

BECAUSE WE BELIEVE IN THE VALUE  
OF MEASURED PROTECTION.

THE MOST ADVANCED SYSTEMS FOR  
SECURITY AGAINST THE MOST DELICATE HAZARDS



**W-FOG System**  
for the protection of

**TURBINES**



**Turbines are vital to energy generation networks at world level, carrying out part of the transformation of the energy of a fluid into the electricity necessary for countless industrial operations and domestic tasks.**

*Turbines are turbomachines with a movable impeller and turbine blade which are moved by the fluid which is made to pass through them. They are classified according to the nature of this current:*

- **STEAM TURBINES**
  - **GAS TURBINES**
  - **WATER TURBINES**
  - **THERMAL TURBINES**
- It is also possible to classify them according to passage (axial or transversal), or according to whether or not pressure is varied on release (reaction or action respectively). In any case all of these turbomachine motors transfer the mechanical energy produced to the electrical generator which passes it to the grid.**

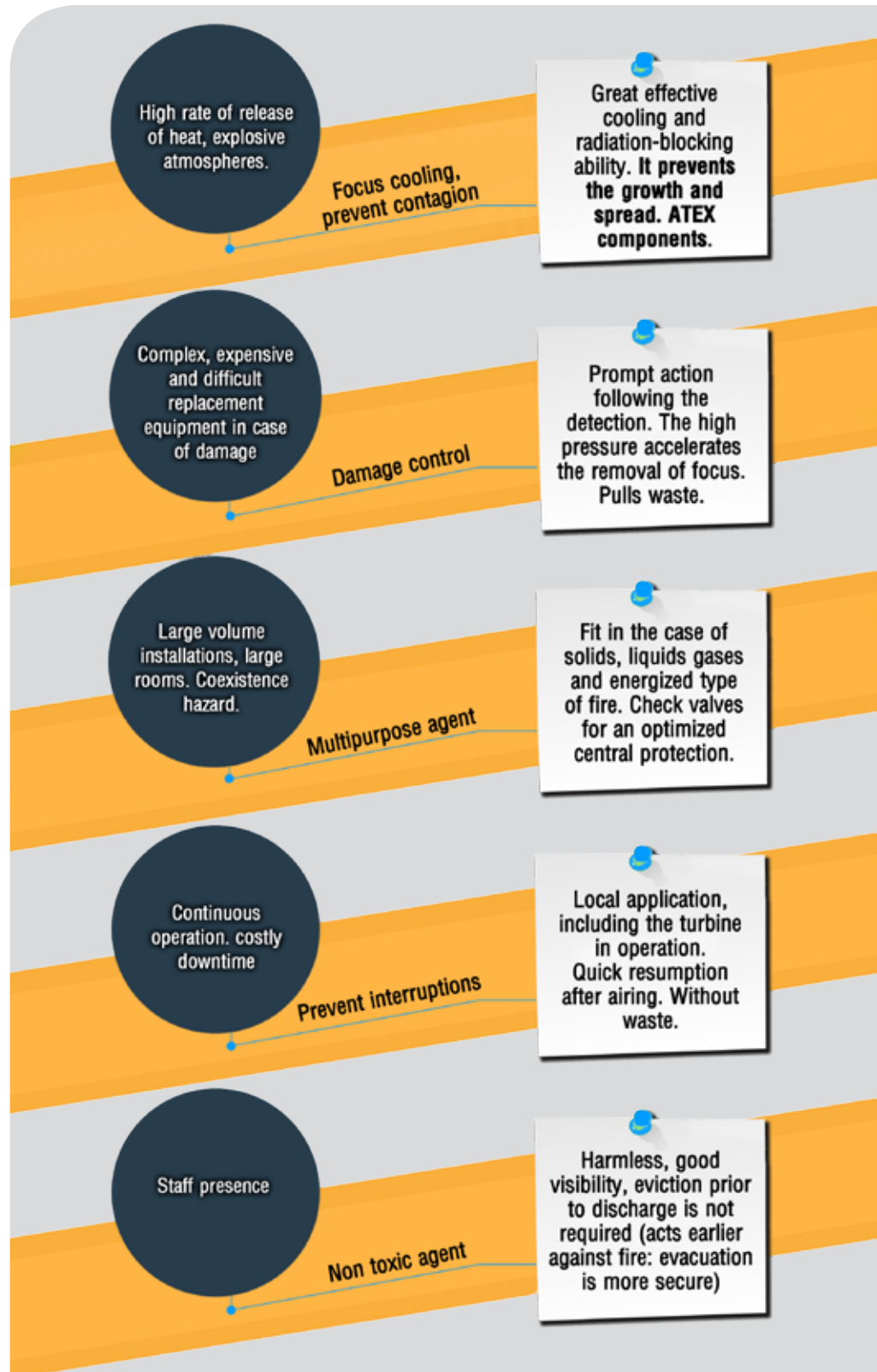
From the point of view of fire safety these are highly dangerous installations due to their mode of functioning, high fire load and diversity of auxiliary installations. Due to their high cost and the serious financial consequences of stoppages to production it is vitally important to adopt appropriate protective measures.

