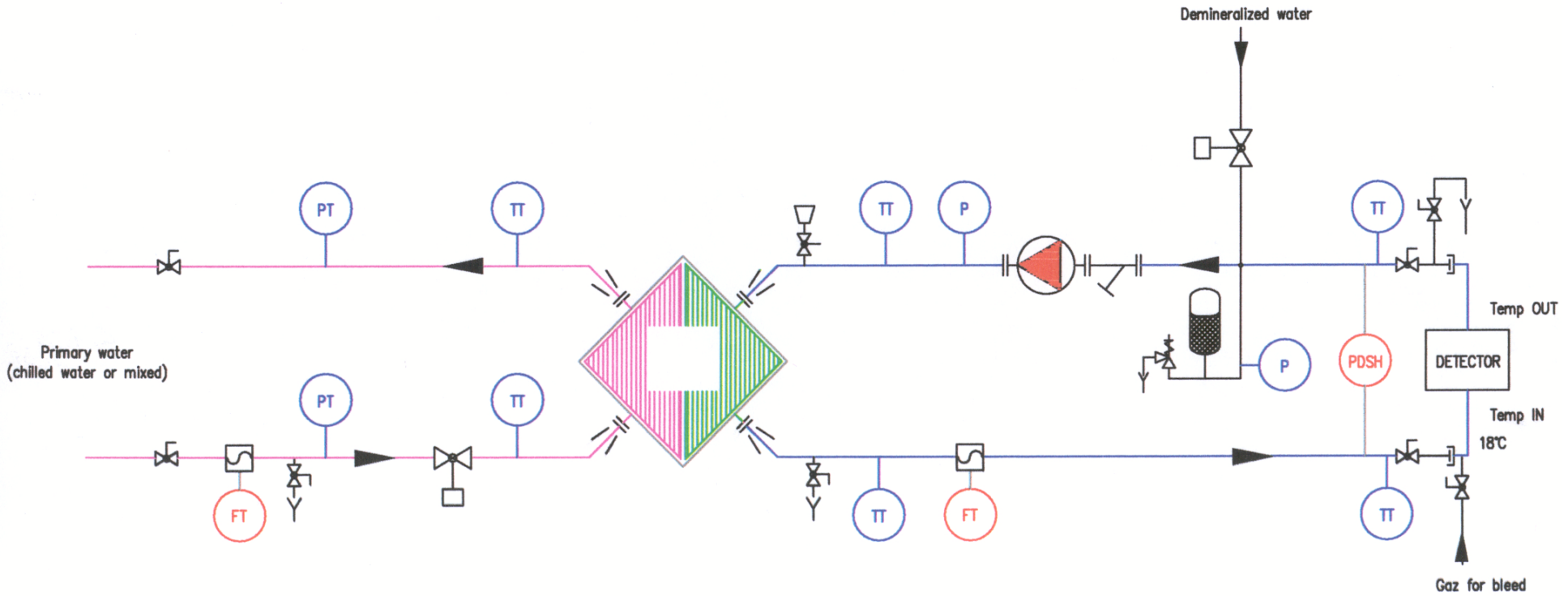
Application to a Super Module

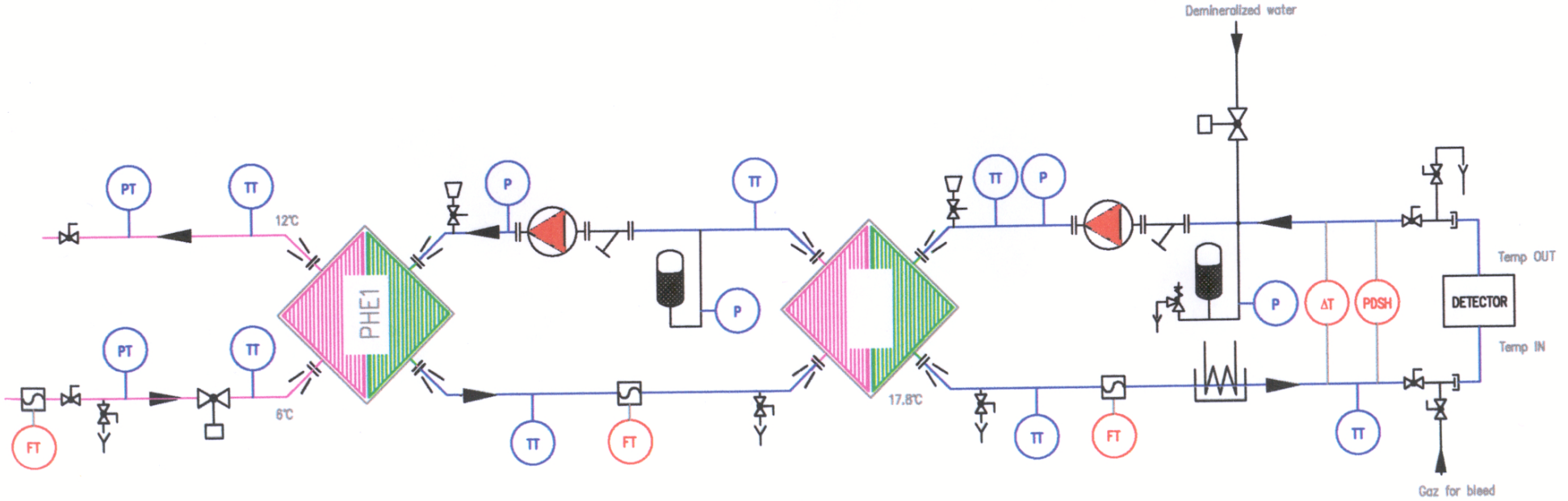
Hydraulic plans: Power circuit



Drawing B.Bourgoin

Application to a Super Module

