The Divisional Silicon Facility

- Purpose
- Current configuration
- Status

Purpose

Provide appropriate space and basic technical facilities for
- bonding
- assembly
- testing
- modifications
- repair
- R&D

} of solid state detectors

Basic idea

Group the assembly and test areas of LHC experiments around a common bonding lab under responsibility of division (EP/TA1-SD).

Bonding lab is open to all users (also non -LHC ones)!

What are the requirements of the LHC experiments ?

- access to bonding lab: all 4 experiments. ➔ presentation by Alan Honma
- assembly and test zones:
  - ALICE ca. 200 m2
  - ATLAS ca. 300 m2
  - CMS 1000m2 (will prepare a zone under own responsibility, B186, 2nd floor)
  - LHCb ca. 50 m2

Cleanroom classification

find compromise between cost, noise, discipline ⇔ risk of detector or equipment failure due to dust.

Divide zone up into 3 sub-zones:

- bonding lab (SSDBL) <100.000 (zone A)
- clean zone ≈ 100.000 (zone B)
- less clean zone > 100.000 (zone C)

Temperature control

$\Delta L/L = \alpha \cdot \Delta T/T$
$\alpha = 10 - 20 \cdot 10^{-6}\ K^{-1}$
$L = 10$ cm $\rightarrow \Delta L = 1.5\ \mu m/K$

Keep T at 21 ± 1°C.
To be paid with air conditioning units.

Humidity control

H too low → accumulation of electrostatic charges → damage of electronics
H too high → corrosion of surfaces, condensation at cold spots,
HV breakdown (V_{bias} = 400 V over 300µm ≈ E=13.3 kV/cm)
malfunctioning of electronic circuits and electrical machines.

Keep H at 45 ± 5%
To be paid with costly air treatment (cooling, heating, steam addition).

Airborne Particulate Cleanliness Class Comparison

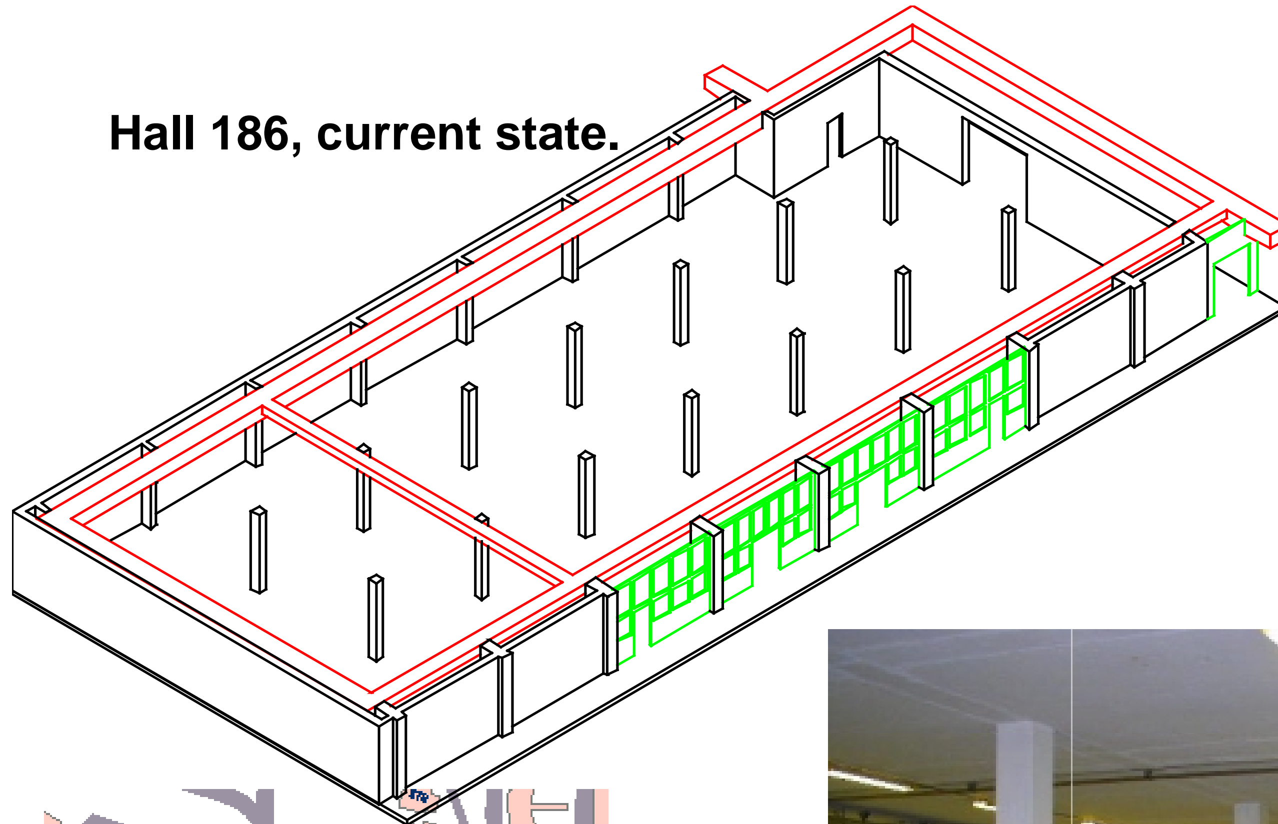
ISO 14644-1	FED STD 209E	
1		
2		
3	1	M1.5
4	10	M2.5
5	100	M3.5
6	1,000	M4.5
7	10,000	M5.5
8	100,000	M6.5
9		

