Building, Supply Facilities and Infrastructure COSY Jülich

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1. Building

The COSY-building consists of three adjoining sections.

1.1 COSY-hall

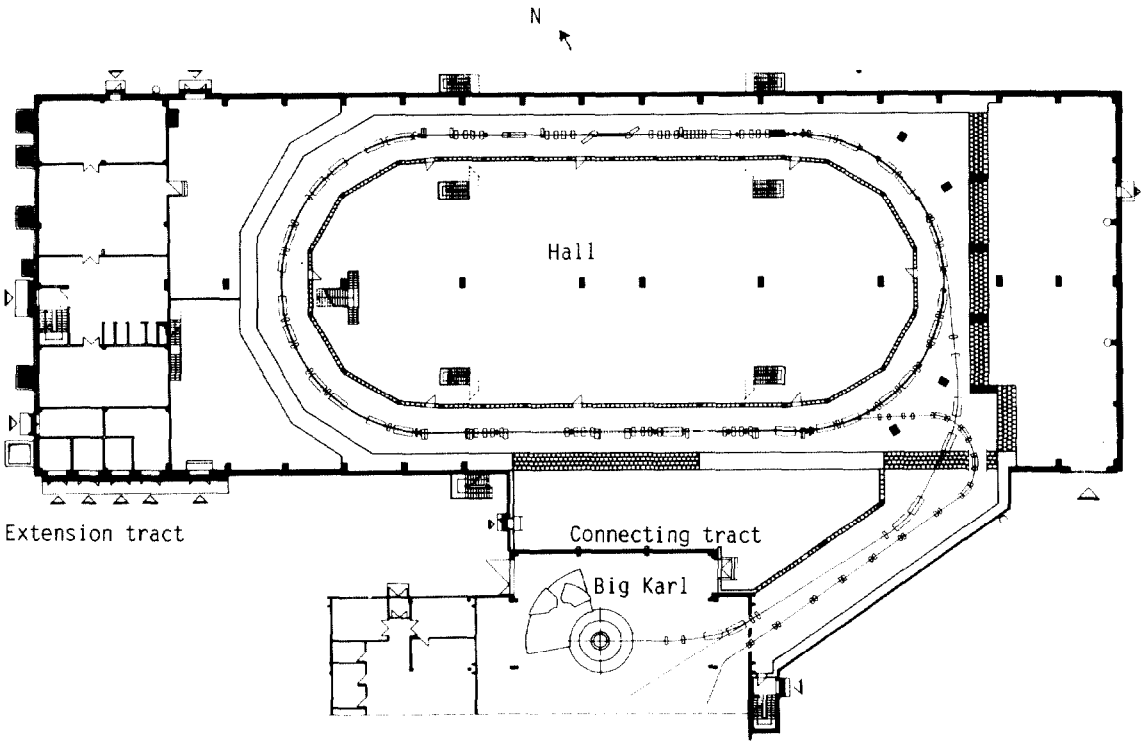
The accelerating- und storage ring is accomodated in a hall with the dimensions: 104 m length, 41 m width and 14 m height. The ring itself is contained in a concrete tunnel to shield radiation. On the longitudinal sides the inner width of the tunnel is about 4.6 m, the short sides about 5.6 m. The overall height of the tunnel is 3.6 m. The remaining areas outside the shielding are available for experiment stations and assembly space but also for storage. A possible extension of the COSY-hall has been provided for on the east-facing side. To lower construction costs, intermediate supports are erected. In the so divided hall two parallel moving cranes with a carrying force of 320 kN each are installed.

1.2 Extension tract

The west-facing side of the hall adjoins the extension tract which has a width of 14 m. The basement is constructed to contain most of the supply facilities, i.e. pumps and heat exchangers for the magnets - and power supply - cooling systems, heating and water facilities, the compressed-air plant and a waste water reservoir for active H_2O. Next to the control and computer rooms are transformers and switch gear for the buildings's power supply. The power supply for the magnets is on a seperate electric mains feed in the connecting tract. Offices for scientists and rooms for air-conditioning aggregates, which supply the hall and accelerator tunnel, are accomodated in the first story.

1.3 Connecting tract

The existing north-wing of the cyclotron JULIC is in communication with the COSY hall via the connecting tract. A beam-line from the cyclotron serving as an injection for COSY leads directly to the COSY-ring. An additional extraction beam-line runs parallel and can conduct the beam out of the COSY ring for external use. Access space on the ground floor is available for experimental stations. The first and second floors contain transformers for the magnets power supply. The air conditioning for this building operates on the third story.



COSY-building main story

2. Concept for Radiation Protection

2.1 Shielding

To meet the demands of radiation protection, the shielding of the ring towards the sides and the top will be designed in concrete. The shielding at the outer longitudinal sides of the ring is casted and part of the hall wall. Stackable concrete stabs will be used for the inner shielding as well as for roof shielding.

Because the proton loss-rate is very difficult to forecast and rendered more complicated being dependent on the respective experiments at the target stations, the following radiation protection measures were chosen.

The COSY-ring will be provided with a so-called "base-shielding". This shield-tunnel will be 2 m thick for the outer walls and 0.5 m for the inner walls and ceiling. The hall may not be entered during operation and should be designated closed area.

Should the "base-shielding" not be sufficient at higher proton loss-rates, the possibility of reinforcing all ring walls has been furnished, by stacking additional concrete stabs. For this, ample space has been allowed.

2.2 Ventilation

To abduct the heat, which will be produced by the accelerator about 38,000 m^3 air per hour will be needed. To meet the radiation protection standards following measures will be taken to control air-activity caused by radiation losses and if necessary drained off.

The required air volume will be blown into the hall to flow into the tunnel through vents placed evenly distributed in the floor of the ring tunnel. The exhaust air is sucked from the tunnel by an air-duct covering the whole length of the tunnel ceiling. Before the exhaustion air is released from the roof it is conducted through uptakes to be monitored.

This concept allows a directed air flow from the hall through the tunnel and prevents an uncontrolled transmission of active air into the hall.

3. Energy Supply

For the energy supply a pulsed peak power of 15 MVA is necessary. The magnets have their own seperate 110 kV feed. The switch plant for the 21 kV voltage is installed in a building near the COSY-hall. The power supply units use molded resin transformers mounted on the concrete ceiling of the injection and extraction beam-lines.

4. Cooling Systems

Heat from the two primary cooling circuits for the magnets and power supply units is given off to the secondary circuit through heat-exchangers situated in the basement of the extension tract. The secondary cooling circuit is operated at a slightly higher pressure than the primary circuits to prohibit flow of possibly active water into the secondary circuit during a leak in the heat exchanger.

The produced heat of about 5 MW will be driven off by cooling towers operating in the closed circuit.