

CATI 1.0 - Passive Catalytic Igniter

for Limitation of Combustion Loads on the Containment Walls in Case of Hydrogen Release during Severe Accidents

CATI 1.0 ensures deliberate ignition of combustible gases such as hydrogen at lowest-possible concentrations to protect containment integrity during severe accidents.

Challenge

During beyond-design core melt accidents metal-water reactions of the core, and concrete-core interactions lead to transient release of large amounts of combustible gases, mainly hydrogen and carbon monoxide inside the reactor containment. This involves rapid local formation of flammable mixtures of air and hydrogen which can release large amounts of energy when ignited. If random ignition occurs later at high hydrogen concentrations, the containment may be subjected to loadings large enough to degrade its integrity.

Solution

This increase in hydrogen concentration can be limited to levels well below the detonation limit. Early deliberate ignition serves to protect containment integrity. Initiating combustion as soon as small volumes of ignitable gas mixtures have formed results in a significant gain in safety. The loads incurred are then distributed in time and space and do not pose a threat to containment integrity. For this purpose, Framatome has developed a passive operating catalytic igniter which requires no external power supply.

- CATI 1.0 initiates combustion by using the same proven catalyst technology as in the Framatome PAR which is installed in more than 150 nuclear power plants worldwide.
- The catalytic igniter is self-activated at the onset of the accident and initiates combustion when the hydrogen concentration just exceeds the ignition limit of the gas mixture. The ignitions are localized and staggered in time so that loads do not challenge the containment.
- The catalytic igniter has been subjected to extensive functional and environmental qualification tests.

Customer benefits

- Qualified for severe accidents
- Reliable operation
- No external power supply required
- Easy installation
- Low maintenance effort

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is **our everyday commitment**



CATI 1.0 front view (left) and bottom view (right)

Technical information

- Dimensions
 - Diameter approx. 120 mm
 - Height 280 mm
- Weight < 5 kg
- Lower ignition limit 6.8 vol.-% H₂

Qualification program

- Resistance to thermal aging
- Tests of ignitable hydrogen concentrations at various water vapor concentrations
- Operation in the presence of atmospheric impurities generated after an accident (e.g. iodine, smoke from oil fires, aerosols)
- Seismic resistance

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