**MATERIAL cost (without manpower)**

**Cooling**

**Station 4.1**

We assume 2 chambers /channel (40deg cooling sectors)

1) RE4 SM cost in 2012 was 10 598 $ for all components.

🡪 5.5k$ or 5.5k CHF

2) Additional hose to RE4/1 320m = 700$

= 6.2k$ plus 10% = 6.8k$

We require to add "T"s to the Mini manifolds. x40 @ 9.0chf = 400$

Spares at 10% = 7.92k$

🡪 **Total RE4/1 cooling = 8kCHF**

**Station 3.1**

RE3/1 is an extension of the RE3/2 system. Two RE3/1s will service x1 RE3/1

Dia 8x6mm/metre = 8.5 CHF/m !!

dia 8mm Cu pipe 2m/RE3/1  = 80m  =  680 CHF

Unions are on the chambers but may have to change 10% at 4.9chf and 5.7chf each. 15 union @ 5.7CHF  = 85 CHF

Worst case change all legris unions on RE3/2s 4.9chf x 36 x 2 = 360 CHF

**Total RE3/1 cooling = 1.1 k CHF**

* **GRAN TOT COOLING 3.1 & 4.1 = 9.1 kCHF**

**GAS**

* Cu pipes everywhere
* we will use 12 channels per station
* Same gas mix as the rest of the system

**Station 4.1**

From bulkheads on the disk periphery to the chambers (one line for each chamber)

Dia 4x6mm/100 m = 140 EURO/100m = 150 CHF

TOT= 36 \* 5 m \* 2 (supply and return) = 350 m

**1)  COST 525  CHF**

From distribution racks on the towers to bulkheads (3 chambers/channel)

Dia 6x8mm/100 m = 196 EURO/100m = 210 CHF

TOT. = 12 \* 30 m \* 2 (supply and return) = 720 m

**2)  COST 1510  CHF**

**3) Bulkhead with union from 8mm to 6mm (SAGANA)—>  cost ? 150 CHF**

**4) 3 chambers/channel impedance (GAS group production)—>  TOT. 12  about 300 CHF  (to be checked) = 3600 CHF**

**TOT. 4.1  =  5785 CHF**

**Station 3.1**

—> Cu pipes everywhere

—>  we will use 6 channels x each side positive and negative. For each side:

- From bulkhead on the disk periphery to the chambers (one line for each chamber)

- Dia 4x6mm/100 m = 140 EURO/100m = 150 CHF

TOT= 36 \* 5 m \* 2 (supply and return) = 350 m

**1)  COST 525  CHF**

**2) patch-pannel  SAGANA—>  cost ?**

**3) 3 chambers/channel impedance (GAS group production)—>  TOT. 12  about 300 CHF  (to be checked) = 3600 CHF**

**TOT. 4.1  =  4275 CHF**

* **GRAN TOT GAS 3.1 & 4.1 = 10 kCHF**

**GAS Copper pipe cost based on GERD’s email on 6 Dec 2016.**

**Trolley : 6 assuming RE3.1 and RE4.1 installed in two YETS.**