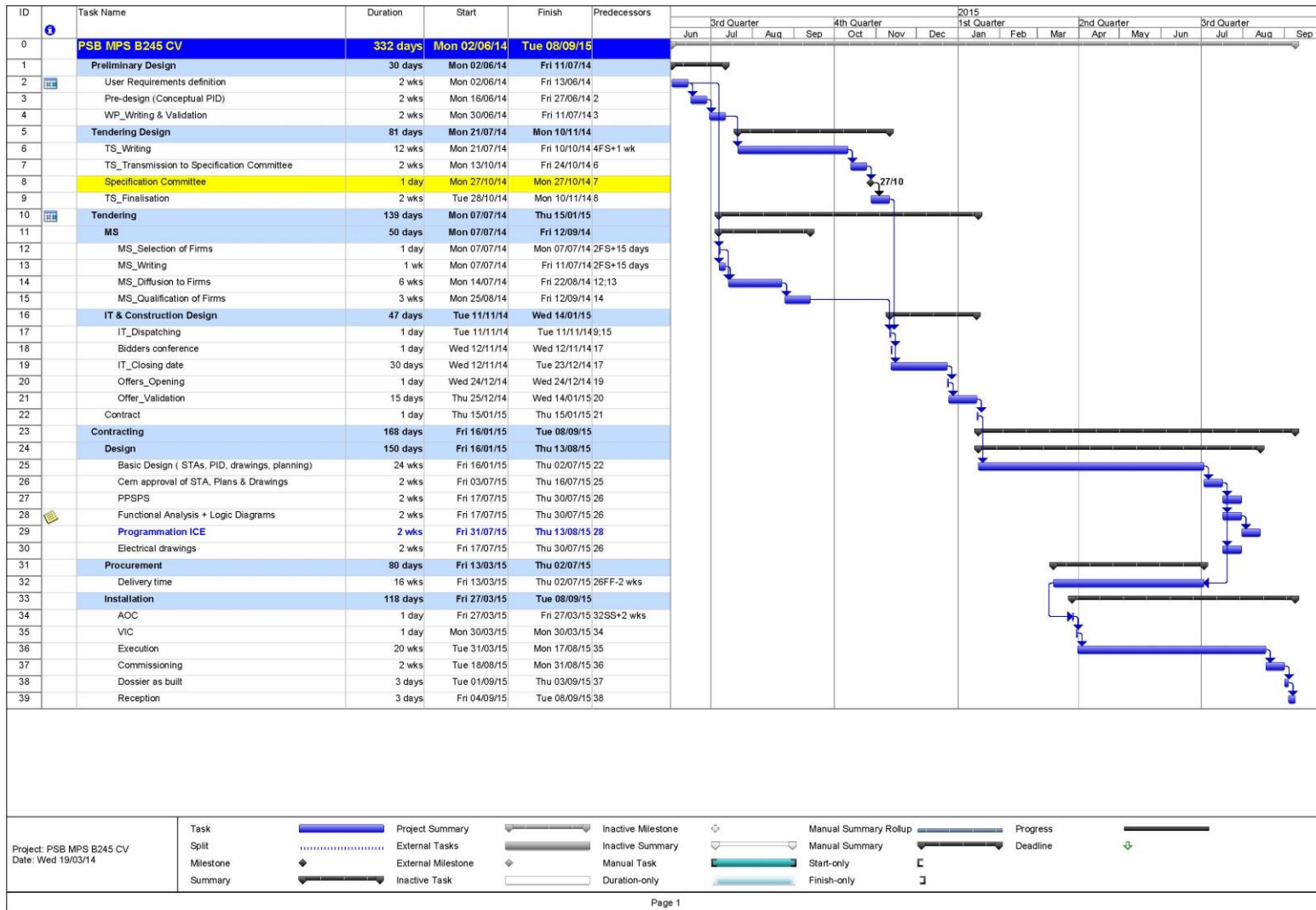
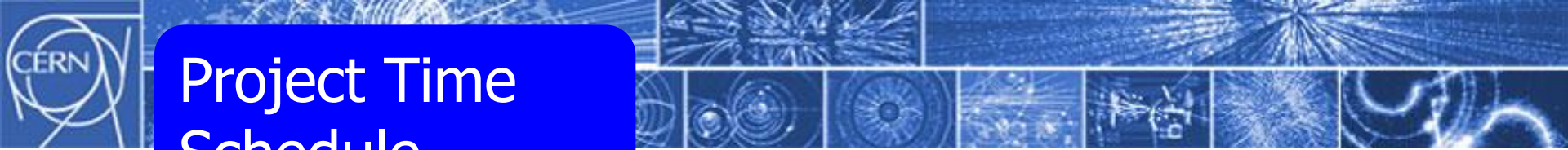