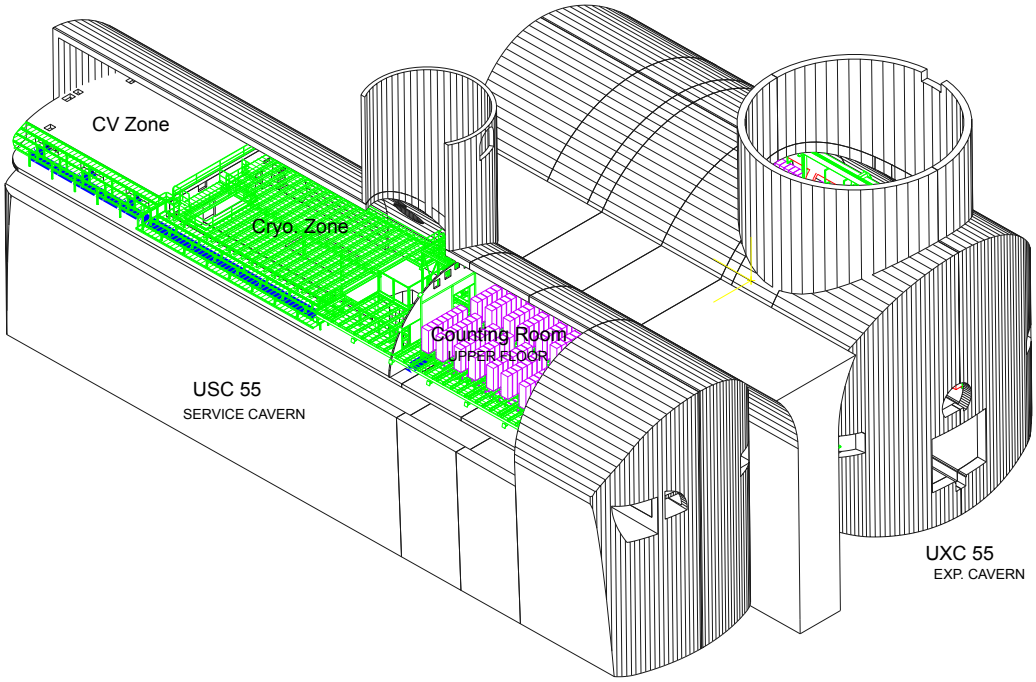
Hydraulic plans: Regulating circuit

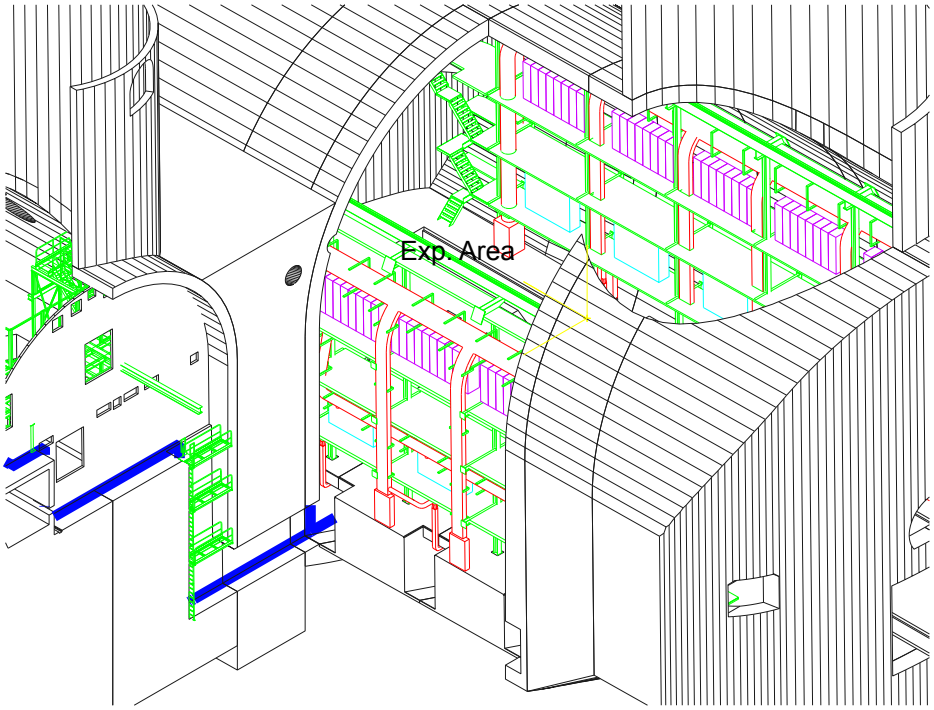


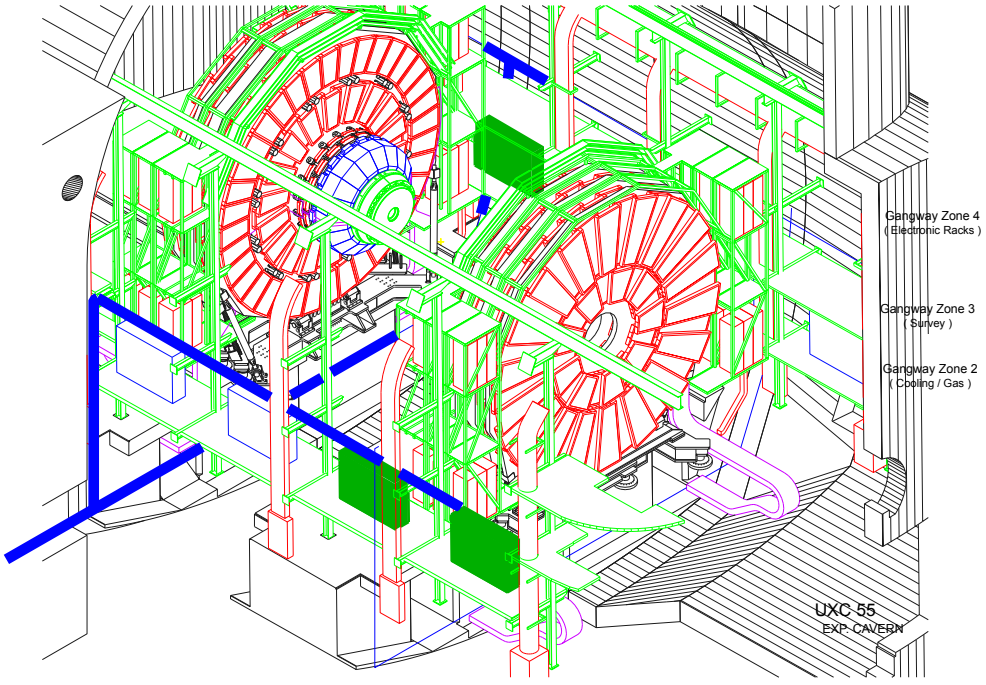
Drawing B.Bourgoin

