BUILDING AND SUPPLY FACILITIES OF COSY JÜLICH

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The COSY building has been completed. The most important technical data are given for the power supplies and the cooling circuits.

Buildings

The license for construction of the COSY building was granted by the authorities in late May 1988. The laying of the foundation stone, which took place on July 7, 1988, was associated with the signing of a cooperation agreement between North Rhine-Westphalia University Working Group (CANU) and the KFA Jülich on joint utilization of COSY.

At the end of September 1988, the concrete base plate, 1 m in thickness, was cast in one operation without any joints in just three days. After the shell of the COSY hall has been completed, as well as the adjoining wing with the control room and the intermediate wing containing accomodation for the power supplies and their transformers, the topping out ceremony took place on May 31, 1989. The interior of the building was completed within the envisaged schedule.

Energy Supply

Two independent systems are installed for the energy supply of the facility. The COSY ring requires a pulse power of approx. 15 MVA and a continuous power of 10 MVA. A gas-insulated line leading to a 21 kV transformer station was laid underground from a Rheinisch Westfälische Elektrizitätswerk (RWE) 110 KV transformer unit to supply the dipoles, quadrupoles, sextupoles, steerers, pumps and septa, as well as for the high frequency and the electron cooler. The 21 kV switchgear assembly was installed next to the COSY hall, with a cable route leading to the first floor of the intermediate wing where the cast-resin transformers for the power supplies are located. The rooms for the power supplies are on three floors directly adjacent to the transformers so that only relatively short cable runs are required. The most important data for the power supplies are given in Table 1. The other energy fed with approx. 2 MVA serves to supply the general electricity requirements of the buildings, the machinery and the COSY experiments. The necessary 10 kV / 0.4 kV transformers are accomodated in the adjacent wing.

Table 1: Data of COSY power supplies

Status: May 1990

	Load	Number of power supplies	Mode: dynamic/ continuous	Power per supply	Voltage	Current	$\frac{\Delta I}{I}$
1	dipole	1	ramp/DC	6.500 kVA/ 1.910 kW	1300/382 V	5000 A	$+/- 1 \times 10^{-4}$
2	quadrupole MQU	6	ramp/DC	103 kVA/ 71 kW	188/130 V	550 A	$+/- 8 \times 10^{-4}$
3	quadrupole MQT	8	ramp/DC	148 kVA/ 94 kW	270/170 V	550 A	$+/- 8 \times 10^{-4}$
4	backleg windings/dipole	12	ramp/DC	1 kVA/	40 V	25 A	$+/- 1 \times 10^{-3}$
5	sextupole MXL	5	ramp/DC	10 kVA/ 8,6 kW	32/ 27 V	320	
6	sextupole MXS	1	ramp/DC	6,7 kVA/ 6,4 kW	21/ 20 V	320	
7	sextupole MXG	1	ramp/DC	8,4 kVA/ 7 kW	102/ 85 V	82 A	
8	steerer	27	ramp/DC	1 kVA	40 V	25 A	$+/- 1 \times 10^{-3}$
9	inject. septum	1	DC	85,5 kW	45 V	1900 A	$+/- 1 \times 10^{-4}$
10	electrostatic septum	1	DC	0,32 kW	16...160 kV	2 mA	$\Delta u/u = 2 \times 10^{-3}$
11	extract. septum	1	DC	282 kW	94 V	3000 A	$+/- 1 \times 10^{-4}$
12	bumper	3	ramp	0,3 kW	240 V	230 A	5×10^{-2}
13	e-cooler	1	DC	444 kW	370 V	1200 A	$+/- 1 \times 10^{-4}$

Cooling Systems

The cooling system for COSY consists of five cooling circuits with a total power of 6500 kW. The most important technical data are given below (see Table 2).

Table 2: Data of the COSY cooling circuits

circuit	cooling power kW	conductance µs/m	flow m^3/h	T_S °C	T_R °C	pressure bar
magnets	5000	1	160	26	56	16
mains units	1100	5	50	25	45	10
injector	400	5	50	19	30	10
septa and HF	40	0.2	8	19	22	16
target	5	5	1	23	25	10

The cooling circuits for the magnets and mains units have a common secondary circuit. Heat is dissipated from the secondary side by a flow of water. In the case of return temperatures between 35 - 51 °C, the water is cooled to 30 °C before being released into the waste water system via an air cooling tower. Heat from the remaining circuits is relased into the cold water system of the KFA.

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