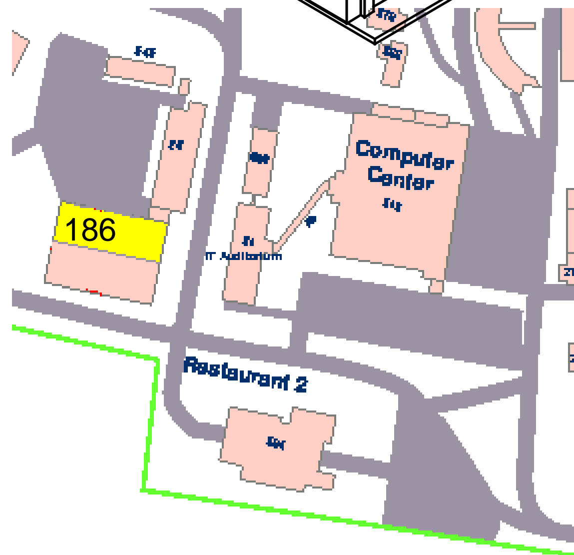
CLASS	Number of Particles per Cubic Meter by Micrometer Size					
	0.1 um	0.2 um	0.3 um	0.5 um	1 um	5 um
ISO 1	10	2				
ISO 2	100	24	10	4		
ISO 3	1,000	237	102	35	8	
ISO 4	10,000	2,370	1,020	352	83	
ISO 5	100,000	23,700	10,200	3,520	832	29
ISO 6	1,000,000	237,000	102,000	35,200	8,320	293
ISO 7				352,000	83,200	2,930
ISO 8				3,520,000	832,000	29,300
ISO 9				35,200,000	8,320,000	293,000

