

## The New BAM Drop Test Facility for Big Full-Scale Casks

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The Federal Institute for materials research and testing (BAM), Germany, constructed in 2004 a new drop test facility that allows drop testing of full-scale spent fuel and HLW casks of the new generation. Due to improved cost-benefit relation these cask are designed to larger dimensions and higher total mass of the transport package. Additionally, since these casks are designed to serve as dual purpose cask for transport and long-term interim storage, full-scale drop testing has been taken under consideration within appropriate testing of those new designs.

The new BAM drop test facility is constructed for test objects with a mass up to 200,000 kg and provides the capability for lifting and dropping in any desired orientation from a height of 9 m or more.

The main construction features are:

- 36 m high drop tower as steel pipe construction.
- 200 ton hoist on top of the drop tower, with a maximum hook height of 30 m.
- A 24 m x 20 m closed test hall below the drop tower with moveable roof and rolling gates.
- A 80 ton overhead crane inside the test hall.
- The unyielding target is realized by a reinforced concrete block with the dimension 14 m x 14 m x 5 m depth, with a mass of 2,450,000 kg, and with an impact pad made of anchored mild steels plates 10 m x 4.5 m x 0.22 m.

The impact pad consists of a center steel plate 2.5 m x 10 m x 0.22 m and two side steel plates 1.0 m x 10 m x 0.22 m, also embedded and fixed on the concrete block.

Various detaching devices developed by BAM are used to release packagings, depending upon their weight. For packages up to 200,000 kg, a hydraulically operated system is in use. The technical principle is that the rupture of a steel bolt by a hydraulic mechanism with an electric controlling device releases the test object, causing it to drop moment free. The bolt is adopted to the test object's mass by varying the cracking pressure on the selected notched bolts diameter. Up to a object mass of 20,000 kg smaller release devices operate by electro-mechanical mechanism.

The drop tests with two big spent fuel casks (141,000 kg and 181,000 kg) on technical tour events during PATRAM 2004 demonstrate the first operation and practical tests of the new BAM drop test facility.



**Fig. 1.** Construction of the unyielding target realized by a reinforced concrete block with the dimension of 14 m x 14 m x 5 m depth and a mass of 2,450,000 kg.



**Fig. 2.** BAM drop test facility in Horstwalde for big full-scale cask:  
Overall view and detaching device for test object's mass up to 200,000 kg.



**Fig. 3.** Preparation of full-scale spent fuel casks for 9 meter drop testing at the BAM drop test facility.