# PSB MPS Building 245 CV Status

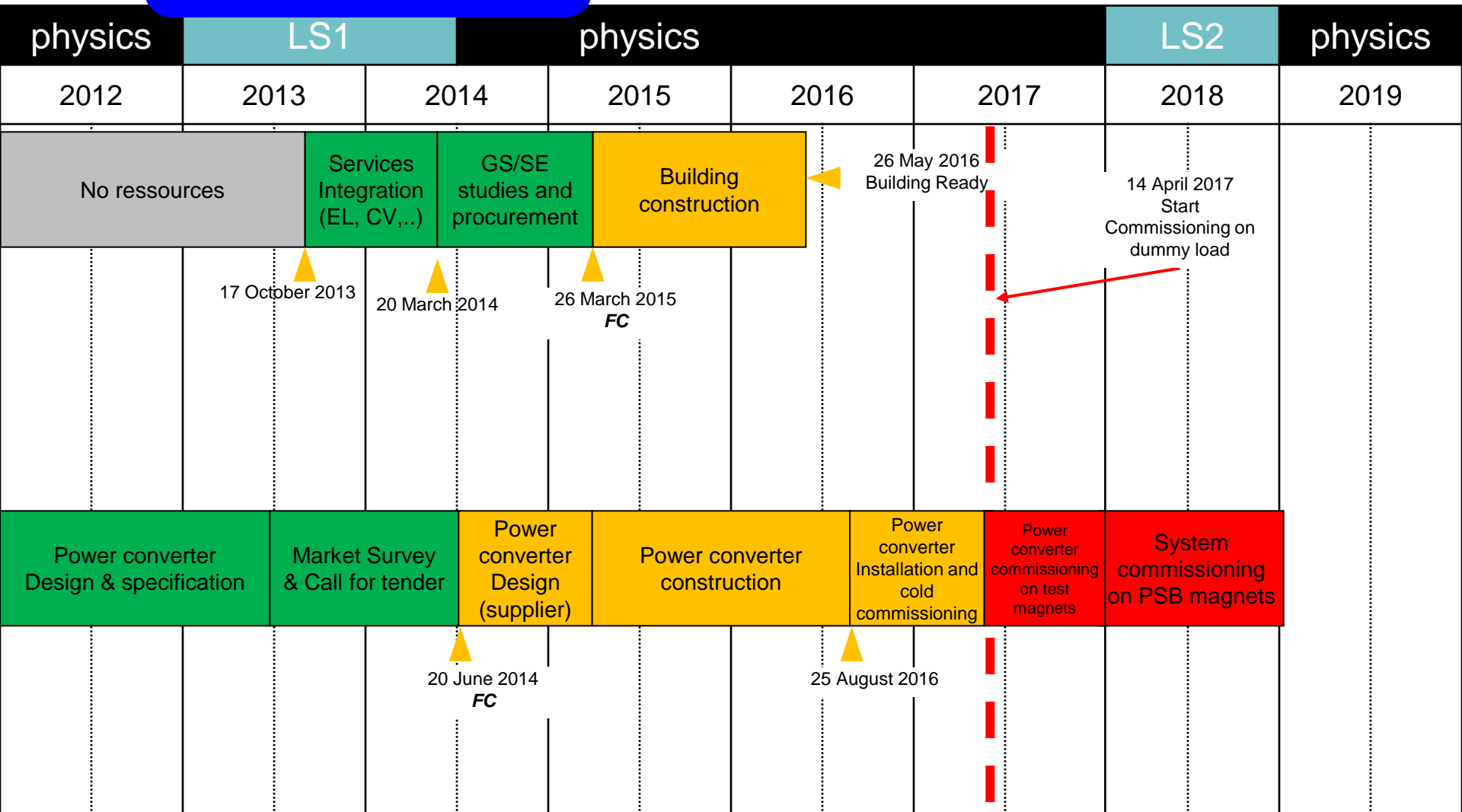


# CV Planning – First draft





# Project Time Schedule





# CV – Cost estimation

## B245 PSB-MPS Budget

Designation	Parameters	Unit Price [CHF]	Qty	Unit	Total Price [CHF]	Comment
<b>SUBTOTAL ALL WORKS</b>					<b>1 277 896</b>	
<b>CONTINGENCY</b>					<b>127 790</b>	10%
<b>TOTAL</b>					<b>1 405 686</b>	
<b>TOTAL INSTALLATION</b>					<b>1 178 396</b>	
<b>Primary Cooling Water Circuit</b>					<b>351 560</b>	
Cooling Towers	bunterflow 800 kW, 35/25, 22WBT	100 000	2	ea	200 000	Jaeggi
Pumps - Primary water	75 m3/h / 20m / 17 kW	12 000	2	ea	24 000	
VSD	CT fan, 5 kW	1 500	4	ea	6 000	
Instrumentation		0	1	allow	13 800	
Chemical Treatment - storage and Dosing Pumps		20 000	1	ea	20 000	
Piping - Primary Branches	Inox 1.4404 / PN 10 / DN 200	300	20	m	6 000	
Fittings		15%	1	allow	900	
Valves and Accessories		10%	1	allow	26 980	
Supports		10%	1	allow	600	
Design		5%	1	allow	12 800	
Test, Commissioning, Documentation		3%	1	allow	7 680	
Civil works		5%	1	allow	12 800	New building - major civil works not in this budget, access platforms, minor work only.
Acoustic Treatment		10 000	2	ea	20 000	
<b>Demin Water - MPS Converter Hall</b>					<b>207 116</b>	
Heat Exchanger - Plate and Frame	Inox 1.4404 / PN 10 / 500 kW	25 000	1	ea	25 000	
Pumps - MPS Demin 10 bar	240m3/h / 500m / 100 kW	40 000	2	ea	80 000	
Demin Cartridges		4 000	2	ea	8 000	
VSD	Pump, 100 kW	12 000	2	ea	24 000	
Pipework - Demin Distribution Converter Hall Ringma	Inox 1.4404 / PN 10 / DN 100	160	20	m	3 200	
Pipework - Connections	Inox 1.4404 / PN 10 / DN 25	80	80	m	6 400	
Valves and Accessories		25%	1	allow	36 650	
Support		10%	1	allow	950	
Instrumentation		6%	1	allow	6 780	
Design		6%	1	allow	8 796	
Test, Commissioning, Documentation		5%	1	allow	7 330	
<b>HVAC</b>					<b>474 720</b>	
AHU	27500 m3/h	100 000	2	allow	200 000	
RA OA MA Ducts	1000 x 1500 / 60 m / 40 kg/m	20	4 000	kg	80 000	
RA OA Spill Dampers		4 000	3	ea	12 000	
RA OA Spill Grilles		4 000	3	ea	12 000	
VSD	10 kW	3 000	2	ea	6 000	
Smoke extraction	5 kW	8 000	2	ea	16 000	
Split Systems	Ductless, 5kW	5 000	5	ea	25 000	
Unit Heaters	10kW electric	2 000	4	ea	8 000	
Accessories		20%	1	allow	71 800	
Support		5%	1	allow	5 200	
Instrumentation		5%	1	allow	10 000	
Design		3%	1	allow	10 770	
Test, Commissioning, Documentation		5%	1	allow	17 950	
