

Niobium EP Setup

Niobium EP Setup

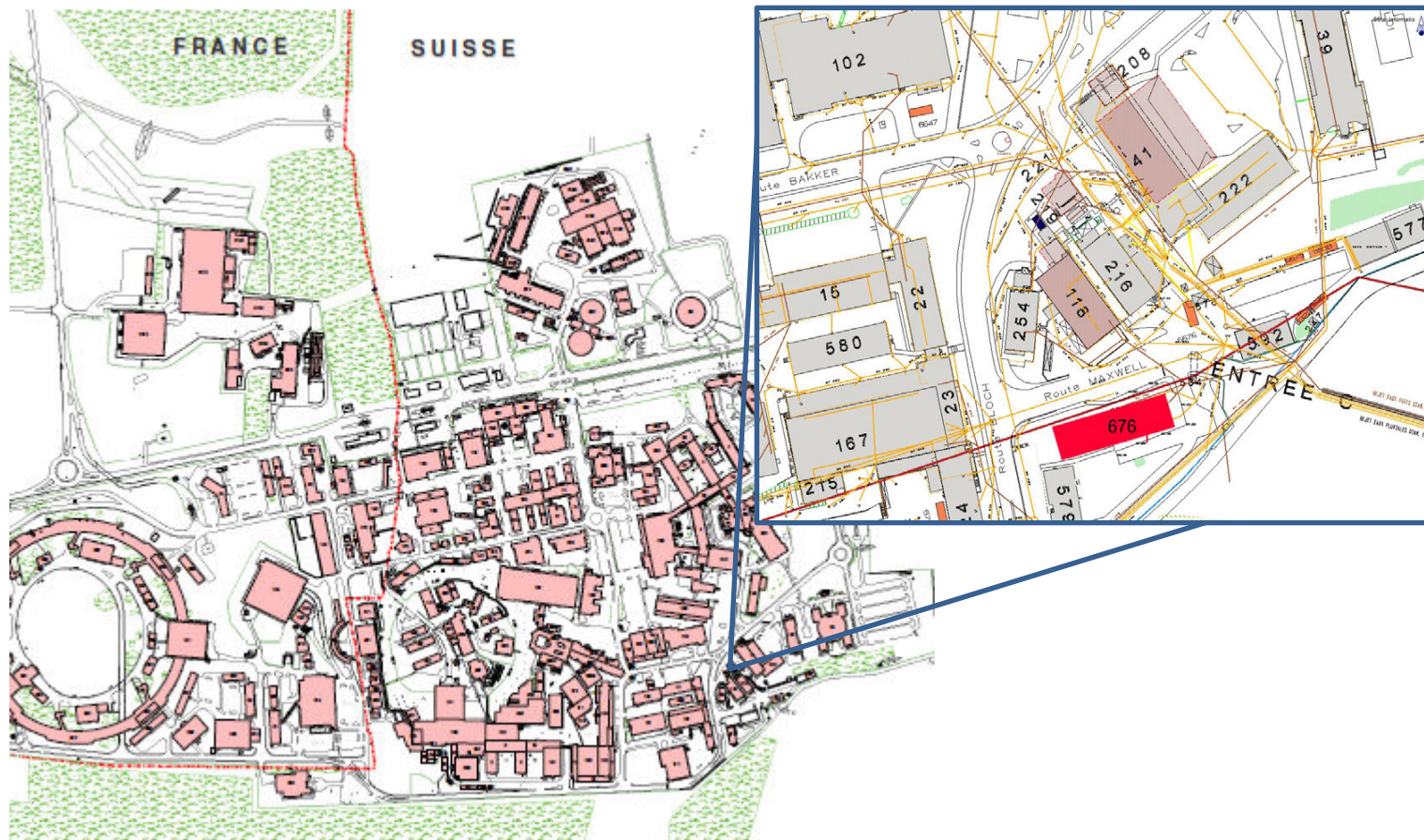
Content:

