

## HOT CELL COMPLEX IN FRM-II

D. COORS and R. PÄHLKE

*Framatome ANP GmbH, Erlangen  
Freyeslebenstraße 1, 91058 Erlangen, Germany*

The new research reactor in Garching FRM-II is equipped with a  $\beta,\gamma$ -type Hot Cell complex which is located in the Reactor Hall above the west end of the storage pool just on top of the pool. It mainly serves for

- cutting off the heads of spent fuel assemblies,
- cutting and packaging of activated components into shielded casks for waste disposal,
- inspection of activated components and
- intermediate storage and packaging of irradiated probes.

The Hot Cell complex consists of two cells:

- a small cell at a low contamination level serving for shielded cask handling and hot cell crane inspection, equipped with a shielding gate towards the Reactor Hall and
- a large cell with the equipment needed for cutting, packaging and inspection. Both cells are kept at a slight underpressure; they are separated by an internal shielding gate which can be opened in three vertical levels enabling the horizontal transfer of the hot cell crane with or without unshielded casks or for access of personnel to the large cell if required.

The inner dimensions of the cells are: 6.3 m x 2.3 m in the large and 2.2 m x 2.5 m in the small cell. The walls are made of heavy concrete of 4.5 g/cm<sup>3</sup>. The wall thickness is below 1 m, it varies with the height. This allows for a maximum activity of  $3.7 \times 10^{15}$  Bq Co-60 in the large cell linked to a maximum dose rate of 5  $\mu$ Sv/h at the service area in front of the hot cell. The inner height of 6.5 m in both cells allows for a vertical transfer of all components under consideration.

The walls, the floor and the ceiling are clad at the inside with an austenitic steel liner, i. e. with sheet metal welded on profiles which are anchored at the concrete. At locations with higher load impact to the wall the liner is reinforced with thick backing plates. Two leak tight plugs in the ceiling allow for access to the cells for special operations.

The basic equipment of the cells consists of

- one two-directional crane with 10 kN capacity,
- two pairs of master slave manipulators placed above two lead windows,
- one bi-directional small parts lock in the wall,
- one hatch to the storage pool with a cover equipped with an external actuation,
- one movable table for different works,
- lightning, dose rate measuring, tv-camera and noise transmission.

This is supplemented by an equipment needed for the special requirements to this cell complex, e. g.