<b>Electricity</b>					<b>145 000</b>	
Hazemeyer Power Cubicle		40 000	1	ea	40 000	
Control Cubicle HVAC		25 000	1	ea	25 000	
Control Cubicle Water 1		25 000	1	ea	25 000	
Cabling - Power		15 000	1	ea	15 000	
Cabling - Control		20 000	1	ea	20 000	
Terminations		10 000	1	ea	10 000	
Design		5%	1	allow	6 250	
Test, Commissioning, Documentation		3%	1	allow	3 750	
<b>FSU - Drahtman and Site supervisor</b>					<b>50 500</b>	
Drahtman		10 100	3	month	30 300	
Site supervisor		10 100	2	month	20 200	
<b>Control Systems Support</b>					<b>15 000</b>	
Controls		15 000	1	allow	15 000	
<b>Allowances</b>					<b>34 000</b>	
Scaffolding		4 000	1	allow	4 000	
Factory Tests		5 000	2	ea	10 000	
Transport		20 000	1	ea	20 000	



# CV – Electrical supply

## PSB MPS Building 245 CV Electrical Power Supply

Equipment	Equipment Tag	Flow m3/h	Head m	eff 55%		Delta T K	Heat Capacity kWw	Notes
				Power abs kWa	Power motor kWm			

### B.245 - MPS Building Water Cooling

200

Demin water pumps - Power Converter Circuit (Alum)	MPS-PED-1	220	75	81.8	100	2	550	Duty/Standby
Demin water pumps - Power Converter Circuit (Alum)	MPS-PED-2	220	75	81.8	100	2	550	

### B.245 PSB + MPS Cooling Towers - Combined Primary Water System

70

Primary Water Pumps	PEP-1	100	30	14.9	15	6	600	Duty/Standby
Primary Water Pumps	PEP-2	100	30	14.9	15	6	600	
Hybrid dry coolers	CT-1				20		600	Duty/Standby
Hybrid dry coolers	CT-2				20		600	

Equipment	Equipment Tag	Airflow m3/h	Total Press. Pa	eff 60%		Delta T K	Cooling Capacity kWw	Notes
				Power abs kWa	Power Motor kWm			

181

### B.245 - MPS HVAC

HVAC main hall + false floor	AHU-1	28000.0	500	23.33	40	10	90	
HVAC main hall + false floor	AHU-2	28000.0	500	23.33	40	10	90	
HVAC Heating Main hall					20			
HVAC control room	FCU-1				4			ductless split system heat pump
HVAC office	FCU-2				4			ductless split system heat pump
Space Heating - Capacitor banks	UH-1, UH-2, UH-3				15			(3) x 5kW unit heaters
Heating - Misc Rooms	various				20			allowance
Ventilation - Plant Rooms	various				10			allowance
Smoke Exhaust Fans (UPS)	UUTI-1, UUTI-2, UUTI-3				8			allowance, FR cable
<b>b. 245 - Lighting and Small Power</b>								
Small Power	estimate by EN-EL				10			
Lighting	estimate by EN-EL				10			

Total

451 kW





# Building 245 CV Conceptual Design

Conceptual Design based on :