- **Site;**
- **Schematic of setup;**
- **Main equipment parameters;**
- **Details of the installation.**



sLHC

Niobium EP Setup



Niobium EP Setup



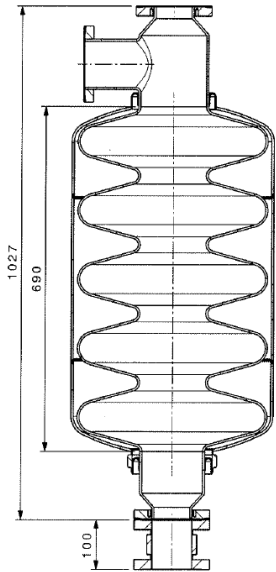
Previous site for Nb EP
(1.3 GHz TESLA)



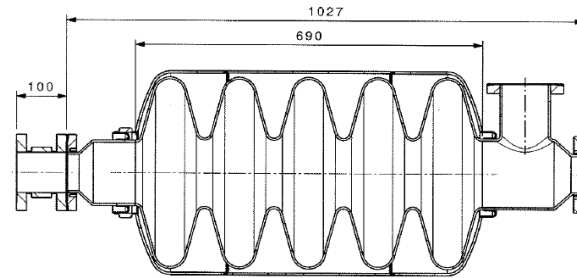
“New” site for Nb EP



Niobium EP Setup



Vertical vs Horizontal

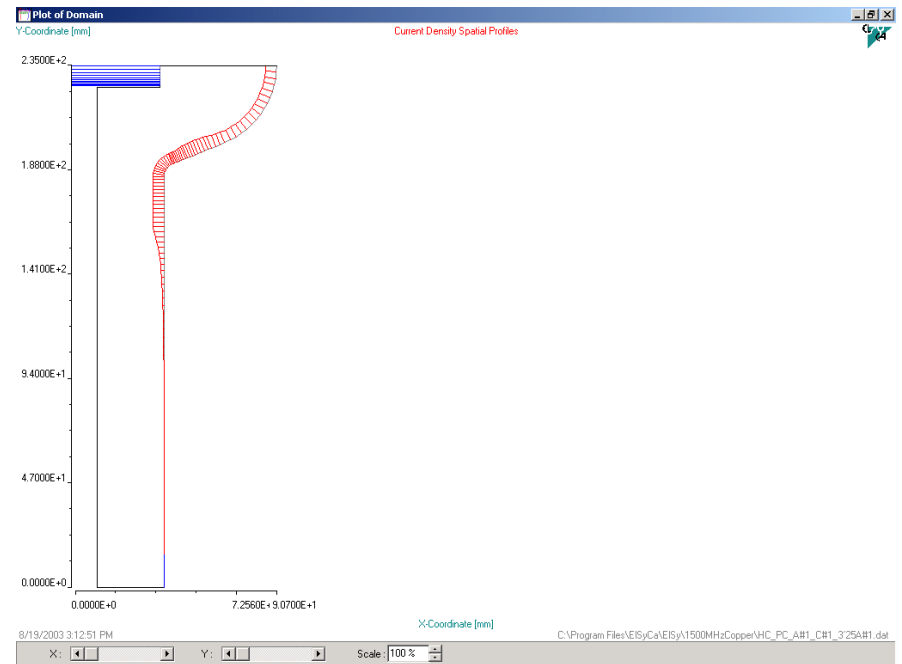
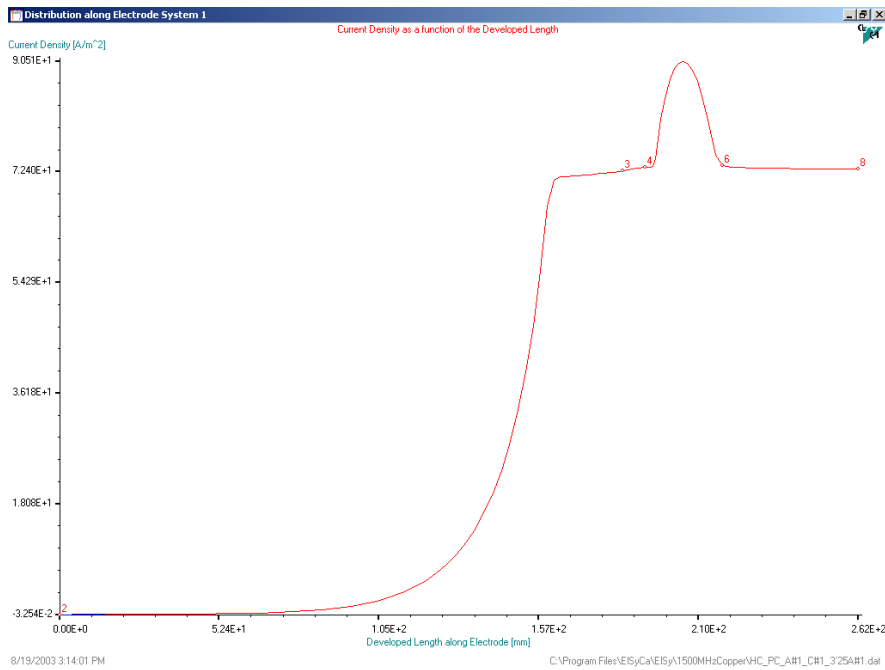