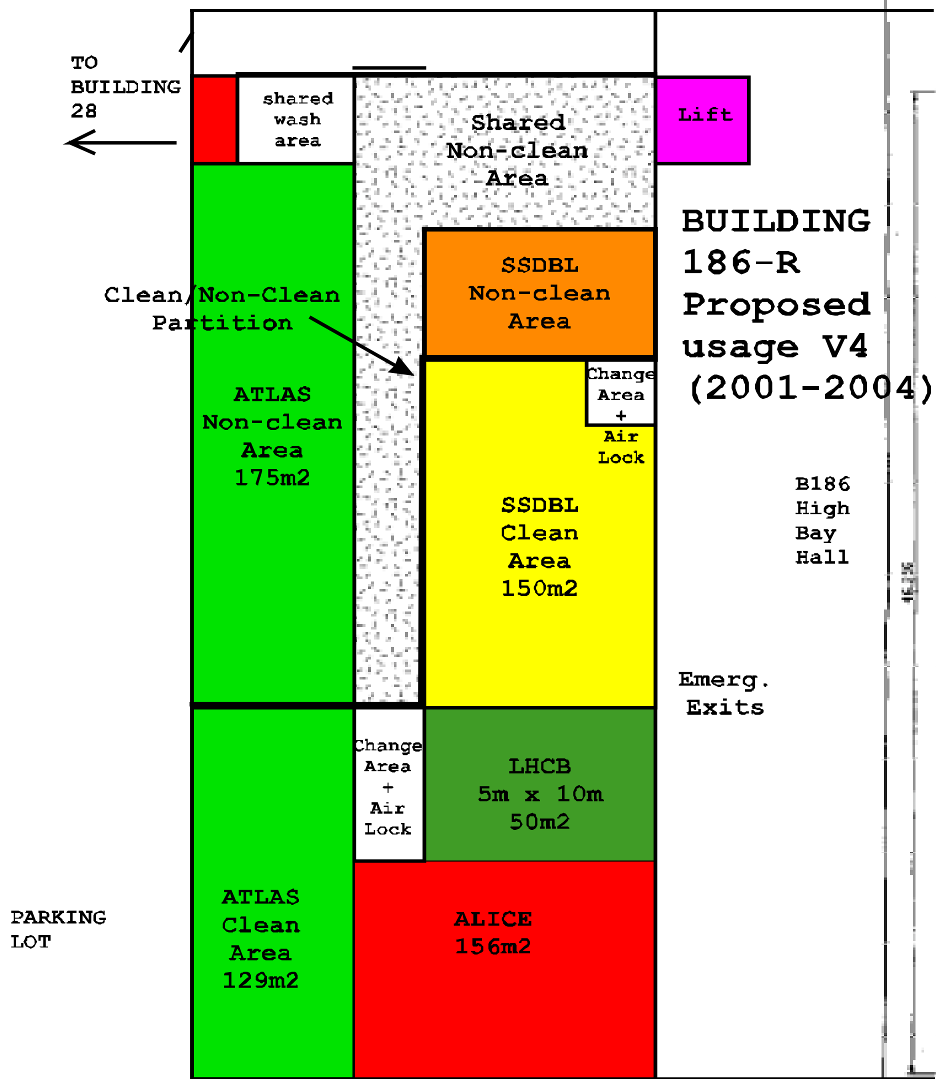
Divisional Silicon Facility

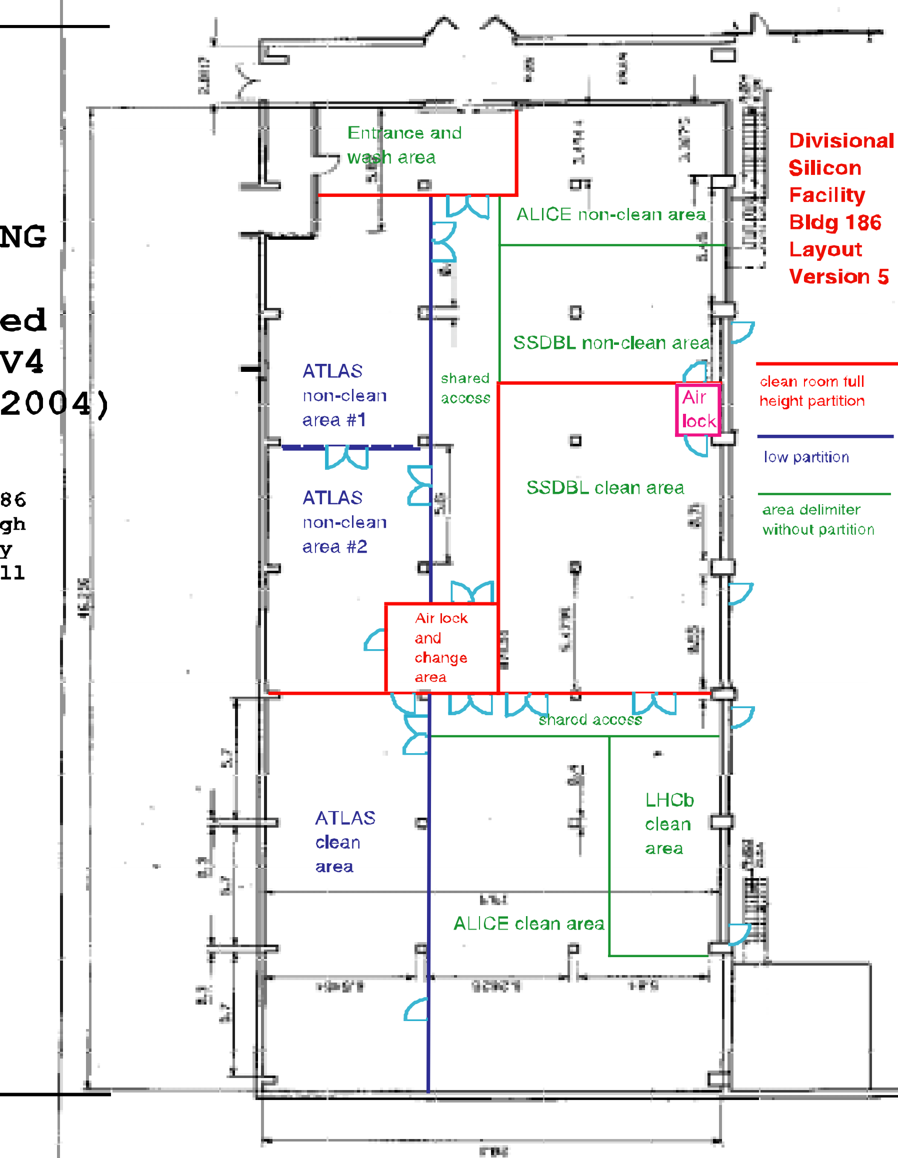
TA1 - SD

Hall 186, current state.









C. Joram EP / TA1 - SD. 4 April 2001

Basic infrastructure

- New electricity network
- New lighting
- Structured telephone and ethernet
- Gas supplies (N_2, Ar, CO_2, comp. air)
- Cooling water, vacuum distribution lines
- Special floor (antistatic) and wall painting (washable)
- Air locks between non-clean and clean zones
- False ceiling in zones A and B.