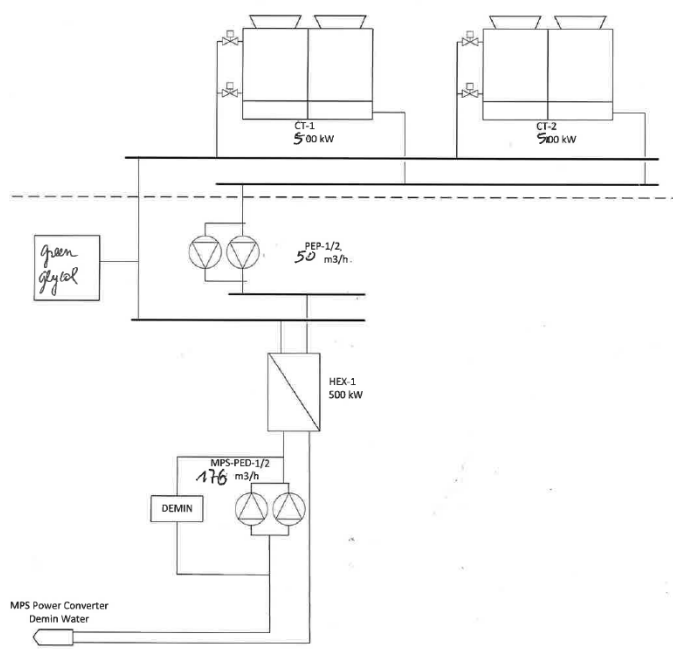
- Independent cooling station :
- Cost optimised Air conditioning system :
  - No chilled water production,
  - Indirect adiabatic cooling system,
  - Units placed on the roof,

URS inputs

- Cooling power on water: confirmed 470 kW = 2 units at 100% + 30% of the third unit Flow rate, delta T of 2.3 ° C,
- Conductivity of the water confirmed, maxi 0,8 micro S/cm at 30 ° C,
- Need to run independently : **2 fully independent stations for cooling** located in the new building,
- Requirements for internal temperature revised, 26 ° C in summer with maxi of 30 ° C during limited periods



# Building 245 CV Conceptual Design



Débit-Puissance						
Débit	CA		176.35	[m³/h]		
Puissance		470.0		470.0	[kW]	
				Pompe		
Delta T	Cp	Densité	Delta P	Rend.	P	
[K]	[kJ/kg*K]	[kg/m³]	[bar]		[kW]	
2.3	4.18	998	4.0	0.5	39.19	

ACIER INOX											
PN10						PN16					
DN	de [mm]	e [mm]	di [mm]	Vmax [m/s]	V [m/s]	DN	de [mm]	e [mm]	di [mm]	V [m/s]	
10	17.2	1.6	14.0		318.21	10	17.2	1.6	14.0	318.21	
15	21.3	1.6	18.1		190.38	15	21.3	1.6	18.1	190.38	
20	26.9	1.6	23.7		111.04	20	26.9	1.6	23.7	111.04	
25	33.7	1.6	30.5		67.05	25	33.7	1.6	30.5	67.05	
32	42.4	1.6	39.2		40.59	32	42.4	1.6	39.2	40.59	
40	48.3	1.6	45.1		30.66	40	48.3	1.6	45.1	30.66	
50	60.3	2.0	56.3	1.2	19.68	50	60.3	2.0	56.3	1.2	19.68
65	76.1	2.0	72.1	1.4	12.00	65	76.1	2.0	72.1	1.4	12.00
80	88.9	2.0	84.9	1.5	8.65	80	88.9	2.0	84.9	1.5	8.65
100	114.3	2.0	110.3	1.7	5.13	100	114.3	2.0	110.3	1.7	5.13
125	139.7	2.0	135.7	1.9	3.39	125	139.7	2.0	135.7	1.9	3.39
150	168.3	2.0	164.3	2.0	2.31	150	168.3	2.3	163.7	2.0	2.33
200	219.1	2.3	214.5		1.36	200	219.1	2.6	213.9		1.36
250	273.0	2.6	267.8		0.87	250	273.0	3.2	266.6		0.88
300	323.9	2.9	318.1		0.62	300	323.9	3.6	316.7		0.62



