

AUTOMATIC FIREFIGHTING
SYSTEMS IN
TURBINES





protection tailored for each turbine

Hazard type

There are a great variety of turbines on the market which vary in types of fluid used, including:

- Hydraulic turbines
- Thermal turbines
- Steam turbines
- Gas turbines
- Impulse or reaction turbines
- High, medium or low pressure turbines

Turbines exist in a variety of sizes, from 0.75 kW units used to drive machinery, pumps, compressors and other equipment, up to 1.5 MW turbines used to generate electricity.

Turbine is the generic name given to most rotating turbomachinery. Fluid passes continuously through these machines and transfers its energy through an impeller equipped with blades or vanes. It is a rotary engine that converts the energy of a stream of water, steam or gas into mechanical energy.

The basic element of the turbine is the wheel or rotor, fitted with blades, propellers, blades or buckets around its circumference. The fluid's movement produces a tangential force on the wheel and makes it spin. This mechanical energy is transferred through a shaft to provide movement to a machine, compressor or electrical generator.

Protecting these very expensive devices with effective fire protection measures is critical. An fire has serious consequences, not only for its economic value but also in terms of shutdowns in production.

The protection of this hazard or the room where it is located is a complex issue to be studied carefully because of the diversity of turbine types available with very different characteristics. The wide range of sizes and operating circumstances implies very different protection challenges.

Fire hot spots vary depending on the type of turbine in question (gas, steam, water, etc.). The potential fire hot spots should be identified in order to choose the most appropriate extinguishing system. This is why sometimes we will protect the cooling oil tank, at other times the interior of the chimney through which gases generated are vented or key turbine parts, and in some cases the entire turbine, flooding the entire room housing it.

The industries in which this protection is applicable are: chemical and pharmaceutical plants, food and beverage, automotive, mining and heavy industry, hospitals, universities, marine propulsion and other industries.

Sources of fire

There are numerous possible causes of fire in a turbine. Not all of them are always present, since each one operates under different circumstances and for a variety of uses. Depending on the type of turbine in question, we might find the following risk factors:

FLAMMABLE LIQUIDS AND GASES

The turbine fuel may be natural gas, propane, diesel, gasoline, etc. These are highly flammable liquids and gases and major fire hazards when a fire reaches them.

HIGH TEMPERATURE COMPONENTS

The high working temperature of the turbine blades - between 850 °C and 900 °C - is a possible fire source, since at these temperatures the possibility of fire spread or explosion is very high.

The same applies to the high temperatures of the exhaust gases (approximately 550 °C). Gases enter the turbine at a temperature of 1200-1400 °C and a pressure of 10 to 30 bar. and go about 450-600 °C. Pressure changes (compression and decompression) in the combustion chamber also pose certain risks, where temperatures reaching 2000 °C can cause explosions.

LUBRICATION SYSTEMS

Some turbines primarily oils as a lubrication system. These have a low flash point and are a source of fire.

Using large turbines

OIL AND GAS SECTOR

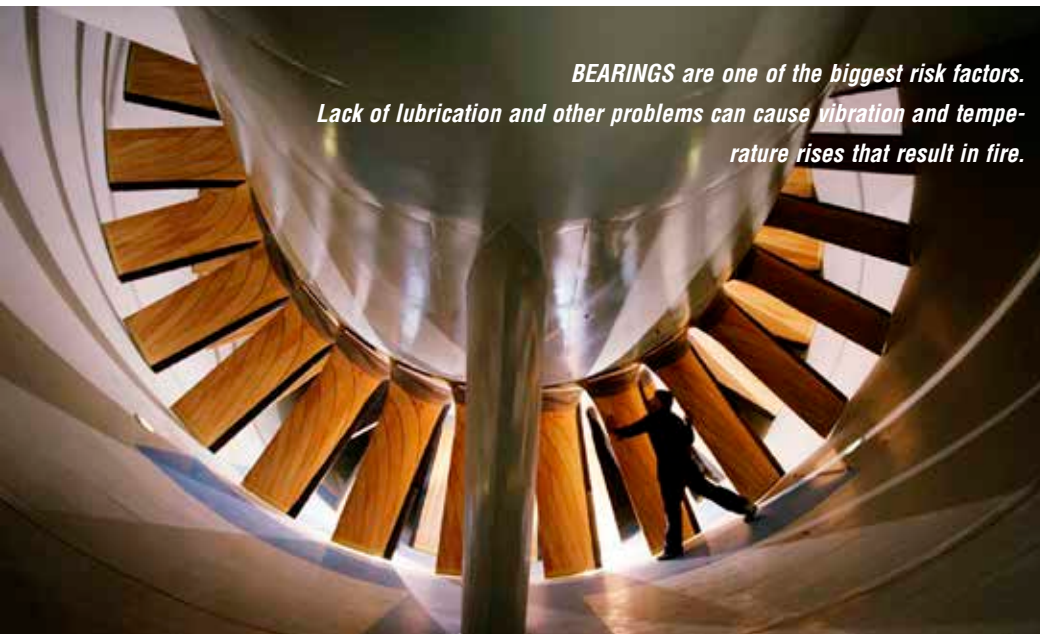
- Water injection and oil pumping, gas extraction and separation of gas and oil.
- Exploiting deposits and wells, gas injection.
- Compression for storage, export and cooling gas in processing plants.
- Generation and supply of electrical power.

