framatome

Mobile Box Sipping

Leak Tightness Test for Irradiated Fuel Assemblies

Reliable detection of defective fuel assemblies with short to long storage times

Challenge

Operators of nuclear power plants are facing challenges with spent fuel in storage pools, especially when dry cask storage or transport to external storage facilities is planned. Fuel assemblies will only be reloaded or transferred to external storage facilities when their conditions have been assessed and all leaking or damaged conditions have been addressed to meet the regulatory safety requirements.

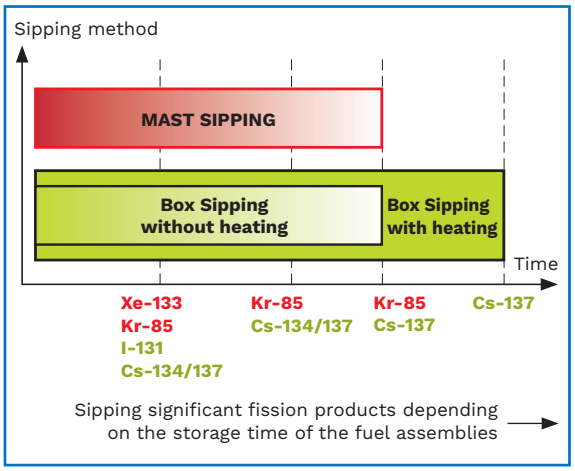
Solution

Leaking fuel assemblies with shorter spent fuel pool storage times can be detected easily by the proven Box Sipping, which can also be utilized during refueling if Framatome's MAST SIPPING is not utilized. For fuel assemblies with longer spent fuel pool storage times, Box Sipping is recommended for the following reasons:

- Fuel assemblies with relatively short storage times show a relatively high concentration of the fission products Xe-133 and Kr-85 but the concentration of all fission products declines with increasing spent fuel pool storage time. After decades, only Cs-137 dominates the water phase and can clearly be detected by Box Sipping with its integrated heating system. Therefore, Box Sipping is recommended for fuel assemblies with longer storage times. By heating, the fission products are extracted and concentrated within the fuel assembly testing canister. The high and quick concentration of fission products leads to a clear leak tightness testing result. No other method can provide better results for irradiated fuel assemblies with long spent fuel pool storage time.
- Defective fuel rods that exhibit high degradation being filled with water can be reliably detected utilizing the Box Sipping heating feature. Heating the fuel rods allows releasable water-soluble fission products (Cs-137) to communicate with the test canister water if there are no gasses present within the leaking fuel rod.

Mobile Box Sipping can be used to test fuel designs for pressurized water reactors (PWRs), boiling water reactors (BWRs) or Russian-type (VVER) reactors.

The Box Sipping system is available for purchase or lease.



Sipping methods during outage and after long-time wet storage

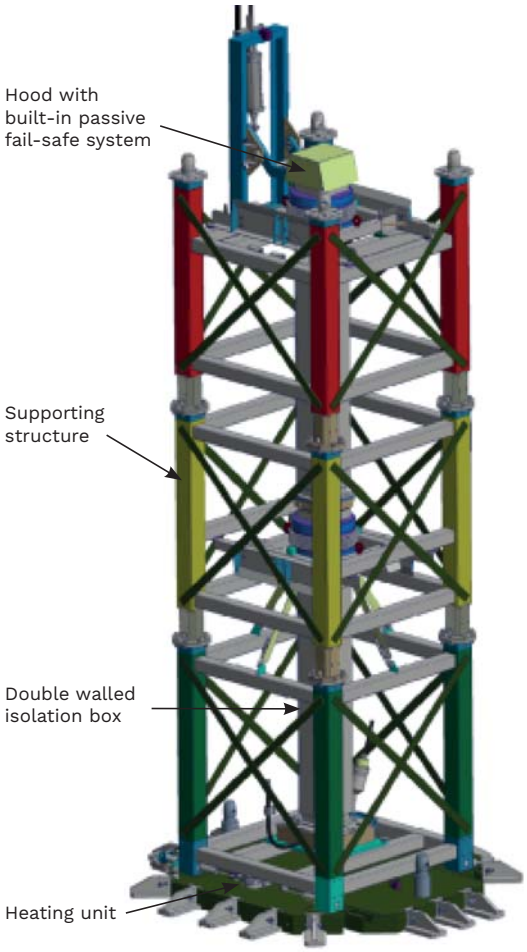
Customer benefits

- Reliable leak tightness test, proven since 40 years and now mobile
- Efficient sipping operations – two fuel assemblies can be examined per hour
- Options of online water gas measuring as well as taking water samples
- Inherently safe
- Easy and fast decontamination of all wetted and gas-loaded components

Your performance
is **our** everyday **commitment**

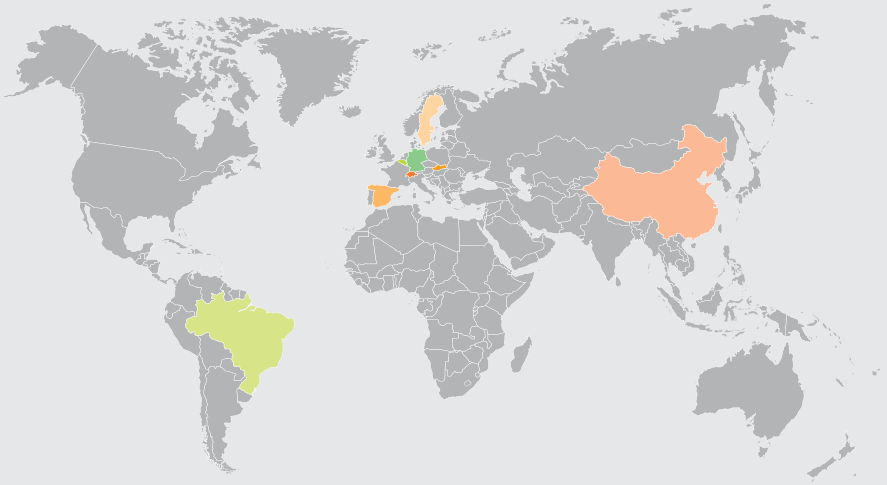
Technical information

- Our new single-cell Mobile Box Sipping unit can be set up temporarily, where the transportation and storage cask usually is placed.
- The supporting structure of the cell is designed to withstand a certain level of seismic impacts. Additional structural measures can be implemented, if higher seismic requirements are necessary.
- No vacuum-pressure tight box is necessary.
- The passive fail-safe system is inherently safe: fuel assemblies are always surrounded by water (no drying out during testing).
- The measuring efficiency is enhanced due to concentration of fission products: fission products concentrate in a small space after being driven out of the fuel rod by heating up.
- Very effective isolation leads to a very short heat up time.
- Due to easy and fast decontamination, dismantling and transport preparation time is reduced.



Mobile Box Sipping unit

References



Country	Type
Belgium	PWR
Brazil	PWR
China	PWR
Germany	PWR
Slovakia	VVER
Spain	PWR
Sweden	Interim storage facility
Switzerland	PWR

27 Box Sipping systems delivered worldwide, thereof 14 systems in Germany

Contact: sales-fuel@framatome.com
www.framatome.com