- Current density distribution is not critical;

- No On/Off effect during EP;
- Simplified assembly (no rotating parts);

Niobium EP Setup

Vertical vs Horizontal



Niobium EP Setup

Materials choice

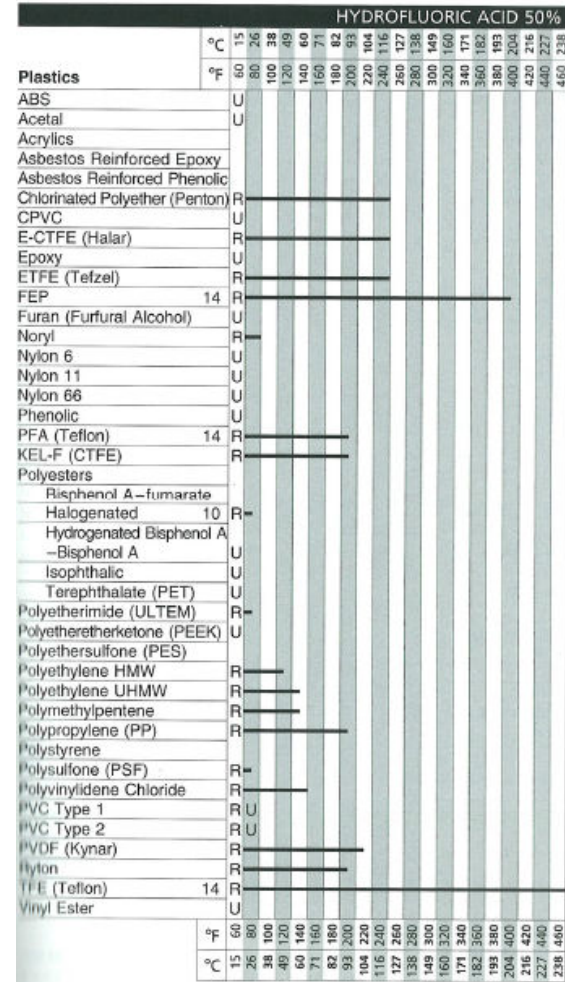
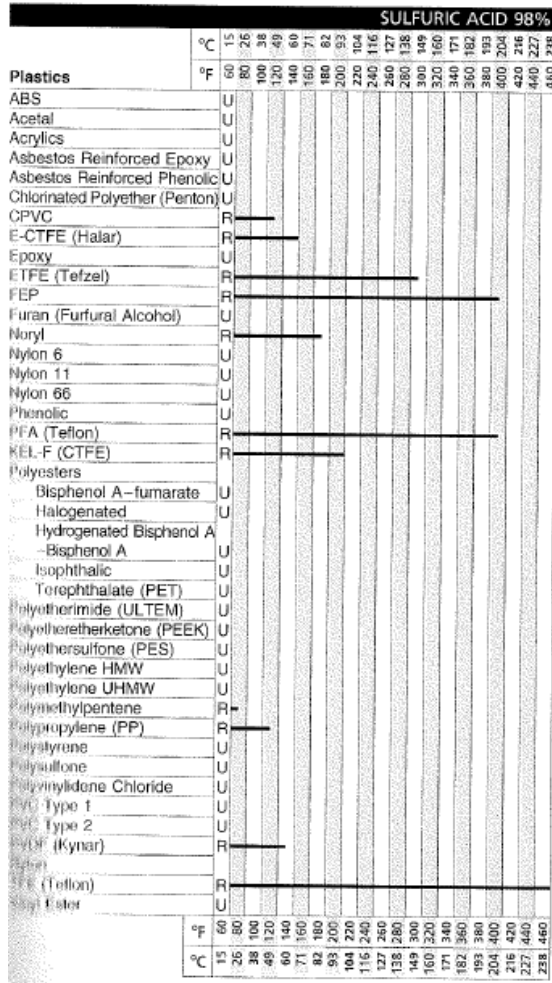
Plastics	PHOSPHORIC ACID 50–85%												
	°C	15	60	80	100	120	140	160	180	200	220	240	260
ABS	R	U											
Acetal	U												
Acrylics	R												
Asbestos Reinforced Epoxy	R												
Asbestos Reinforced Phenolic	R												
Chlorinated Polyether (Penton)	R												
CPVC	R												
E-CTFE (Halar)	R												
Epoxy	R	U											
ETFE (Tefzel)	R												
FEP	R												
Furan (Furfural Alcohol)	R												
Noryl	R												
Nylon 6	U												
Nylon 11	U												
Nylon 66	U												
Phenolic	U												
PFA (Teflon)	R												
Polyamide-Imide	R												
Polyesters	R												
Bisphenol A-fumarate	R												
Halogenated	R												
Hydrogenated Bisphenol A	R												
-Bisphenol A	R												
Isophthalic	R												
Terephthalate (PET)	R												
Polyetherimide (ULTEM)	R												
Polyetheretherketone (PEEK)	R												
Polyethersulfone (PES)	R												
Polyethylene HMW	R												
Polyethylene UHMW	R												
Polymethylpentene	R												
Polypropylene (PP)	R												
Polystyrene	R												
Polysulfone	R												
Polyvinylidene Chloride	R												
PVC Type 1	R												
PVC Type 2	R												
PVDF (Kynar)	R												
Nylon	R												
TFE (Teflon)	R												
Vinyl Ester	R												