Possible occupants can safely leave the area thanks to the high visibility resulting from the particle dragging effect. Moreover as it is harmless it acts immediately, without waiting for the evacuation or the sealing of the chamber, thus the evacuation is safer and time is gained, as the fire is not allowed to develop. If anyone is trapped the water mist is completely harmless.



# WHY USE RG W-FOG IN TURBINES

*The variety of hazards and possible fire outbreaks makes complete study necessary of the details of each project for each case. RG Systems offers you its specialist engineering services to develop projects and R+D with a view to bringing you the most suitable solution.*



# PROTECTION NEEDS OF TURBINE AND GENERATOR INSTALLATIONS.

*The areas to be protected will be sectorised and designed to include the following:*

- **Turbine**
- **Generator**
- **Offices, control rooms**
- **CPD**
- **Boilers**
- **Transformers**
- **High-, medium- or low-temperature equipment**
- **Fuel store**

**THE AREAS UNDER CONSIDERATION INCLUDE BOTH THE POWER BLOCKS OR UNITS WHICH MAKE UP A POWER STATION**

**AND THE AUXILIARY SERVICES WHICH SUPPORT THEM:**

**WATER AND HOT AIR OR PRESSURE HYDRAULIC INSTALLATIONS**

**VENTILATION / EXTRACTION**

**CABLING, CABLE TUNNELS**

**ELECTRICAL SUB-STATION**

**CONTROL CENTRES**

**FUEL STORAGE (PRINCIPAL AND / OR SECONDARY)**

**FUEL TRANSFER POINTS**

**AIR HEATERS**

**REFRIGERATION FLUIDS**

**CABLE TRAYS AND TUNNELS**

**BURNERS AND / OR COMBUSTION CHAMBERS**

**ANY THERMAL FOCUS POINT CLOSE TO AN INFLAMMABLE SUBSTANCE**

*It is necessary within the obligatory hazard analysis for these installations to identify and assess possible sources of fire outbreak in order to prevent them or minimise damage.*

The functioning of a turbine and its capacity to work efficiently and without problems depends directly on its lubrication system. If this fails or the flow is interrupted the rotor axis will turn **in contact with the metal** of the internal support surfaces. This can cause serious damage, overheating and prolonged stoppages.



Other possible sources

of fire outbreak are located in **adjacent equipment** such as the turbines' combustion chambers, storage and transfer of lubricants in the same, transformers (principal and auxiliary), air admission equipment, diesel groups (emergencies), generators, etc.

**In summary whether it is a case of an electrical fault, igniting of hot surfaces or maintenance tasks; it is vital to carry out correct identification of hazards and complete development of scenarios in order to provide the most suitable protection system specifically to protect equipment so special on account of its importance, cost and functions.**



## SPECIFIC PROTECTION OF TURBINE ACCREDITATION TESTS

*The tests consist of assessing capacity to extinguish outbreaks of varying intensity and in different conditions. The fire burns freely for 15 seconds, after which the system is activated. After extinction the fire must not restart.*

RG-Systems has **water mist nozzles tested specifically for use in turbine rooms**, according to demanding test protocols, carried out by the independent laboratory SINTEF in Norway.

The protocol consists of 16 tests for different applications:

The nozzles are located in the ceiling, without intermediate levels, **according to the spacing laid down by each manufacturer**. Their action must be automatic and autonomous. A steel-built machine or turbine is simulated in the centre of the room around which the fire is placed. Various sheets and protrusions cover the fire to assess extinction in unfavourable conditions. The fifth test requires a fire of the same strength as the previous ones to be extinguished in half a room using half the sprays.

TEST	FIRE		POSITION	VENTILATION
1.01	1 MW	Spray	Exposed	No
1.02	1 MW	Spray	Covered	No
1.03	Pool of 0.81 m <sup>2</sup>	Excess fuel	Covered	Yes, natural
1.04	2 MW	Spray (212 L/h)	Covered	Yes, natural
1.05	2 MW	Spray (212 L/h)	Covered	Yes, natural

# ES WITH WATER MIST

## Test series D:

Test on machine rooms. Fuel is diesel projected by a spray at 106 L/h (1 MW) or 212 L/h (2 MW) and 8.6 bar.