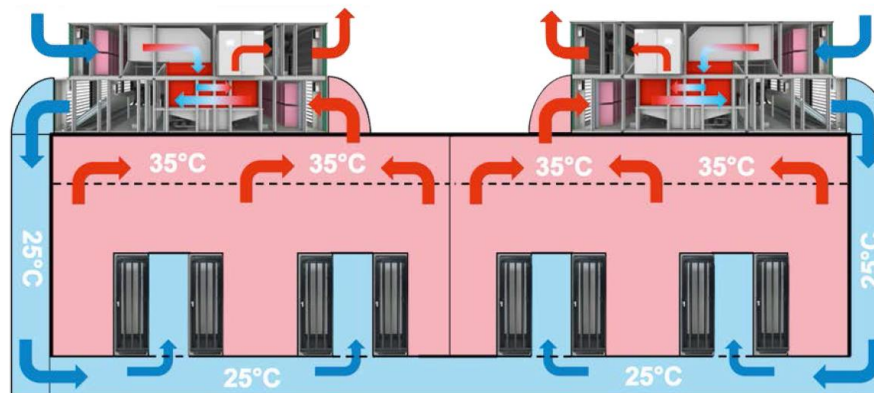
# Building 245 CV Conceptual Design

## GEA *Adia-DENCO*®

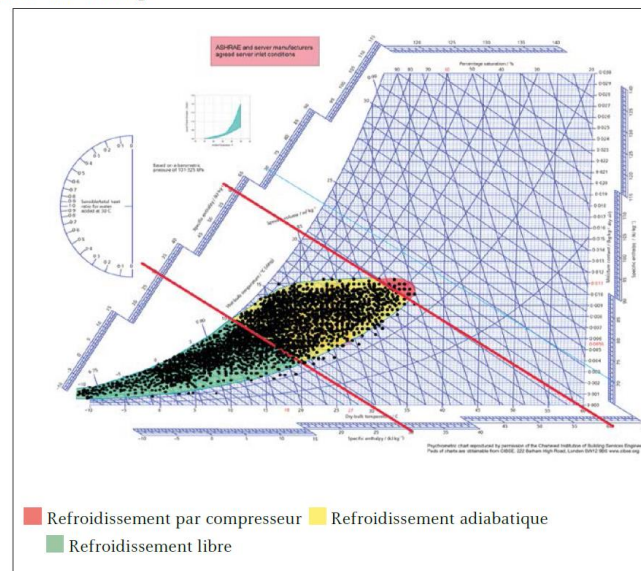
### Caractéristiques techniques

DA100#C		nominale DT10 T <sub>a</sub> : 35°C T <sub>s</sub> : 25°C		nominale DT12 T <sub>a</sub> : 38°C T <sub>s</sub> : 26°C	
<b>Puissance &amp; Efficacité <sup>1)</sup></b>					
Puissance frigorifique totale	kW	88,7	108,6	105,8	131,6
Puissance frigorifique utile	kW	84,5	101,7	101,6	124,7
Mmeilleure efficacité énergétique (EER)		10,3	7,9	12,3	9,6
Ratio de chaleur sensible (SHR)		1,0	1,0	1,0	1,0
<b>Ventilateurs débit d'air extérieur</b>					
Température ambiante	°C	35,0	35,0	35,0	35,0
Humidité ambiante	%	28,0	28,0	28,0	28,0
Débit d'air	m <sup>3</sup> /h	25.800	32.000	25.800	32.000
Nombre de ventilateurs	Pcs.	3	3	3	3
Puissance absorbée des ventilateurs ext.	kW	3,5	5,9	3,5	5,9
<b>Ventilateurs débit d'air intérieur (Salle IT)</b>					
Débit d'air	m <sup>3</sup> /h	25.800	32.000	25.800	32.000
Nombre de ventilateurs	Pcs.	3	3	3	3
Puissance absorbée ventilateur int.	kW	4,2	6,9	4,2	6,9
<b>Adiabatique</b>					
Quantité d'eau en circulation	kg/h	664	664	664	664
Quantité en eau évaporée	kg/h	195	195	260	260
Pression nominale	Bar	10,0	10,0	10,0	10,0
Puissance absorbée pompe	kW	0,88	0,88	0,88	0,88
<b>Données acoustiques</b>					
Puissance sonore "caisson"	dB (A)	60	64	60	64
Puissance sonore "entrée d'air"	dB (A)	77	80	77	80
Puissance sonore "sortie d'air"	dB (A)	83	86	83	86
<b>Caractéristiques électriques <sup>2)</sup></b>					
Puissance absorbée totale	kW	8,6	13,7	8,6	13,7
Alimentation électrique	V/Ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50
<b>Eau glacée <sup>3)</sup></b>					
Puissance frigorifique totale	kW	138,6	158,1	138,6	158,1
Puissance frigorifique sensible	kW	124,9	143,7	124,9	143,7
Débit d'eau	m <sup>3</sup> /h	21,2	24,3	21,2	24,3
Perte de charge échangeur de chaleur	kPa	58,4	74,1	58,4	74,1
<b>Poids &amp; Dimensions <sup>4)</sup></b>					
Hauteur	mm	2.880	2.880	2.880	2.880
Profondeur	mm	2.640	2.640	2.640	2.640
Longueur	mm	6.480	6.480	6.480	6.480
Longueur (avec unité de refroidissement intégrée)	mm	6.920	6.920	6.920	6.920
Poids	kg	4.430	4.430	4.430	4.430
Poids (avec unité de refroidissement intégrée)	kg	4.850	4.851	4.852	4.853

Sous réserve de modifications techniques résultant d'un perfectionnement du produit  
<sup>1)</sup> Air évaporé salle IT 35°C DB(2), Air neuf salle IT 25°C. Environnement: Température bulbe sec 35°C / humidité 21°C  
<sup>2)</sup> Filtrés propres / sans record gain <sup>3)</sup> Eau 10 / 16°C / 0% glycol <sup>4)</sup> Sans antrax (boture / armoire de régulation)