Plastics	NITRIC ACID 70%												
	°C	15	60	80	100	120	140	160	180	200	220	240	260
ABS	U												
Acetal	U												
Acrylics	U												
Asbestos Reinforced Epoxy	U												
Asbestos Reinforced Phenolic	U												
Chlorinated Polyether (Penton)	R	U											
CPVC	R												
E-CTFE (Halar)	R												
Epoxy	U												
ETFE (Tefzel)	R												
FEP	14	R											
Furan (Furfural Alcohol)	U												
Noryl	U												
Nylon 6	U												
Nylon 11	U												
Nylon 66	U												
Phenolic	U												
PFA (Teflon)	14	R											
Polyamide-Imide	R												
Polyesters	R												
Bisphenol A-fumarate	R												
Halogenated	R												
Hydrogenated Bisphenol A	R												
-Bisphenol A	R												
Isophthalic	U												
Terephthalate (PET)	R												
Polyetherimide (ULTEM)	R												
Polyetheretherketone (PEEK)	R												
Polyethersulfone (PES)	U												
Polyethylene HMW	U												
Polyethylene UHMW	U												
Polymethylpentene	R												
Polypropylene (PP)	U												
Polystyrene	U												
Polysulfone	U												
Polyvinylidene Chloride	U												
PVC Type 1	R												
PVC Type 2	R												
PVDF (Kynar)	R												
Nylon	U												
TFE (Teflon)	14	R											
Vinyl Ester	U												