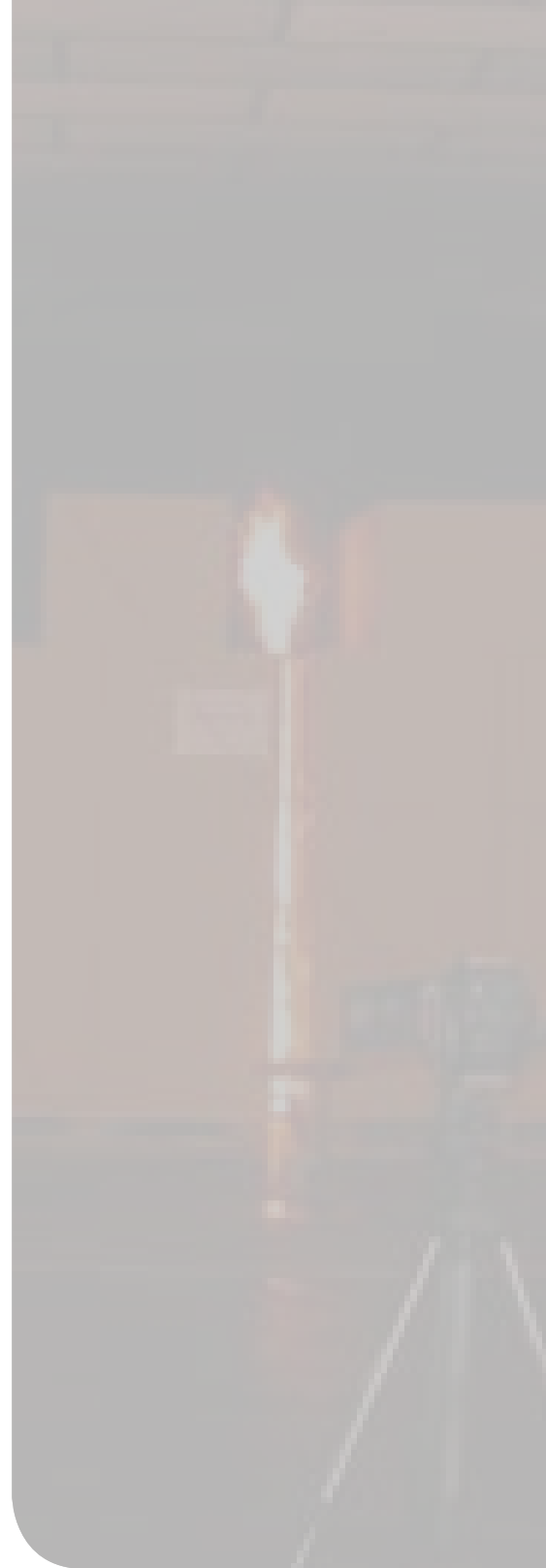
## Test series E:

This test covers machine rooms of special risk. Ethanol is used projected by a spray at 117 L/h (1 MW) or 235 L/h (2 MW) and 8.6 bar.

## Test series F:

This test specifically covers combustion turbines. Used on fire of diesel light at 106 L/h (1 MW) or 212 L/h (2 MW) and 8.6 bar.

**It includes a sixth test on refrigeration effect, without fire, which assesses heat dissipation. This determines there is no serious damage or distortion of the turbine due to sudden changes of temperature (thermal stress), and is key both for determining the minimum distance and to ensure that the action of RG-SYSTEMS Water Mist on the turbine is COMPLETELY EFFECTIVE and HARMLESS.**



## COMPONENTS

### THE MAIN ADVANTAGES COMPARED TO OTHER CLEAN AGENTS LIES IN:

**APPLICATION:** the water mist does not need waterproofing in the rooms to act in the proper way. The response is immediate, without waiting for the closing of gates or halting of ventilation.

**HARMLESSNESS:** the water is atomised and discharged at high pressure to reach the flame quickly, absorb its heat and evaporate without residues. It is also a non-conductor and harmless for the people present.

**CLEANING:** disappears on simple ventilation, without residues. Moreover the micro-drops which do not evaporate agglutinate and leave corrosive particles in suspension, preventing them from spreading and damaging other equipment.

**PERSISTENCE:** The mist produced remains in colloidal suspension, blocking radiation and preventing the fire from re-igniting.

### LOCAL APPLICATION:

#### SET OF CYLINDERS:

used for lesser hazards (eg: mobile generator, small rooms). Fires are caused mainly by overheating, electrical faults or spillage, and massive local application is used to control and / or extinguish the outbreak.

#### OPEN NOZZLES:

RG-Systems has FM approval for this hazard. Positioned aimed at the hazard, with dry piping. If activated all of the sub-network discharges on the equipment.

#### PUMP UNITS:

made up of diesel and / or electrical pumps, used for larger hazards requiring more water.





## EXAMPLES OF INSTALLATION

### OTHER COMPONENTS:

#### CONTROL VALVES:

Equipment centralised according to the most serious hazard, protecting everything thanks to these valves which aim the water at the room affected.

#### SECTION VALVES AND FLOW DETECTORS:

Detect the flow or passage of water through the wet piping, showing in which sector the discharge has occurred. The valves may be closed to allow maintenance and avoid accidental discharges.

#### DETECTION:

RG-Systems has mechanical and pneumatic detection systems which ensure the activation of the equipment in any circumstances. Their completely autonomous and independent functioning ensures the activation of the equipment in the event of electrical short circuits, and they may be used as principal or redundant safety detection.

### PROJECT

Design and calculation of needs from phase one, according to applicable regulations and realworld testing.

### INSTALLATION

Our advanced technology allows for a reduction in diameter and faster installation. Data sheets are provided to facilitate assembly.

### MAINTENANCE

RG Systems offers installation and maintenance manuals, as well as spare parts and incident support.

## GUARANTEE AND CERTIFICATIONS

RG-Systems ensures the suitability of its W-FOG equipment with detailed studies and components accredited by international certifying agencies of recognised prestige.



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**THINK  
GREEN**