Concept du système *Adia-DENCO*®



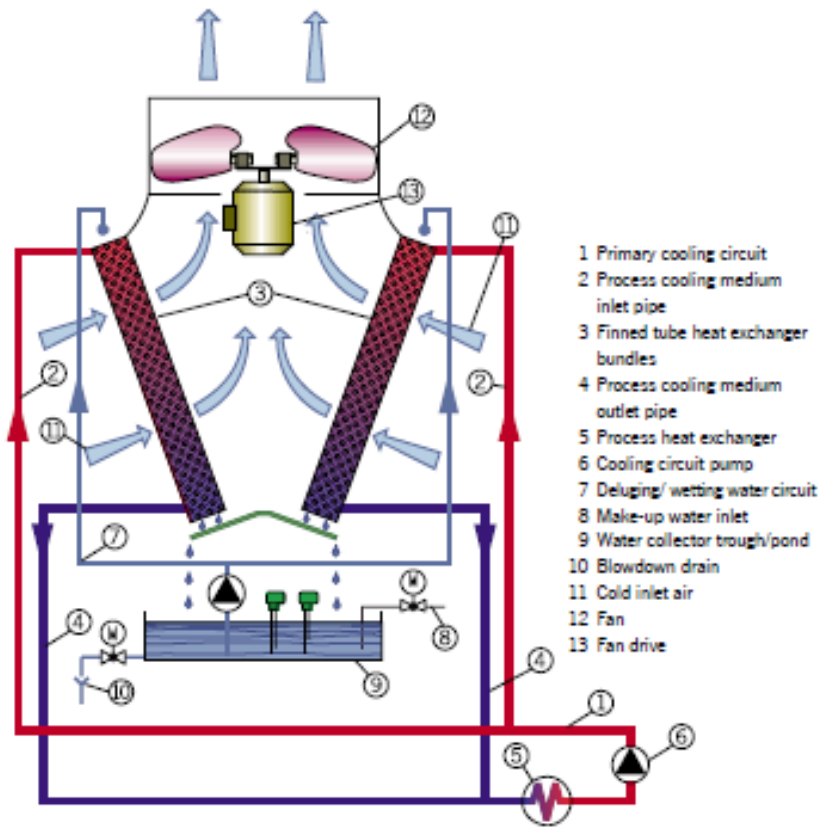
■ Refroidissement par compresseur ■ Refroidissement adiabatique  
 ■ Refroidissement libre





# Building 245 CV Conceptual Design

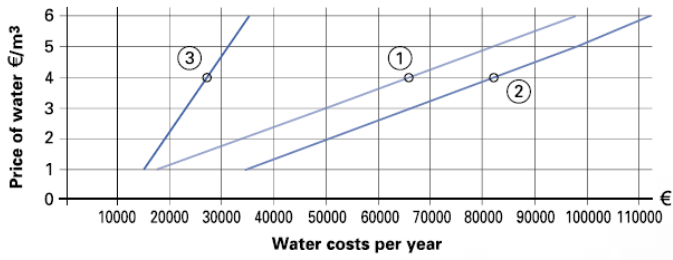
Normal Jäggi Hybridcooler



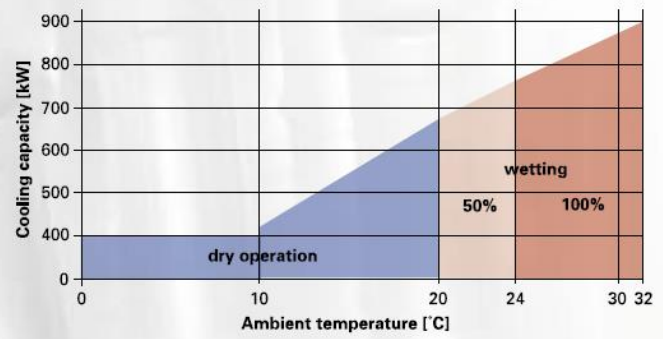
## Annual operating costs (water, power and capital costs)

Calculation example at 4 €/m<sup>3</sup> water price

	€	System ① Open evaporative cooling tower	System ② Closed loop evaporative cooler	System ③ Jäggi Hybridcooler
Water costs	€/year	63 080	63 080	13 584
Power costs	€/year	1 613	15 927	5 807
Capital costs	€/year	1 646	3 437	6 981
<b>Annual operating costs</b>	<b>€/year</b>	<b>66 339 (251%)</b>	<b>82 444 (312%)</b>	<b>26 372 (100%)</b>



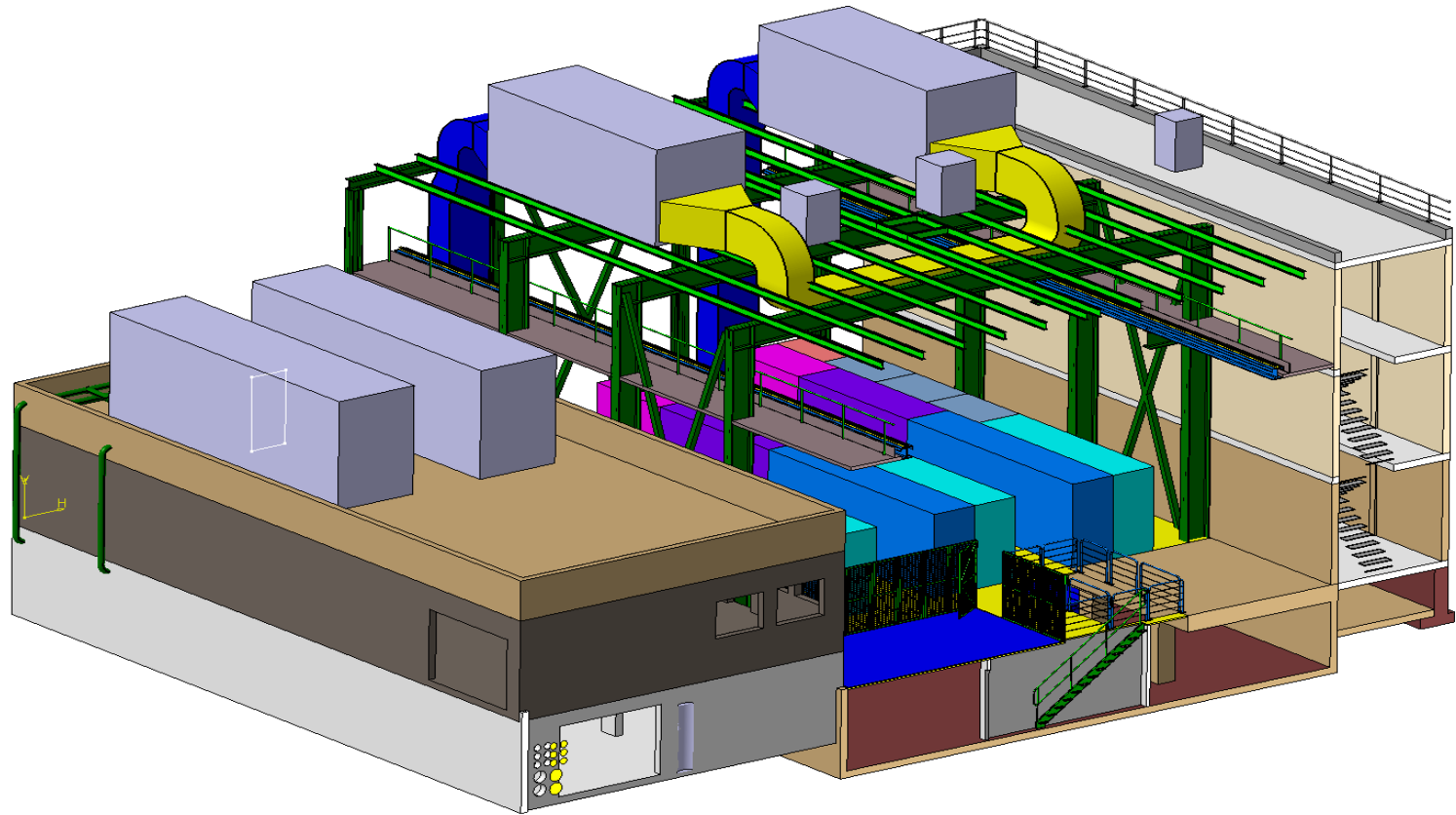
## Operating characteristics of a Jäggi Hybridcooler (example)