COOLING SYSTEMS

Layout of piping from USC to UXC

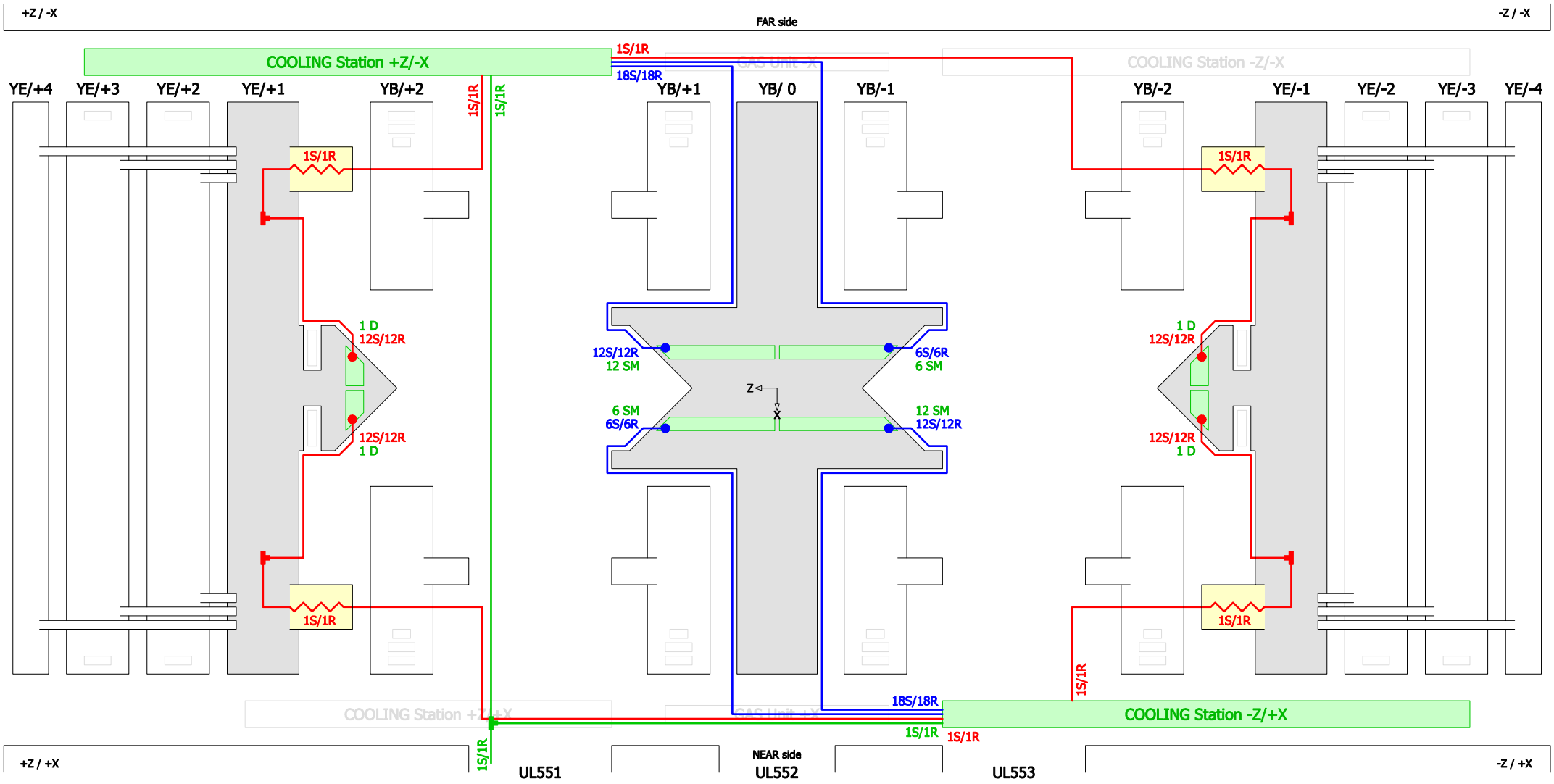






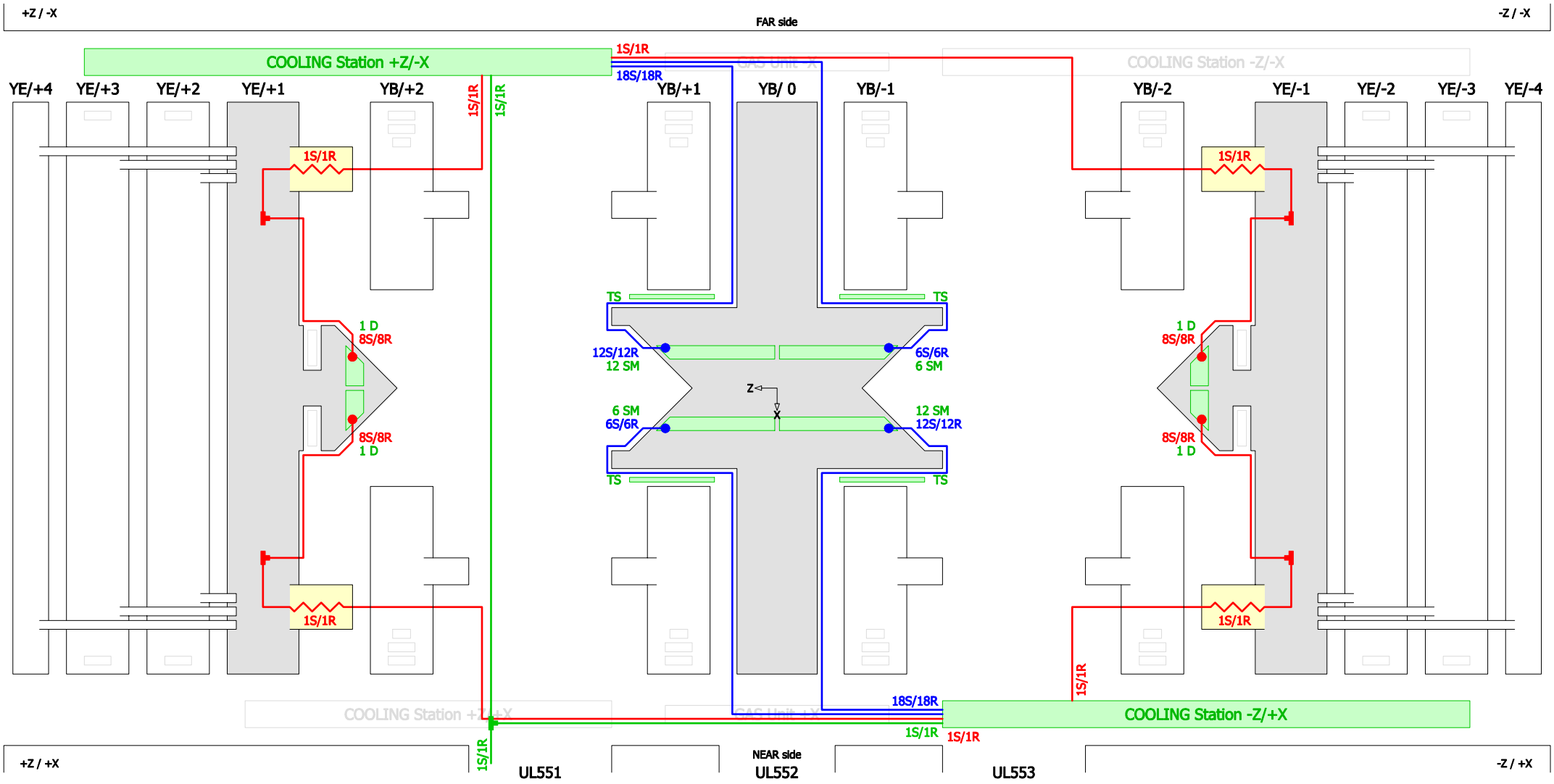
COOLING
REGULATING Circuit

ECAL
BARREL (EB) & ENDCAP (EE)