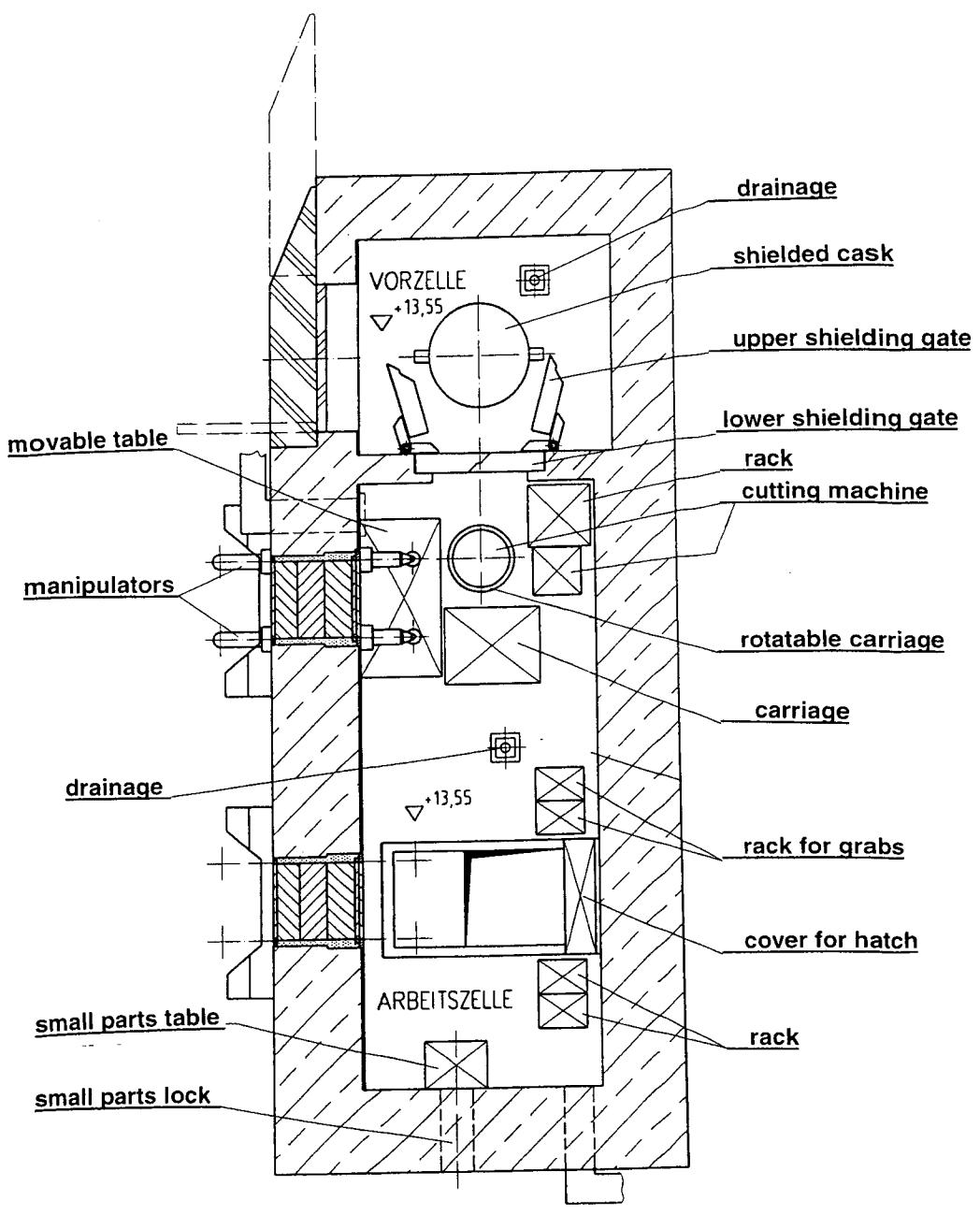
- a cutting machine for reducing the size of components to small pieces,
- several grabs for the remote handling of reactor components stored in a special rack,
- two small trolleys on rails for support of the handling processes in the large cell and
- one hand driven carriage for transferring a 100 kN shielded cask from the reactor hall into the small cell.

A typical handling sequence in the Hot Cell for activated waste can roughly be described as follows:

- Positioning of the component in the storage pool under water below the hatch leading into the large cell with an under water carriage,
- coupling of cell crane and grab to the component,
- lifting of the component into the large cell,
- horizontal transfer to the cutting machine,
- clamping of the component to the cutting machine above an open R200-drum,
- cutting to the required dimensions (cut pieces drop into the drum),
- closing of the R200-drum,
- transfer of the R200-drum to the small cell with the crane,
- positioning of the R200-drum in a shielded cask,
- closing of the shielded cask, opening of the shielded gate to the reactor hall,
- transfer of the shielded cask to the reactor hall on a carriage,
- transfer of the shielded cask to the first floor with the reactor hall crane and further to the cask store with a carriage.

The handling sequence for a fuel assembly starts similar, however, after cutting off the head (which drops directly into the drum) the remaining main part of the assembly is transferred back to the storage pool and is either stored in the under water storage rack or loaded directly into the shielded fuel transport cask MTR-II.