Divisional Silicon Facility

TA1 - SD

Current Status

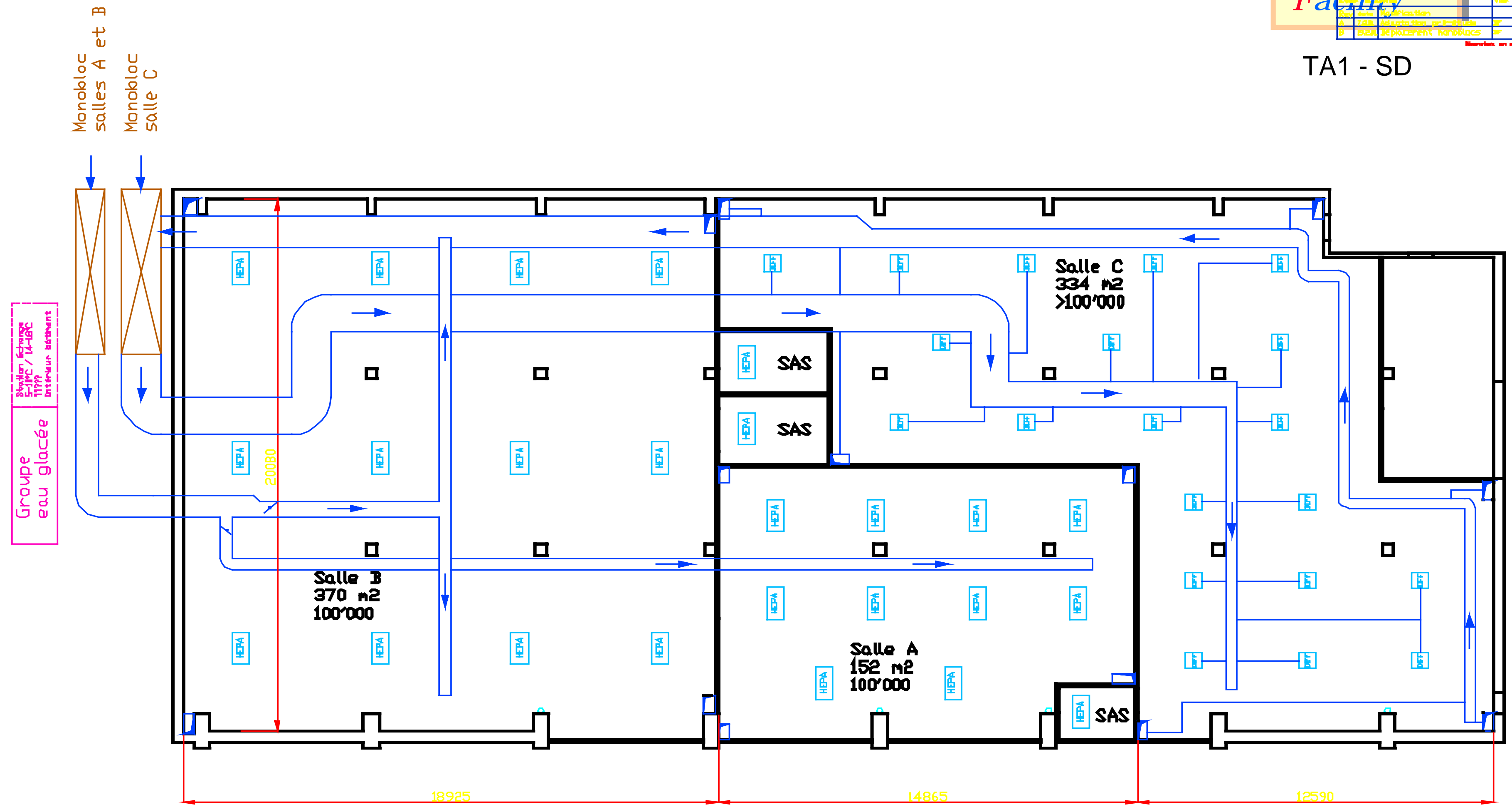
- Performed a conceptual study of air treatment (together with company TEC)
- Technical discussions and price estimates for all subprojects