COOLING
POWER Circuit

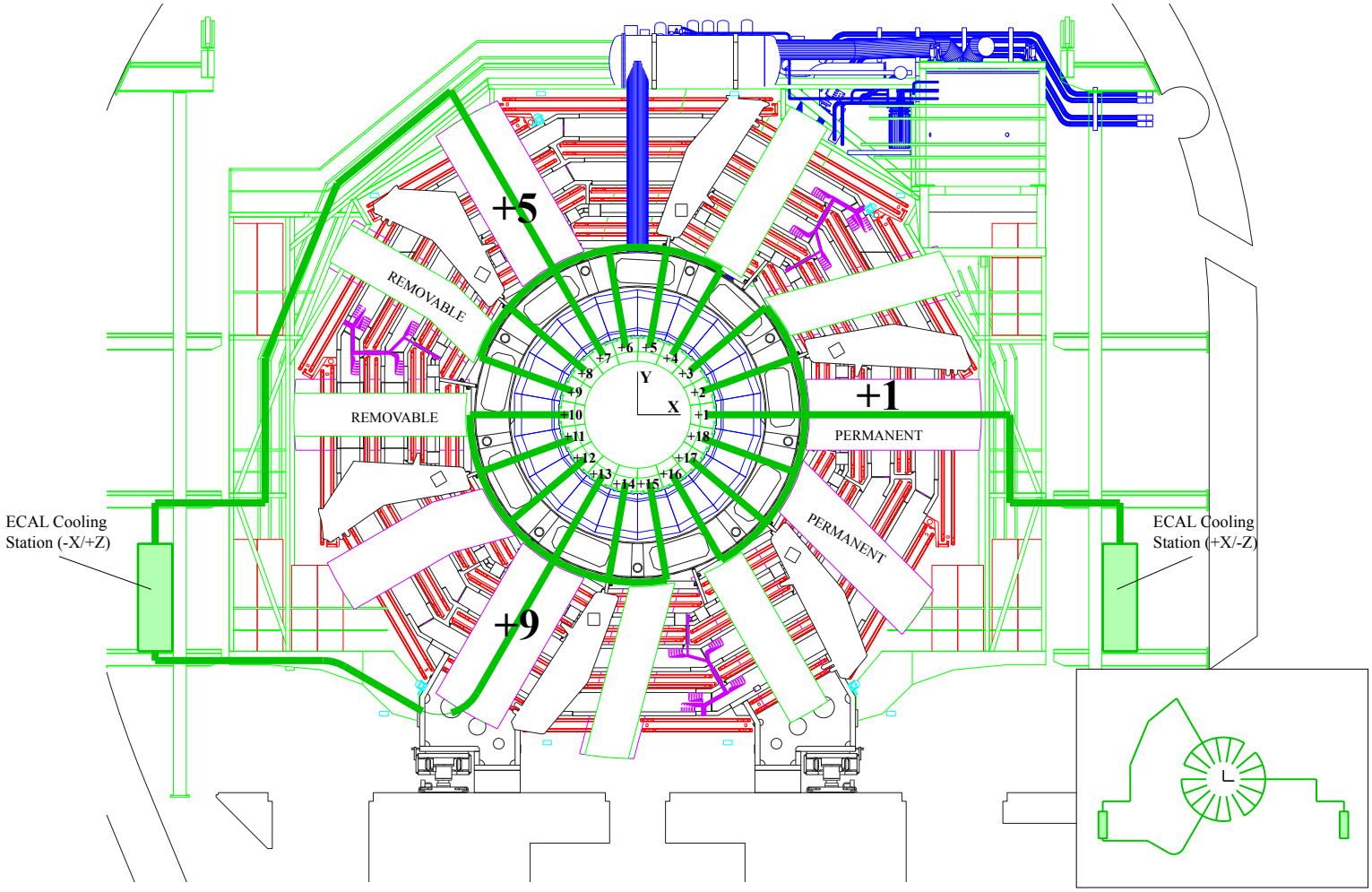
ECAL
BARREL (EB) & ENDCAP (EE)