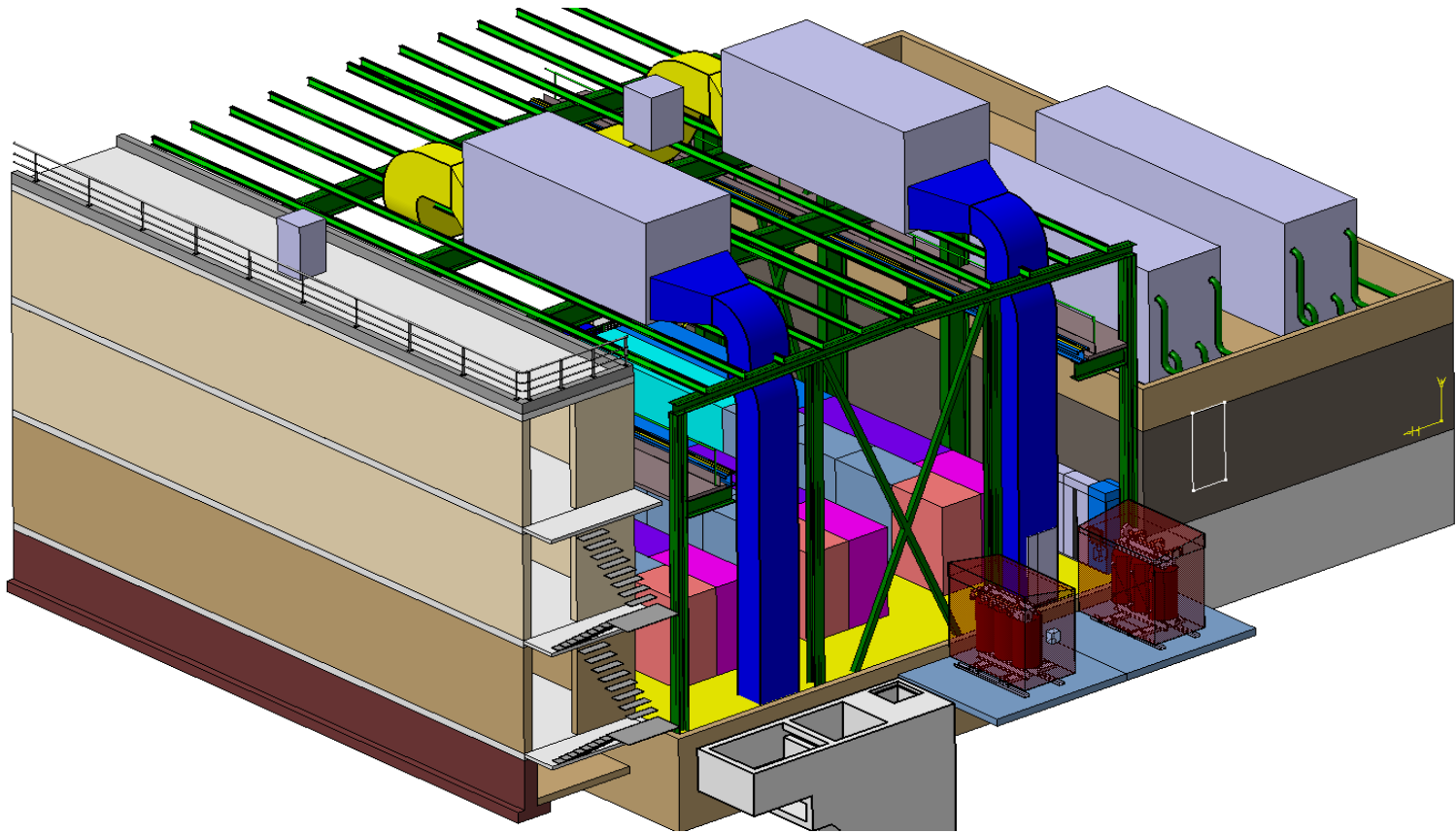
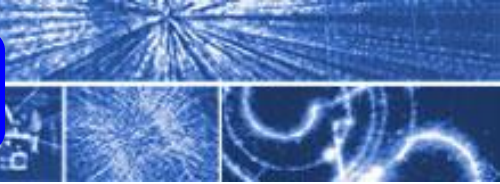
Natural convection cooling | Refrigeration systems, dry cooling