Plastics	SULFURIC ACID 98%												
	°C	15	60	80	100	120	140	160	180	200	220	240	260
ABS	U												
Acetal	U												
Acrylics	U												
Asbestos Reinforced Epoxy	U												
Asbestos Reinforced Phenolic	U												
Chlorinated Polyether (Penton)	U												
CPVC	R												
E-CTFE (Halar)	R												
Epoxy	U												
ETFE (Tefzel)	R												
FEP	R												
Furan (Furfural Alcohol)	U												
Noryl	U												
Nylon 6	U												
Nylon 11	U												
Nylon 66	U												
Phenolic	U												
PFA (Teflon)	R												
REL-F (CTFE)	R												
Polyesters	U												
Bisphenol A-fumarate	U												
Halogenated	U												
Hydrogenated Bisphenol A	U												
-Bisphenol A	U												
Isophthalic	U												
Terephthalate (PET)	U												
Polyetherimide (ULTEM)	U												
Polyetheretherketone (PEEK)	U												
Polyethersulfone (PES)	U												
Polyethylene HMW	U												
Polyethylene UHMW	U												
Polymethylpentene	R												
Polypropylene (PP)	R												
Polystyrene	U												
Polysulfone	U												
Polyvinylidene Chloride	U												
PVC Type 1	U												
PVC Type 2	U												
PVDF (Kynar)	R												
Nylon	U												
TFE (Teflon)	U												
Vinyl Ester	U												