EB Th. Regulation & Power COOLING

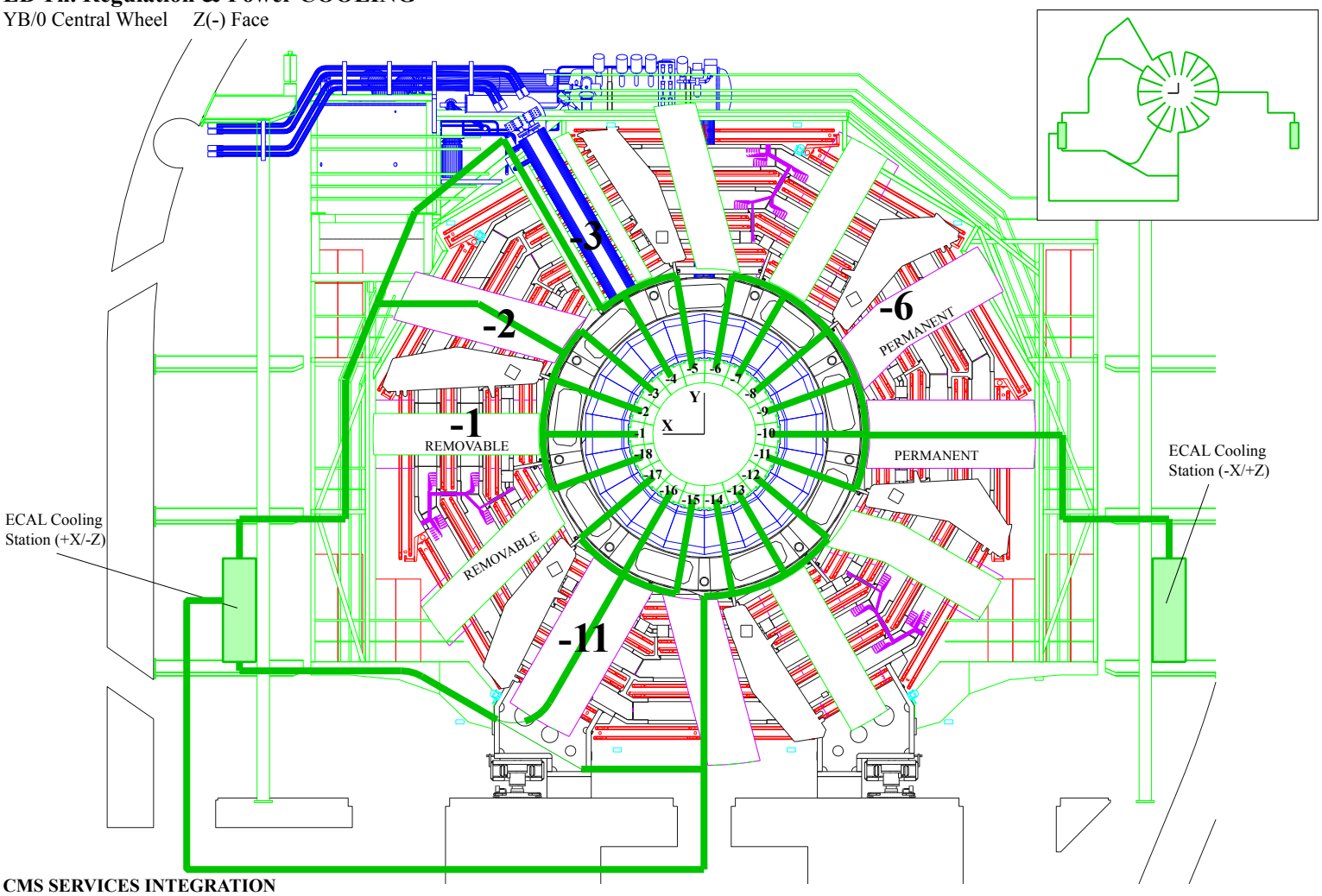
VERSION 2

YB/0 Central Wheel Z(+) Face



EB Th. Regulation & Power COOLING

YB/0 Central Wheel Z(-) Face



CMS SERVICES INTEGRATION

EB Th. Regulation & Power COOLING - 28 AUG 2001

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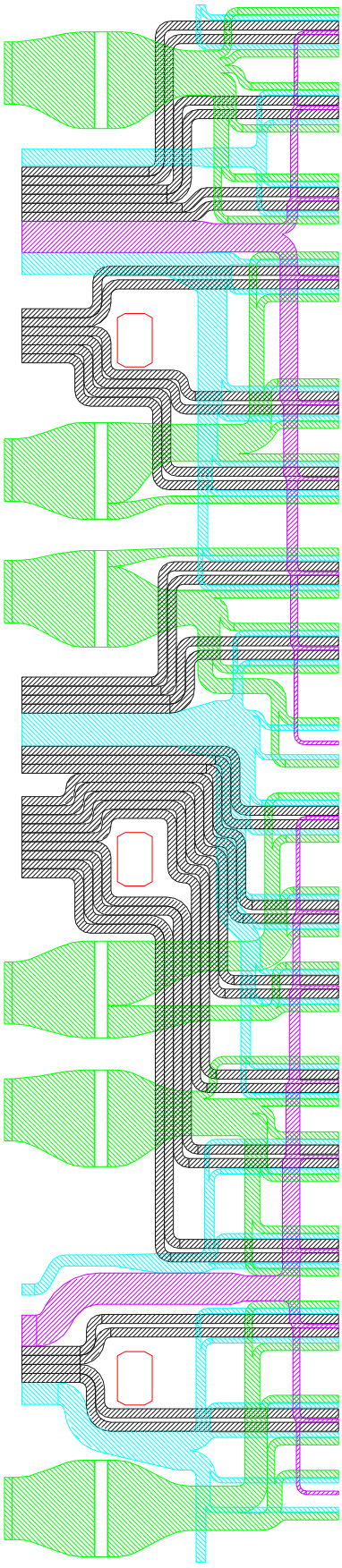
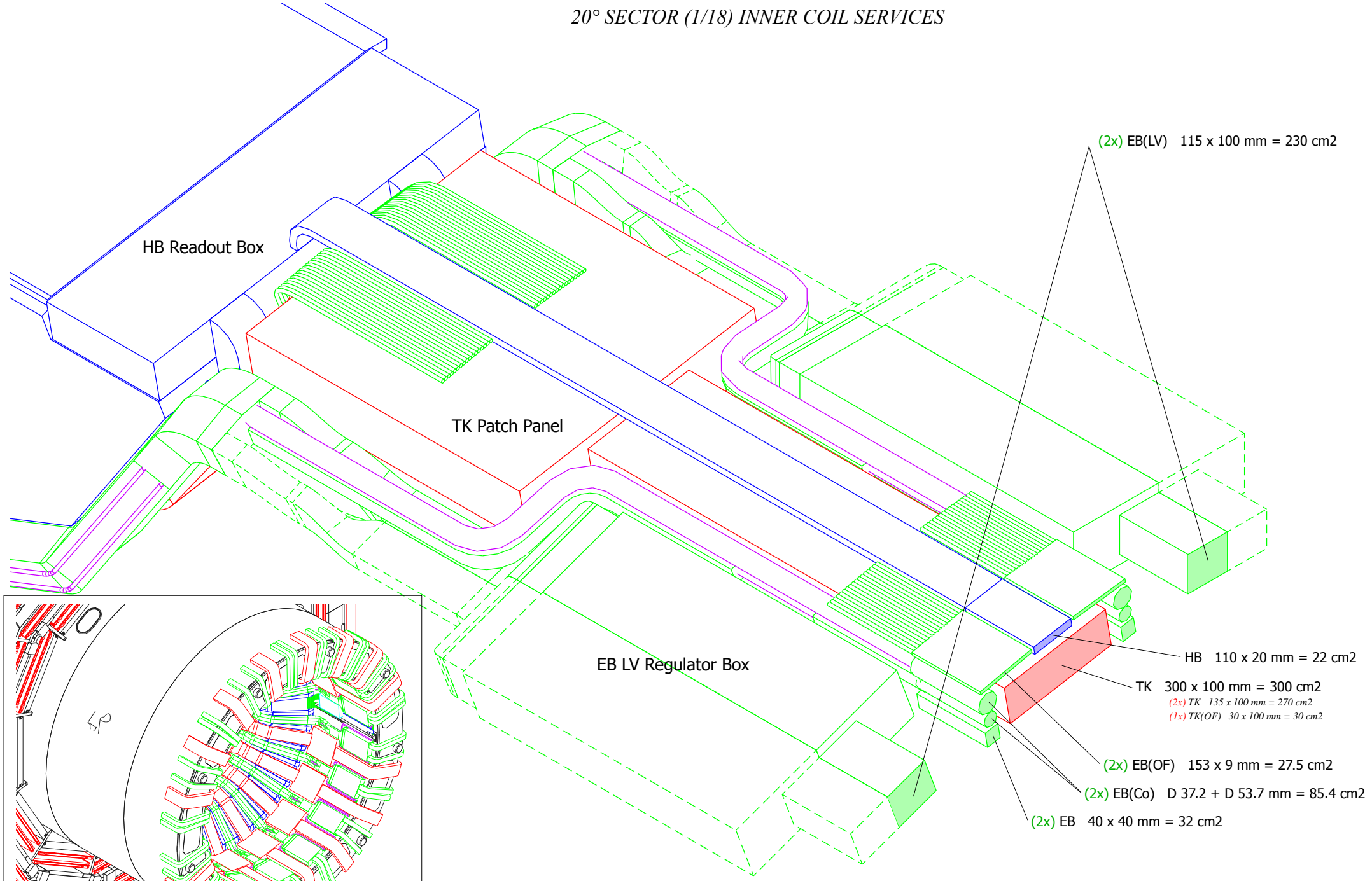


