

## Spark Igniter

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

The spark igniter 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 molten 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 late 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 spark igniter with low electrical power consumption.

- The spark igniter generates high energy sparks at high frequencies that instantaneously initiate combustion when the hydrogen concentration just exceeds the ignition limit of the gas mixture. The ignitions are localized and staggered in time so that the loads do not challenge the containment integrity.
- The spark igniters are self-starting and/or are started from a control panel (or main control room). The spark igniters remain in operation during severe accident as required by the severe accident management strategy, can be put out of service and/or can be re-started again, if being temporarily set out of service.
- The spark igniters have been subjected to extensive functional and environmental qualification tests.



Spark Igniter: overview (left), spark generator (right)

### Technical information

- Dimensions
  - Diameter approx. 150 mm
  - Height approx. 200 mm
- Weight < 5 kg
- Power consumption: < 10-20 W (per igniter)
- Spark frequency:  $\geq 1$  Hz
- Lower ignition limit 6 vol.-% H<sub>2</sub>

### Qualification program

- Resistance to thermal ageing
- Resistance to radiological ageing
- Function tests with thermodynamic loads
- Seismic resistance

### Customer benefits

- Qualified for severe accident
- Easy installation
- Reliable function
- Low Maintenance
- Low power consumption

**Your performance is our everyday commitment**

**Contact:** [containment-systems@framatome.com](mailto:containment-systems@framatome.com)  
[www.framatome.com](http://www.framatome.com)

It is prohibited to reproduce the present publication in its entirety or partially in whatever form without prior written consent. Legal action may be taken against any infringer and/or any person breaching the aforementioned prohibitions.

Subject to change without notice, errors excepted. Illustrations may differ from the original. The statements and information contained in this publication are for advertising purposes only and do not constitute an offer of contract. They shall neither be construed as a guarantee of quality or durability, nor as warranties of merchantability or fitness for a particular purpose. All statements, even those pertaining to future events, are based on information available to us at the date of publication. Only the terms of individual contracts shall be authoritative for type, scope and characteristics of our products and services.