Natural convection cooling: A considerable saving in power consumption by switching off the fans for a time.

# CV - Integration

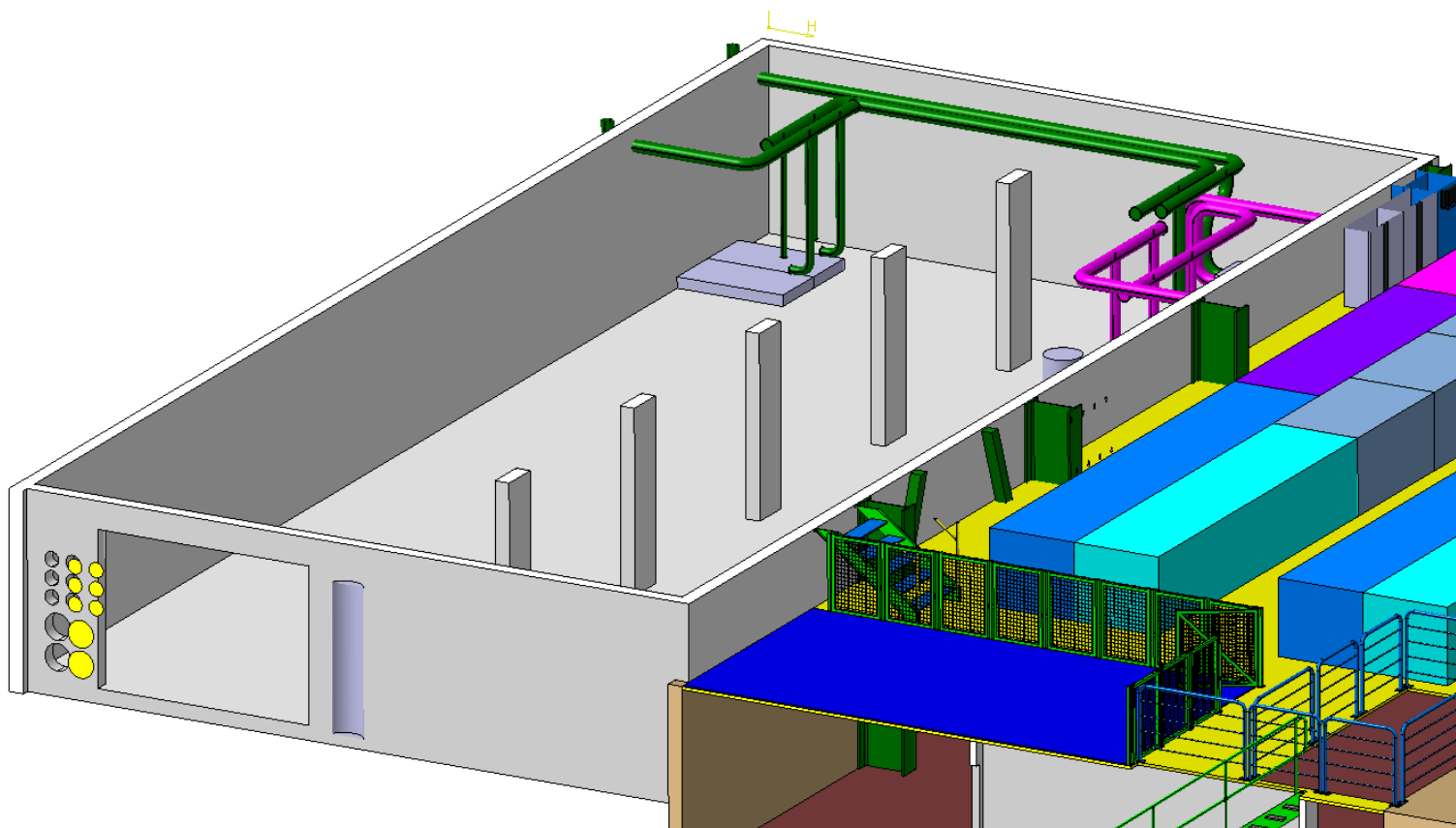
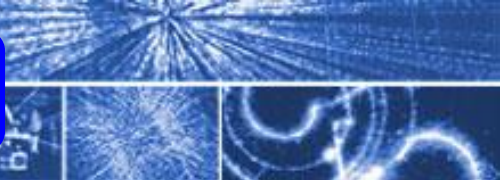


# CV - Integration





# CV - Integration



# CV - Integration