TRANSPORT: LNG PIPELINES, STORAGE AND PLANTS

- Compressors and pumps driven by gas turbines, for example, for high-pressure gas pipelines and pumping oil.
- Power generation and refrigerant compression for liquefied natural gas (LNG).

PRODUCTION: GTL REFINERY, PETROCHEMICAL AND PLANTS

- Power generation for GTL plants
- Power generation in refineries



BEARINGS are one of the biggest risk factors.
Lack of lubrication and other problems can cause vibration and temperature rises that result in fire.

SOLUTIONS



Experience in the use of CO₂ for protecting turbines certifies this as one of the most popular systems, standing out especially for its extinction effectiveness and modes of application.

With CO₂, unlike other gases, it is possible to have designs with openings in the enclosures. It is therefore an ideal gas for protecting turbine rooms, because all such rooms must have openings to allow natural ventilation. ISO 6183, NFPA 12 or CEPREVEN and CEA 4007 are some design guidelines which stipulate the method for calculating CO₂ losses through these openings and, therefore, the additional amount of agent to be added to the system.

Although the most widely used method for protecting these rooms is by local application, total flooding installations can be made or can be applied with extended discharges.



Safety of our equipment.

We have systems that provide safety to occupants, such as odorizers (cartridges which open at the moment of discharge and give off a specific odour), pneumatic retarders (delay CO₂ discharge between 30 and 60 seconds) pneumatic siren (issues an audible alarm during discharge), weighing systems (notifies the panel when there is a pressure drop of between 5% and 10%).

We also have isolation or shut-off valves 3/8" to 4".

All our CO₂ components and the overall system have CE and VdS certification.

FEATURES

Agent properties:

- Non-combustible
- Provides its own pressure
- Discharged as a gas to penetrate everywhere
- Electrically non-conductive
- Easily liquefied by compression
- Its density, 1.5 times heavier than air, means that it begins to accumulate in the lower areas of the enclosure.

System properties:

- Bottles from 2.7 to 67 litres.
- VdS approved calculation software.
- Mechanical detection systems for a fully autonomous system.



Water mist splits water into very small drops, resulting in a large increase in cooling capacity for the same amount of water. In case of discharge, given the small amounts of liquid used, the damage to equipment is almost negligible. The smaller drop size, compared to traditional equipment, results in a greater and faster absorption of heat energy and generates a greater amount of steam.

Protection of turbine fire aim to extinguish burning materials and prevent it from spreading until firefighters arrive. In addition, flue gases and fumes are knocked down, clearing the atmosphere.



This protection should be made through local application over the turbine or by total flooding of the enclosure (for rooms smaller than 130 m³ or 260 m³).

Features

SIEX™ WATER MIST enables the use of pumpsets or cylinder banks according to the size of the turbine.

The system has control valves capable of protecting several independent and isolated hazards, using a single system. These control valves have solenoid (receives the operating signal from the turbine on fire), pressure switch (detects the flow of water) and manual release to activate it manually.

All our SIEX™ WATER MIST SYSTEM nozzles have FM certification.

For agent discharge, SIEX has a wide range of nozzles depending on coverage, flow, approvals, height of application, etc. We have two types of FM approvals based on the room volumes: for rooms with volumes less than 130 m³ and for volumes smaller than 260 m³.

The system is supplemented with shut-off valves, which are normally open valves. They are fitted with a gauge and flow sensor indicating the flow of water. For a fully standalone release, mechanical detection systems may be added to the installation that do not require power to respond.

Our commitment

CHOICE OF SYSTEMS

SIEX has the widest range of products and systems to suit different needs, both as regards pressures and extinguishing agents.

COMPETITIVE PRICE

Optimizing all of our processes make us more and more competitive worldwide.

SPECIALIZED ENGINEERING

Our highly qualified staff ensure the best service for customers both as regards technical advice on the choice of system, and solving any problems that might arise after installation. Backed up by our extensive experience and a track record of successful projects.

INNOVATION

At the forefront of innovation in every product we develop, ensuring the technical features offered.

QUALITY GUARANTEE

All products meet the highest quality requirements and internationally recognised official approvals.

OTHER SPECIAL HAZARDS PROTECTING BY SIEX:

SERVICE STATIONS	TELECOMMUNICATION CENTRES	HISTORIC BUILDINGS
ARCHIVES AND LIBRARIES	HOTELS	ROBOTIC PARKINGS
DPCs	HOSPITALS	WIND TURBINES
PAINT SPRAY BOOTHS	EDUCATIONAL ESTABLISHMENTS	STEEL INDUSTRY
ELECTRICAL PANELS	TRAIN AND UNDERGROUND STATIONS	BANKS
INDUSTRIAL KITCHEN	TRAINS	OFFICES
TURBINES AND GENERATORS	TRANSFORMERS	LARGE VEHICLES
ROAD TUNNELS	OFFSHORE PLATFORMS	CONVEYOR BELTS
NATURAL GAS PLANTS	SOLAR THERMAL PLANTS	GAS PUMPS
CLEAN ROOMS	MACHINE TOOLS	OIL & GAS
CABLE TUNNELS	PRINTING INDUSTRY	TIMBER INDUSTRY



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