Dominique.Carrocci@cern.ch
DATE: 17-JAN-2002
EUCLID: DI_X2341PL
CDD:

20° SECTOR (1/18) INNER COIL SERVICES



CMS-DISIC-ED-0062 v.2 (EDMS Id: 320930)

CMS SERVICES INTEGRATION

20° Sector (1/18) INNER COIL SERVICES - 11 FEB 2002

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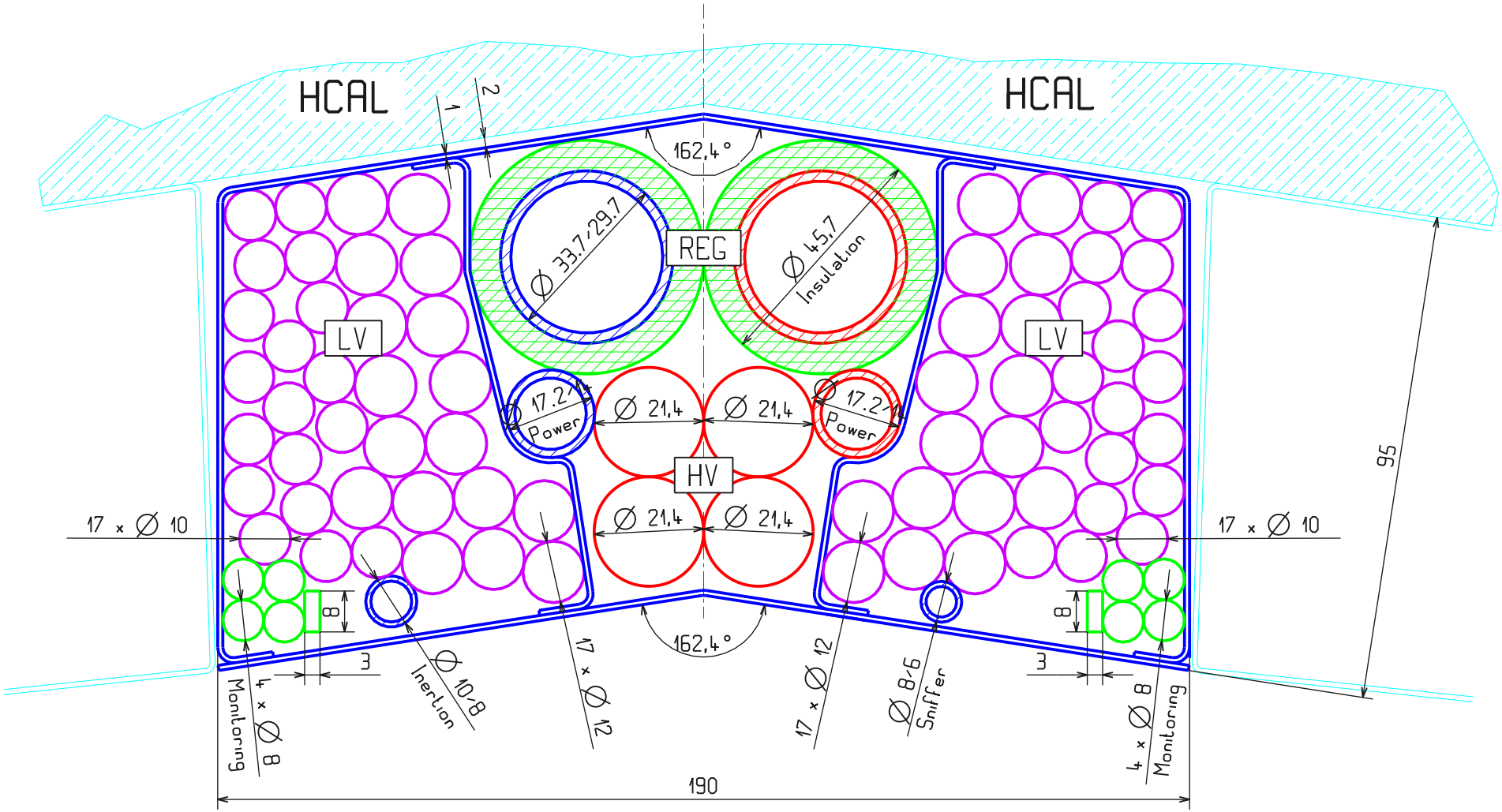
Cables and pipes cross section in 53° crack



Nota:
At the moment regulation cooling pipes are represented with 6 mm insulation and power cooling pipes without insulation.
In the future, the necessary insulation around regulation and power pipes will be a compromise between the space allocated by the integration group and the remaining space inside this cross section (previous figures were 1 mm for regulation and power pipes).

Section description:
2 Regulation cooling pipes Ø 33.7/29.7 (DN 25)
2 Power cooling pipes Ø 17.2/14 (DN 10)
1 Inertion pipe Ø 10/8
1 Sniffer pipe Ø 8/6
4 High Voltage cables Ø 21.4
34 Low Voltage cables Ø 12
34 Sense cables Ø 10
8 Monitoring cables Ø 8
2 Monitoring cables 8 x 3

ECAL BARREL EDR 05
D. Carrocci & F. Mossière
28/01/02

5 Hydraulic layout inside EE

Figure 1 shows, for one Dee, the topology of ECAL End cap cooling network with pipes diameter, as it is described in the previous section.

