



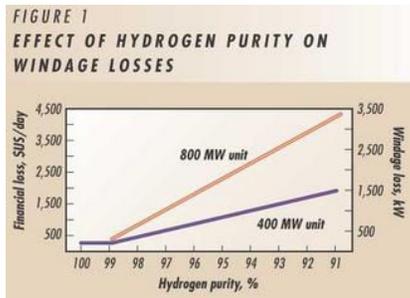
# HYDROGEN COOLED GENERATORS

## Application

Measurement of hydrogen purity is in a hydrogen-cooled generator during operation, start-up, and shutdown

## Background

Hydrogen is used as the cooling medium in electrical generators because of its high thermal conductivity. The hydrogen absorbs heat created in the generator and dissipates that heat as the hydrogen re-circulates through a compressor and dryer system outside the generator. Hydrogen is also used in generators is due to its very low viscosity. Hydrogen reduces the amount of wind resistance and friction on the spinning generator shaft, thus increasing the generator's efficiency.



A reduction in hydrogen purity from 98 to 95% on a large generator can increase losses from friction and windage by up to 40%. Safety is another consideration. If air leaks into the generator, the gas can approach the upper explosive limit, possibly producing an explosion. Typically, the system is checked for leaks on a periodic basis at the generator and the tubing to and from the

compressor and dryer.

## Reference Users

GE Energy Services, Electrical generation facility, coal, gas, nuclear facilities

## Advantages

The H2scan hand held HY-ALERTA™ 500 is Hydrogen specific. The response will not be compromised by other components in the gas stream. The portability allows checking at all locations of the generator including the bearing box, and the tubing running to and from the compressor/dryer. With a wide range of detection, the HY-ALERTA 500 is used to detect leaks from 15ppm to 100%. HY-ALERTA 1600 is used to ensure a safe area surrounding the generator if the generator room is in a contained environment.

## Additional Uses

### Start-up

During start-up of a hydrogen-cooled electric generator, air in the generator is replaced with CO<sub>2</sub>. This step is taken first so hydrogen is never added to air possibly reaching the LEL. After the generator is filled with CO<sub>2</sub> hydrogen is introduced until the generator is filled. With the hydrogen atmosphere intact, the generator can be started.



Model HY-ALERTA™ 500

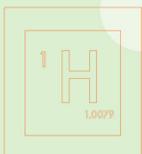
### Shut-down

During shutdown, the hydrogen atmosphere in the generator is first displaced with CO<sub>2</sub> and then the CO<sub>2</sub> is displaced with Air. The Hydrogen level can be read during all phases of startup, running, and shutdown.



Figure 2: Typical generator cooled with Hydrogen

Safe area monitoring in generator rooms



HYDROGEN SPECIFIC SENSING SYSTEMS



HYDROGEN IS THE FUTURE, WE CAN SENSE IT!



## APPLICATION NOTE

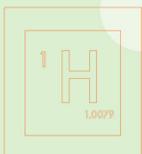


### HYDROGEN COOLED GENERATORS

Hydrogen leaking into the area surrounding the hydrogen generator could make the containment room potentially explosive. HY-ALERTA™ 1600 installed in generator rooms will ensure safety operation of generators. Programmable alarms, relays and system integration are available options.



**Model HY-ALERTA™ 1600**



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