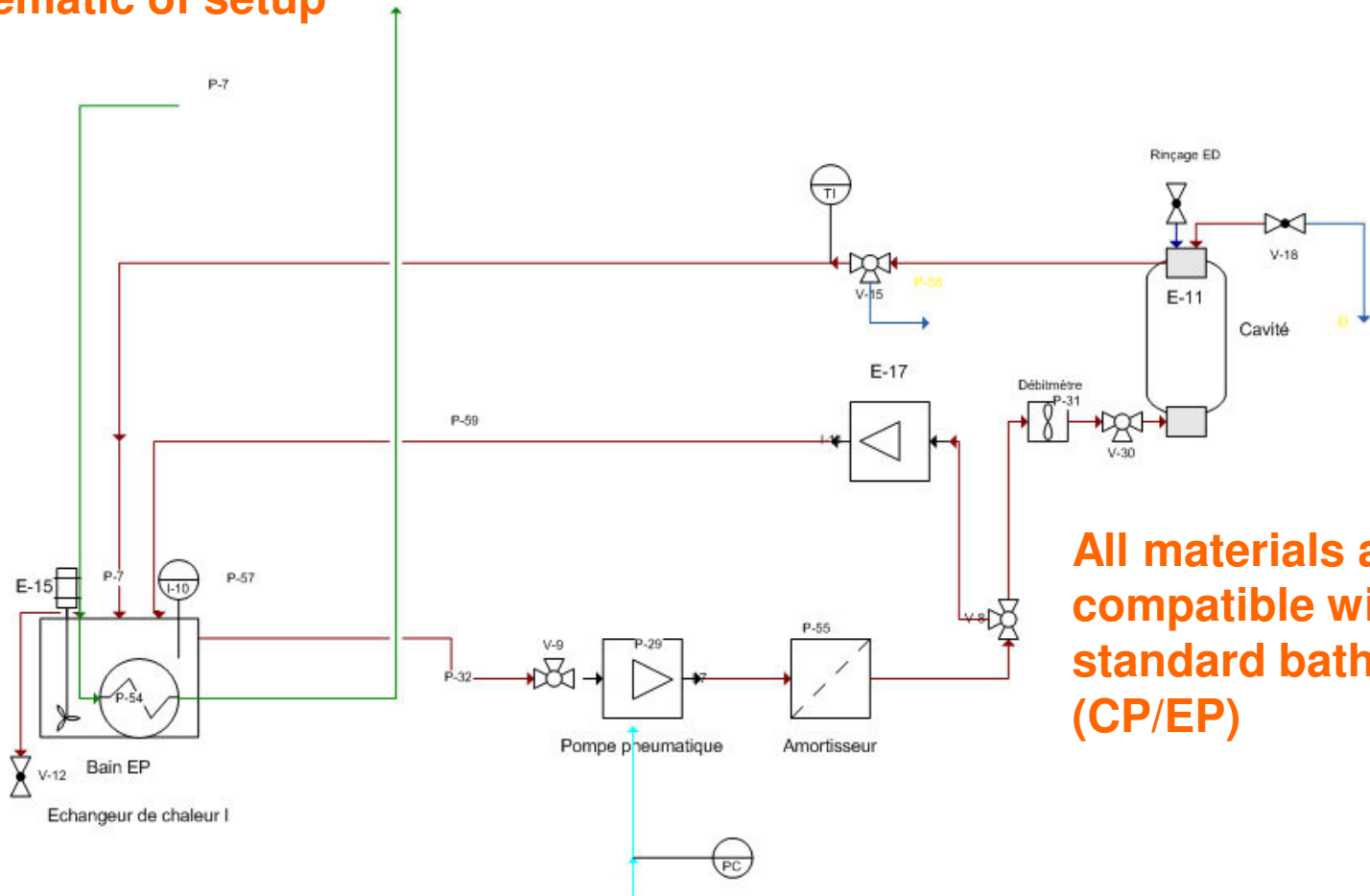
Niobium EP Setup

Materials choice



Niobium EP Setup

Schematic of setup



All materials are compatible with standard baths (CP/EP)

Niobium EP Setup

Main equipment parameters

Pump
Max. 50 lpm

Specific Volume	1.77 g.cm ⁻³
Viscosity	0.23 g.cm ⁻¹ .s ⁻¹
D_H	4.00 cm
Flow	50.00 dm³/min
Speed	66.31 cm.s ⁻¹
Re	2050 < 2100

Heat exchanger
Min. 6 kW

Extrapolation from TTC* data for SPL beta 1

* TESLA Technology
collaboration

Applied potentiel	17 V
Applied courant	777 A
Power	13 kW

Removed heat

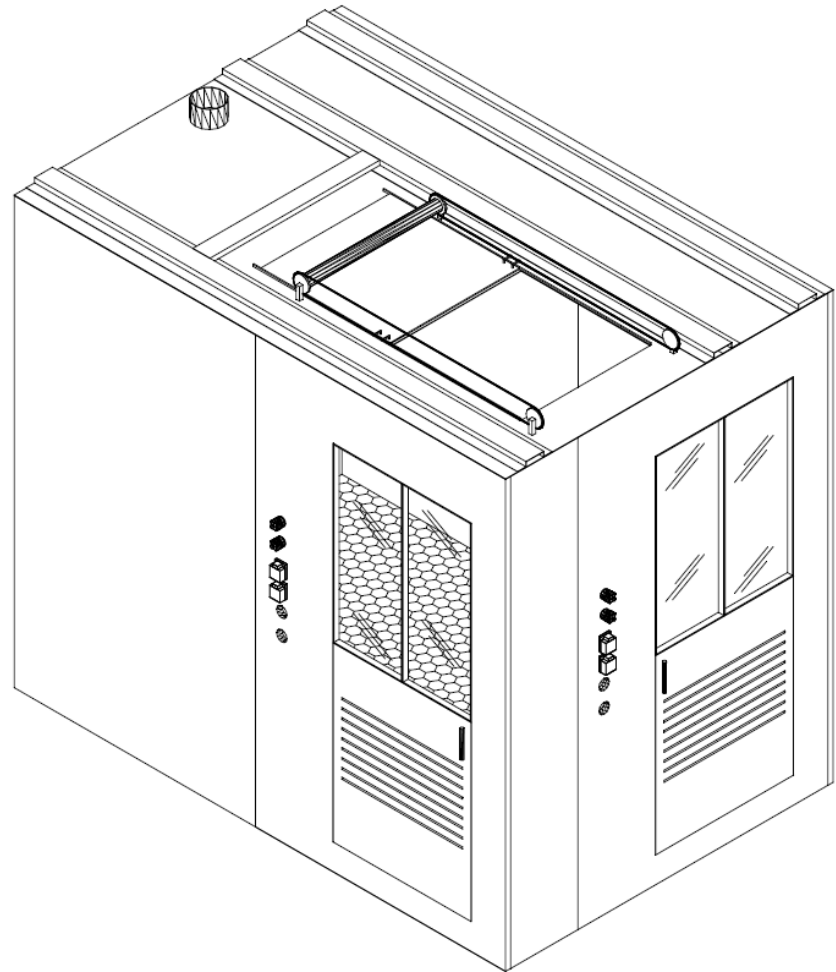
T _{in} =	15 °C	
T _{out} =	25 °C	
Q _v =	29 dm ³ /min	1740 lph
H =	11215 kcal/h	13kW