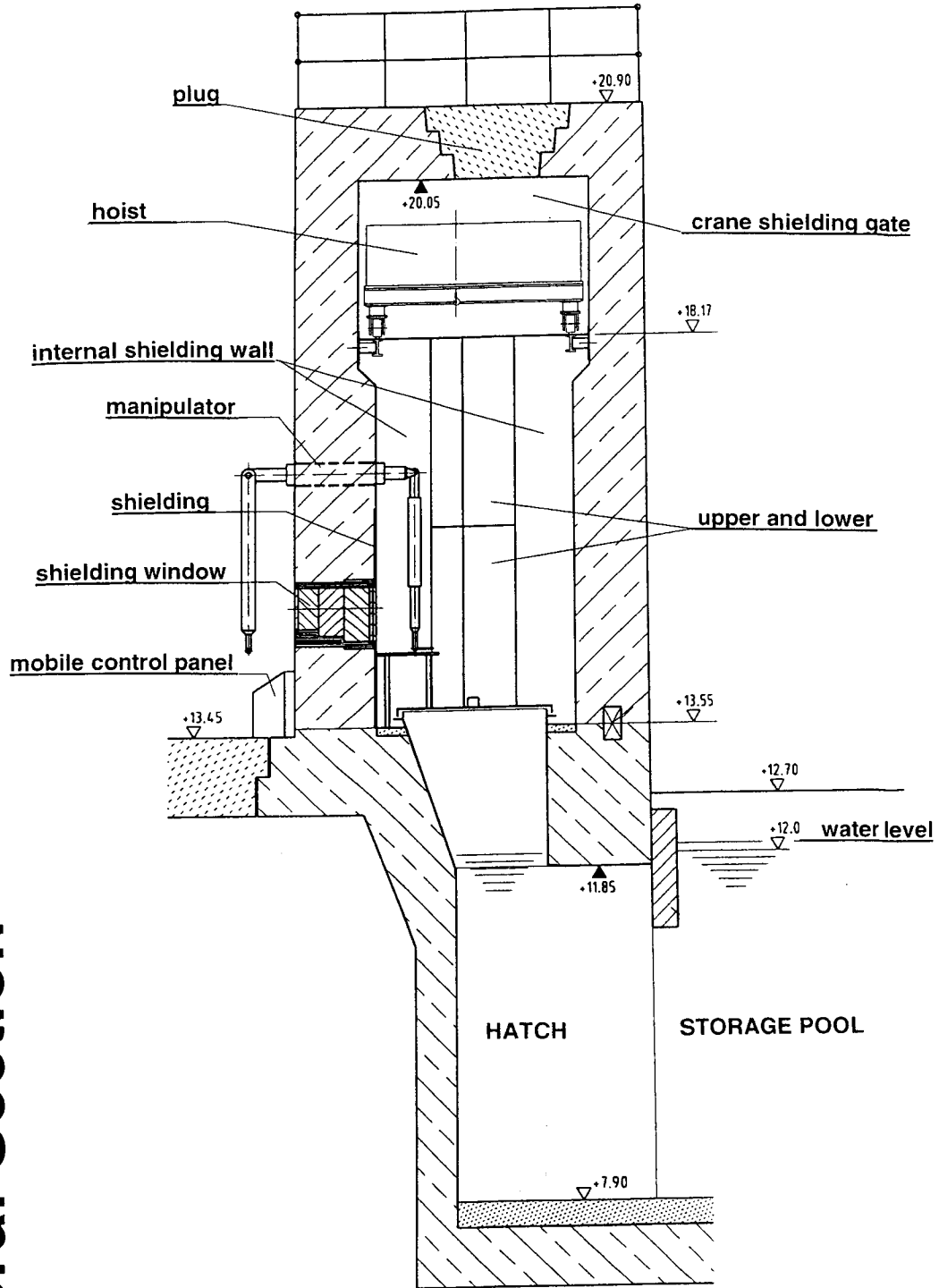
# Cross Section, Arrangement of Equipment



FRM-II, Hot Cell Complex

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# Lateral Section



FRM-II, Hot Cell Complex

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# Service Area

# Window and Control Panel

# Rotation of Dummy Fuel Assembly after Cutting off the Head