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DRAFT

MEMORANDUM

A / To : D. Hay / EN-MEF

De / From : C. Martel / GS-SEM
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Objet / Subject : New cooling system for building 904

Please find below a feasibility study, for comment, in order to provide new a cooling system inside building 904, based on your last requirements.

1 Description of the existing equipment

Building 904 is heated and ventilated. It is also equipped with a 150 kW nominal chiller (Make TRANE, reference CGAN 600), able to supply maximum 120 kW chilled water to three different circuits, via a 900 liters buffer tank and a 21.5 m3/h secondary pump.

The chiller is powered with normal current and there is no cooling redundancy.

- Circuit 1: 9 racks inside R-U18 to R-U34 rooms.
- Circuit 2: 45 racks in the R-U36 hall.
- Circuit 3: 100 kW (the recent circuit able to supply 10 racks of 10 kW each).

NB: circuit 3 was built even if the total existing cooling power is not sufficient to cool 100% of all the three circuits.

2 Requirements

The following basic data have been used in order to size the system:

- The 100% existing racks shall be 100% cooled.
- The indoor conditions of each new assembly will be 20$\pm$2°C, with maximum relative humidity < 60%, 4 people, 1kW specific heat dissipation.
- Monitoring room: R-E06, 10 people, 15 computers, 26°C maximum.

- Other rooms will totalize maximum 150 m2, with standard heat dissipation inside (180 W/ m2, 26°C maximum, no humidity control).

3 Proposal

This proposal is based on an existing central cooling of the building, using three chillers, with the best efficiency rate. Two chillers will be in operation when the third will be in standby for redundancy facilities (maintenance operations, faults, etc).

The new chilled water plant will be located outdoor, near the existing plant. Inside the building, it will be reorganised a distribution pressure vessel to serve 10 circuits, as defined in the tab below:

		Tin	Tout	Water flow	Cooling power	
	Description	°C	°C	m3/h	kW	Detail
Circuit 1	Existing baraqs	14	20	11.5	80	9 Racks
Circuit 2	Existing racks	14	20	5.7	40	45 Raks
Circuit 3	Recent racks	14	20	14.3	100	10 Racks
Circuit 4	Demineralised water	15	22	9.2	75	
Circuit 5	Assembly area	13	20	1.8	15	CMS CSCLine
Circuit 6	Wiring area	13	20	2.5	20	CMS CSCLine
Circuit 7	Room 1	13	20	1.8	15	RPC 1
Circuit 8	Room 2	13	20	1.8	15	RPC2
Circuit 9	Monitoring room	13	20	2.5	20	R-E06
Circuit 10	Other rooms	13	20	6.1	50	
Spare	30%			16.9	125.4	
				74.2	**555.4**	

A new assembly will consits of self supported 45 mm sandwich panel, with an accessibleroof, inluding a false ceiling.
The insulation of the panels will be composed of mineral wool.
The access of the area will be done via one air lock for people (width:0.9 m) and double door for equipemnt (width: 2.0 m).
each area will be equipped with standard lighting and 6 assemblies of electrical 230 V power sockets.

Each new Assembly area will be equipped with two or three ceiling-mounted chilled water cooling units.
The monitoring room will be equipped with five units.
The other rooms may be equipped in the future with fan coils.
The dehumidification will be performed by the cooling units.
The humidification process will be proposed as an option.

Each inside unit will have three operation speeds, and shall be oversized in order to have the maximum cooling capacity with the medium speed.

The routing of the chilled water pipes will be visible inside the building, up to walls and partitions.
The condensate water shall be drained outdoor via specific pumps and geberit piped down to the floor drainage.

4 Costs

The tab below gives the costs estimation at this stage of the project:

Main system			kCHF
Civil structure and grids			35
Main electrical power supply			TBC
Chillers (300 kW)	3	120	360
Primary pumps	3	6	18
Secondary pumps	6	5	30
Buffer tank	1	30	30
Pipes	1	120	120
Electrical power cabinets			50
Regulation			60
Monitoring			30
			733

One assembly area			kCHF
Walls, doors and ceiling			80
HVAC			30
Electrical works			20
Humidification >40%			7
			137

The previous costs are draft, and were not established from a detailed design. Anyway, they should give an indication for the project at this stage.

Installation schedule to be agreed according to the users.

5 Reserves

- The proposed installation will be power supplied via normal current. In case of electrical power cut, the HVAC system will stop, and will restart when the electrical power supply will be back.
- No redundancy cooling is foreseen (the costs of a standby unit are not included).
- The final installation will be documented and covered by the general CERN operation and maintenance contract, free of your charge.
- The Ethernet network is not included neither the phone sockets.
- The civil works are not included (floor painting, external doors, wall and roof insulation, key locks of the doors, etc).

- The demineralised water station is not included.