$\Sigma \approx$ 1 MCHF

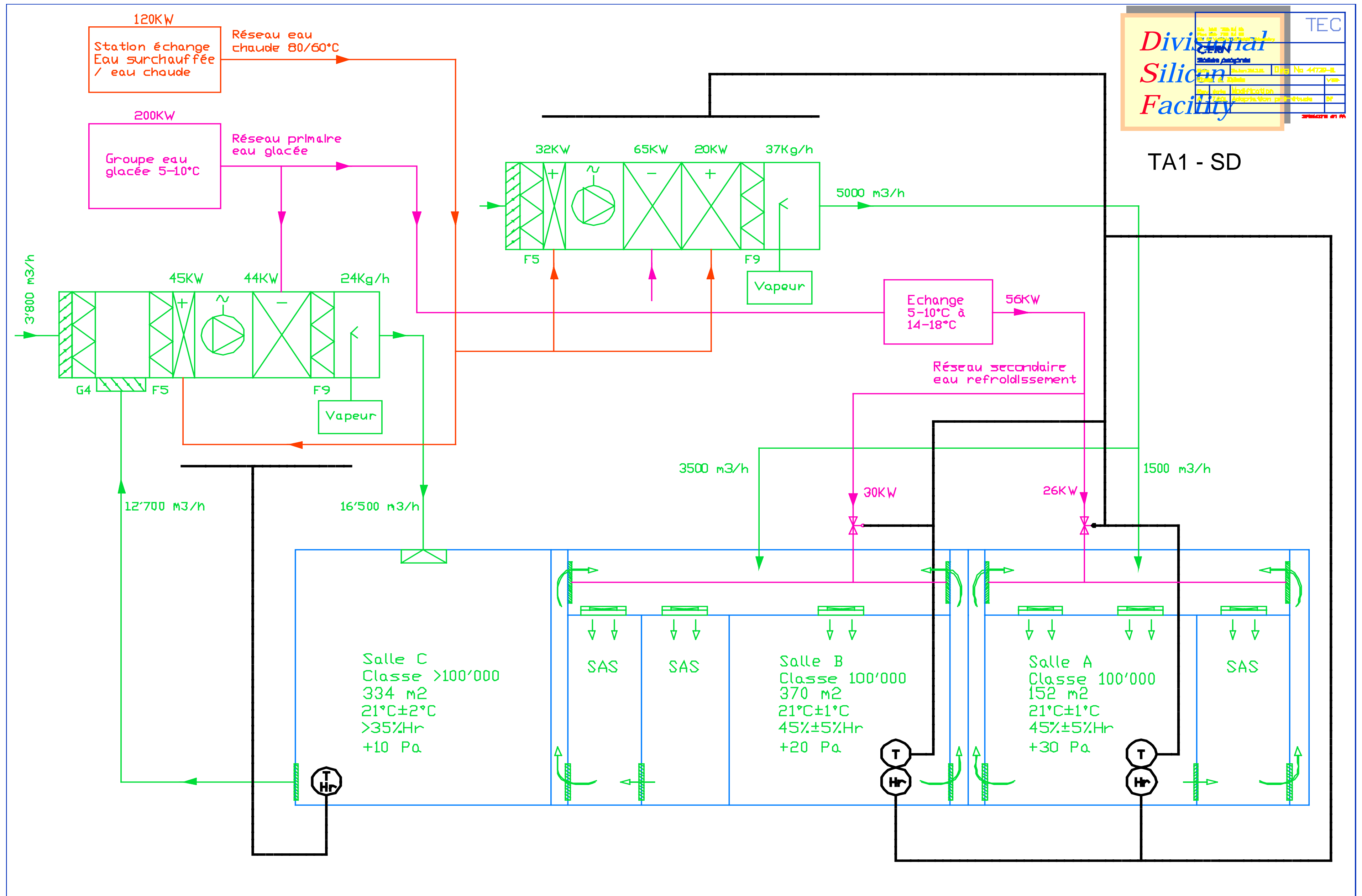
Discussions with division and LHC experiments on financing under way.

If we reach an agreement on financing
- market survey
- call for tender
- start of work (air treatment installations) in September 2001

If we don’t reach an agreement
- reduce scope of project to SSDBL + hall space without air treatment
- possibly skip market survey
- call for tender
- start of work in July 2001



C. Joram EP / TA1 - SD. 4 April 2001



120KW
Station échange
Eau surchauffée
/ eau chaude
Réseau eau
chaude 80/60°C
200KW
Groupe eau
glacée 5-10°C
Réseau primaire
eau glacée
32KW
65KW
20KW
37Kg/h
F5
F9
Vapeur
5000 m3/h
3'800 m3/h
45KW
44KW
24Kg/h
G4
F5
F9
Vapeur
Echange
5-10°C à
14-18°C
56KW
Réseau secondaire
eau refroidissement
3500 m3/h
1500 m3/h
30KW
26KW
12'700 M3/h
16'500 m3/h
Salle C
Classe >100'000
334 m2
21°C±2°C
>35%Hr
+10 Pa
SAS
SAS
Salle B
Classe 100'000
370 m2
21°C±1°C
45%±5%Hr
+20 Pa
Salle A
Classe 100'000
152 m2
21°C±1°C
45%±5%Hr
+30 Pa
SAS
Divisional
Silicon
Facility
TEC
TA1 - SD