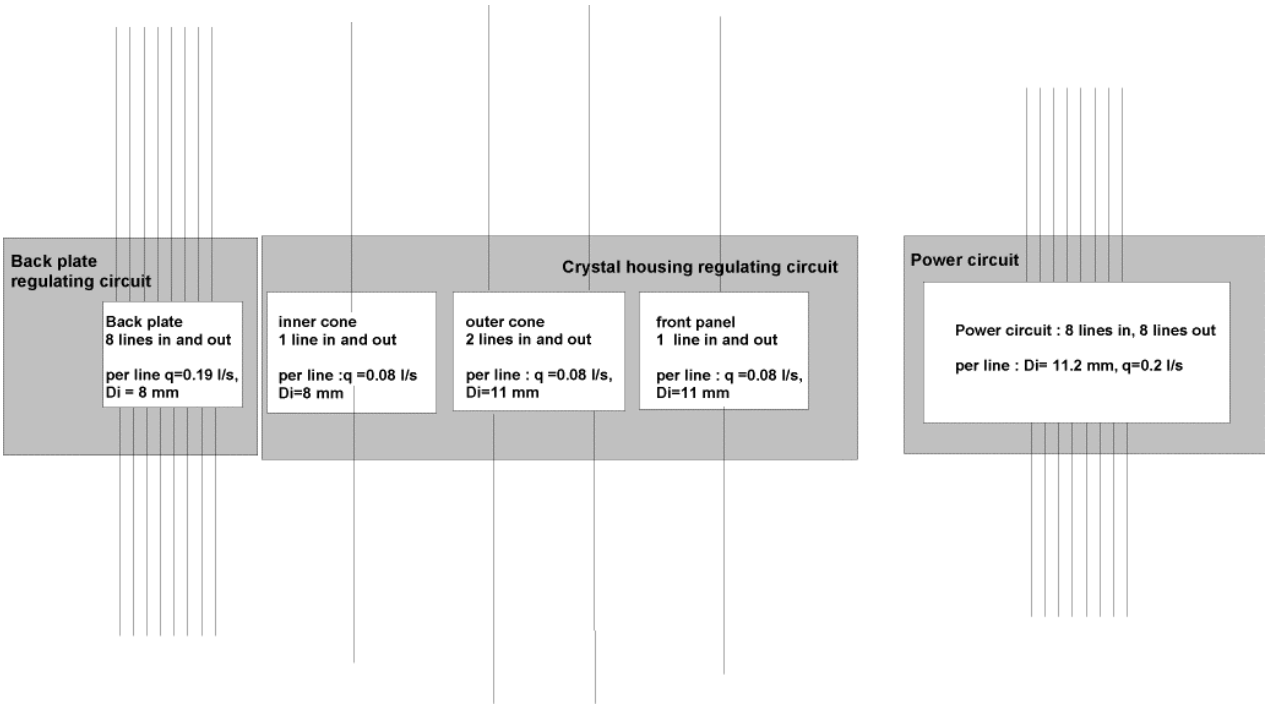


Figure 1**: general principal of EE cooling**

6 Pipes thermal insulation

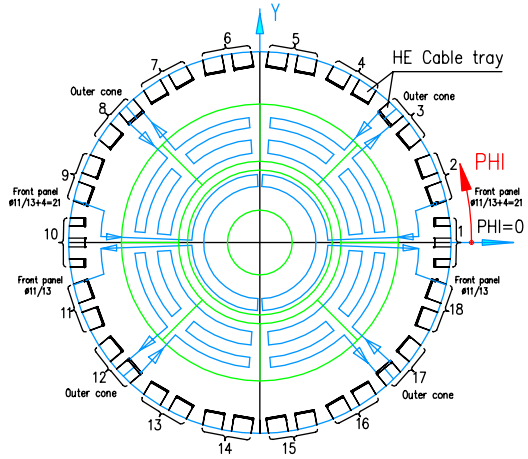
6.1 Power circuit

The power circuit is in charge of removing the heat dissipated by the Low Voltage (LVR) cables and cooling down the electronic boxes (VFE). Inside CMS and its service sectors, the power circuit pipes will be embedded, until the EE patch panels, between the LVR cables in order to cool them down. After the EE patch panels, the pipes will have to cool down the VFE.

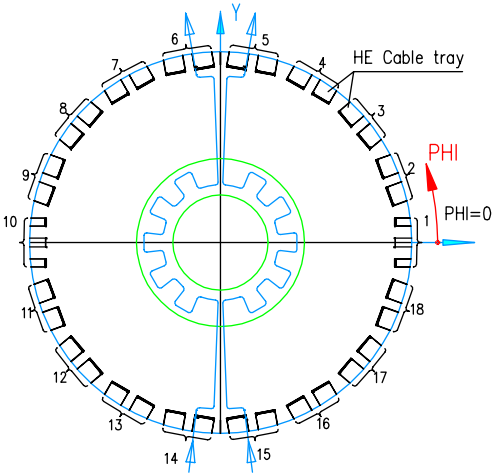
Therefore no thermal insulation is required for the power circuit, at least inside CMS detector.

