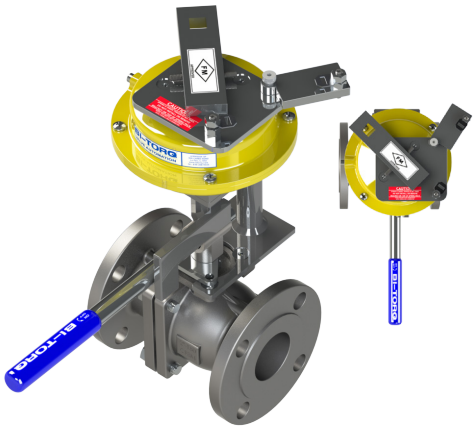
OPERATION PRINCIPLE

The illustrations below show the basic operation of our most commonly-used thermal shut-off valve when triggered by high heat or the presence of fire. Special links also can be triggered with an electric signal.



When the unit is armed, the valve is in the open position with the handle parallel to the pipeline. The valve can be manually operated even when armed.

Direct fire or localized high temperatures then cause the soldered fusible link to break. This releases the clock-spring and the tripper arm begins to close the valve.

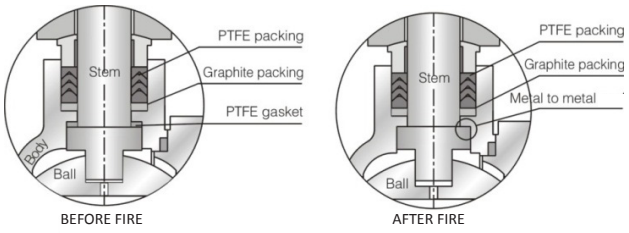


The spring then releases completely and the handle reaches valve stop. The valve is now closed. The floating ball design and graphoil seals prevent leakage.

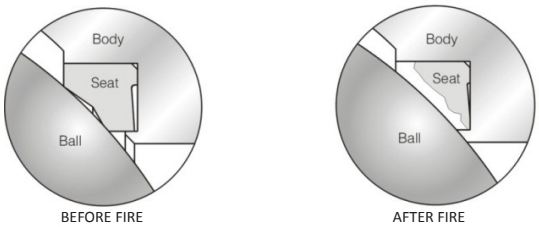
FIRE SAFE VALVE PRINCIPLES

BI-TORQ® Valve Automation's fire-rated valves use a combination of a floating ball, graphoil seals and metal-to-metal seating to provide tight shut-off while preventing external stem leakage.

In normal working conditions, the ball rests against two seats, ensuring bubble-tight closure. When the valve is exposed to temperature above the limits the seats can withstand (for example, +450°F), the seat becomes deformed and is subject to extrusion. When the seats have been totally destroyed, the ball will come to rest firmly against the end cap, producing a metal-to-metal closing. Graphoil body and stem seals, which have high temperature-resistant properties, further restrict leakage in conjunction with a blow-out proof anti-static stem, ensuring that the valve will perform to international API 607 standards.



FIRE SAFE DESIGN OF STEM



FIRE SAFE DESIGN OF SEAT

BI-TORQ® VALVE AUTOMATION

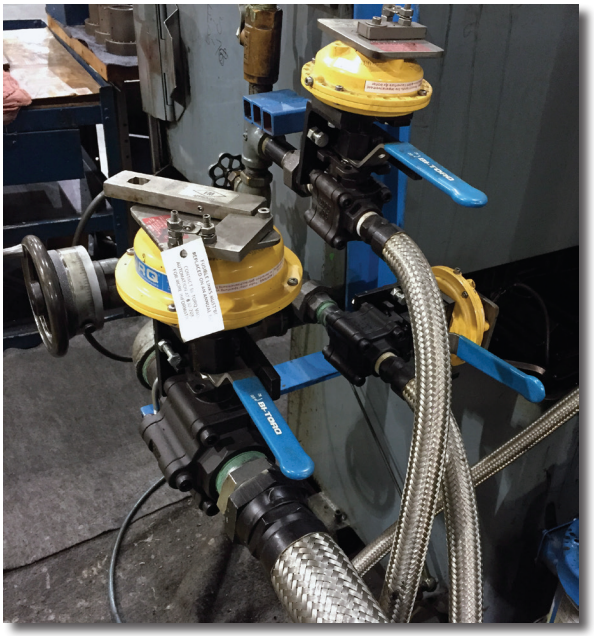
KNOWLEDGE Base

Thermal Shut-off Assembly Sample Applications

BI-TORQ® Valve Automation's thermal shut-off valves (also known as "fusible link shut-off assemblies") are used in a wide variety of applications that require media containment in case of a fire.

TYPICAL INSTALLATIONS

The installation depicted below is the most typical use for our thermal shut-off assemblies. In this case, flammable media is contained within a self-sealing or flameproof tank with a 4" API 607 fire safe approved flanged ball valve on the outlet. In the event of a fire, the outlet valve will be closed to stop media from continuing to flow into the pipeline.



The valves shown above are used by a leading manufacturer of ball and roller bearings. Following a fire where electrical discharge machining (EDM) is used, FM Global determined EDM lubricant contributed to the fire. As a result, BI-TORQ® Valve Automation's FM-approved 2" FLPs were installed.

SAMPLE APPLICATIONS

OIL/GAS/REFINING

Flammable media can be found throughout refineries, including LPG and LNG racks, processing equipment, storage tanks, and fueling stations.

FUEL STORAGE TANKS

Thermal shut-off valves typically are located on the outlet of non-flammable, explosion proof or self-sealing tanks located outside a facility.

CHEMICAL LINES

Fire safe valves with fusible links can be used on processing lines or in areas where large amounts of flammable chemicals are stored.

AIRPORTS/JET FUEL

Our fire safe FLPs are installed in both remote storage locations as well as on-site fueling equipment; they also can be used on deicing systems.

SOLVENTS/COOLANTS/LUBRICANTS

Many solvents used for manufacturing processes are highly-combustible, as are some coolants used on machinery typically found in most manufacturing plants.

HOSPITALS/OXYGEN LINES

Large amounts of pure oxygen can feed a fire, creating the need for a way to shut down O2 lines in case of an emergency. Many hospitals also have back up generators.

BACKUP GENERATORS/NATURAL GAS LINES

Most large manufacturing and municipal facilities use backup generators. Our fusible link emergency block valves often are used on the inlet for natural gas into a building.

FOOD AND BEVERAGE

Alcohols and phosphates are two of the most common elements used in food production that can be highly flammable and often stored in tanks.

HYDRAULICS

Petroleum-based hydraulic fluid, used on a variety of machines and processes, potentially can feed a fire, especially in high pressure systems.

GOVERNMENT/MILITARY

BI-TORQ® Valve Automation's EBVs are installed at military bases, including a fail open application for the Canadian Navy and fuel systems for a large government contractor.

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