Niobium EP Setup

Details of the installation

Walk-in booth:

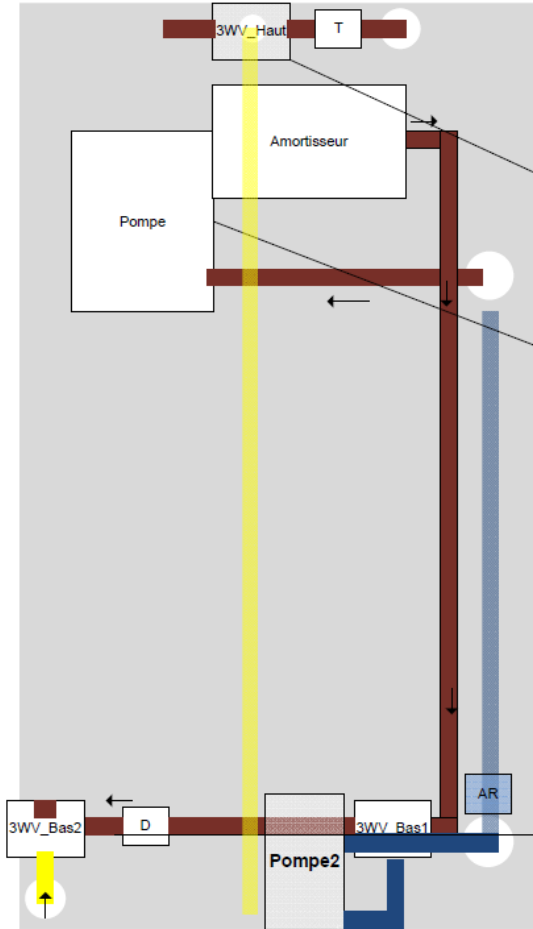
- ~500 m³/h
- ~40 volumes/hour



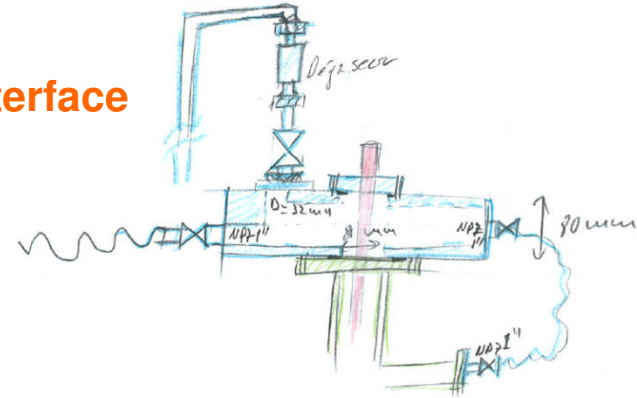
Niobium EP Setup

Details of the installation

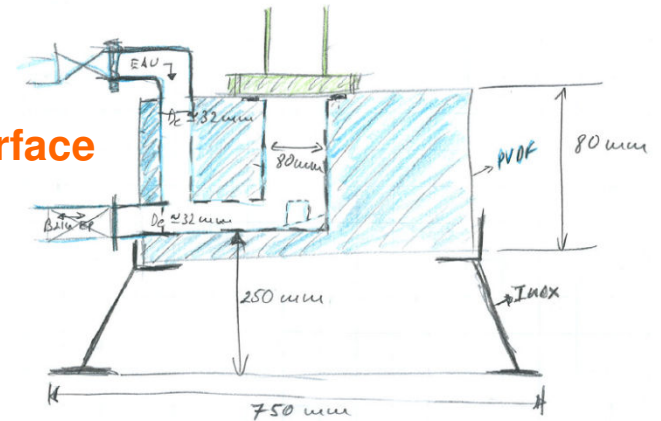
Schematic of circuit



Top interface



Bottom interface



Interface point b2s

Niobium EP Setup

Planning

	Activity	Période
Phase I	Réception of « Sorbonne »	End of December
	Assembling of different components	End of January
	Test hydraulique	February