DRAFT

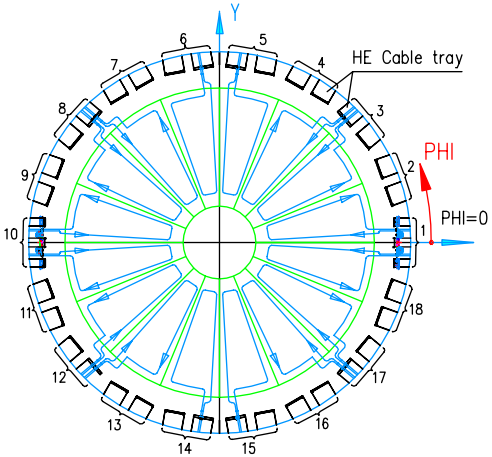
Outer & front

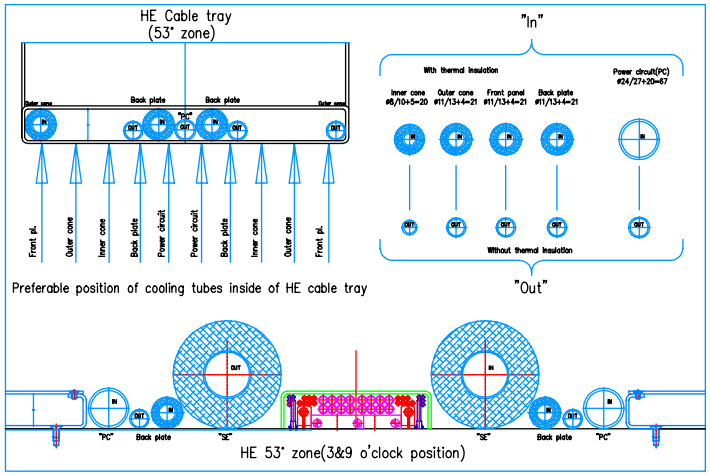


Inner cone

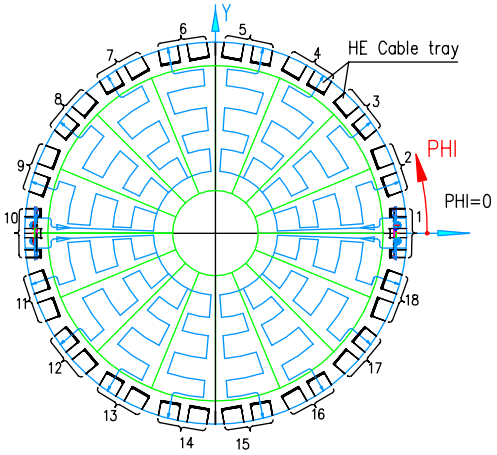


Back plate

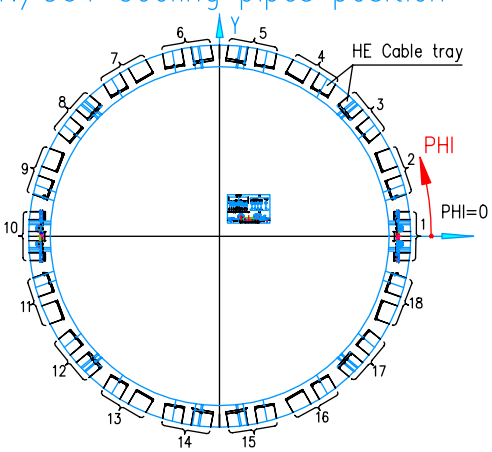




Power circuit



IN/OUT Cooling pipes position



EE cooling pipes(in, out) arrangement

View from I.P.

EE(−)

1...18 HE Cable trays numbering in PHI

PROJECTION

ACAD version: 14	Date:26.07.01
File name: ECALcooling_layout	CMS Endcap Detectors
CERN, Integration group of CMS, A.Surkov	

The entire ECAL has 2 cooling circuits:

1st) POWER circuit
2nd) REGULATING circuit

The BARREL and the 2 ENDCAPs have a portion of the 2 circuits in common:

START at	END at	Circuit Name	Tube Description	Nominal Diameter [DN]	Nominal Pressure [PN]	Inner Diameter ID [mm]	Outer Diameter OD [mm]	Insulation Thickness IT [mm]	Insulated Outer Dia. IOD [mm]	Material of pipe	Quantity of pipe	Length estimation [m]	Altitude variation [m]	Material used into Circuit
USC CV Zone	UL551 Gallery (UXC Entrance)	POWER	Supply	DN100	PN25					Stainless Steel	1	90…100		
			Return	DN100	PN25					Stainless Steel	1	90…100		
		REGULATING	Supply	DN200			219.1	32	283.1	Stainless Steel	1	90…100		
			Return	DN200			219.1	32	283.1	Stainless Steel	1	90…100		
UL551 Gallery (UXC Entrance)	Cooling Station	*POWER*	Supply	DN65	PN25					Stainless Steel	2	40…50		
			Return	DN65	PN25					Stainless Steel	2	40…50		
		REGULATING	Supply	DN65						Stainless Steel	2	40…50		
			Return	DN65						Stainless Steel	2	40…50		

The BARREL has the following specifications:

START at	END at	Circuit Name	Tube Description	Nominal Diameter [DN]	Nominal Pressure [PN]	Inner Diameter ID [mm]	Outer Diameter OD [mm]	Insulation Thickness IT [mm]	Insulated Outer Dia. IOD [mm]	Material of pipe	Quantity of pipe	Length estimation [m]	Altitude variation [m]	Material used into Circuit
EB Patch Panel	Inner Coil Area (After 53d Crack)	POWER	Supply	DN10	PN25	14	17.2	0	17.2	Stainless Steel	36	2.5		Stainless Steel
			Return	DN10	PN25	14	17.2	0	17.2	Stainless Steel	36	2.5		Stainless Steel
		REGULATING	Supply	DN25		29.7	33.7	6	45.7	Stainless Steel	36	2.5		Aluminium
			Return	DN25		29.7	33.7	6	45.7	Stainless Steel	36	2.5		Aluminium
Inner Coil Area (After 53d Crack)	Outer Coil Area (50 cm from Edge)	POWER	Supply	DN10	PN25	14	17.2	10	37.2	Stainless Steel	36	4.5		
			Return	DN10	PN25	14	17.2	10	37.2	Stainless Steel	36	4.5		
		REGULATING	Supply	DN25		29.7	33.7	10	53.7	Stainless Steel	36	4.5		
			Return	DN25		29.7	33.7	10	53.7	Stainless Steel	36	4.5		
Outer Coil Area (50 cm from Edge)	Cooling Station	POWER	Supply	DN10	PN25	14	17.2	10	37.2	Stainless Steel	36	…50…		
			Return	DN10	PN25	14	17.2	10	37.2	Stainless Steel	36	…50…		
		REGULATING	Supply	DN25		29.7	33.7	10	53.7	Stainless Steel	36	…50…		
			Return	DN25		29.7	33.7	10	53.7	Stainless Steel	36	…50…		

The 2 ENDCAPs have the following specifications:

START at	END at	Circuit Name	Tube Description	Nominal Diameter [DN]	Nominal Pressure [PN]	Inner Diameter ID [mm]	Outer Diameter OD [mm]	Insulation Thickness IT [mm]	Insulated Outer Dia. IOD [mm]	Material of pipe	Quantity of pipe	Length estimation [m]	Altitude variation [m]	Material used into Circuit
EE Dee Periphery	Endcap Disk Periphery Manifold	POWER	Supply			8 (9x) & 11 (3x)					8	…20…		
			Return			8 (9x) & 11 (3x)					8	…20…		
		REGULATING	Supply								12	…20…		
			Return								12	…20…		
Endcap Disk Periphery Manifold	Endcap Main Cable Chain Entrance	POWER	Supply								4	…20…		
			Return								4	…20…		
		REGULATING	Supply								4	…20…		
			Return								4	…20…		
Endcap Main Cable Chain Entrance	Endcap Main Cable Chain Exit	POWER	Supply								4	12		
			Return								4	12		
		REGULATING	Supply								4	12		
			Return								4	12		
Endcap Main Cable Chain Exit	Cooling Station	POWER	Supply								4	…50…		
			Return								4	…50…		
		REGULATING	Supply								4	…50…		
			Return								4	…50…		