

***DRAFT SUMMARY ON CRYOGENICS
FOLLOWING THE
MERCURY TARGET MEETING 4/5. 11. 2004 AT CERN***

As basis for today's video conference

CRYOGENIC INFRASTRUCTURE

POWER SUPPLY capacity does not require sub-cooling. Magnet operation temperature at 82 K of magnet with approximately 78 K of LN2 bath.

CONSEQUENCES FOR CRYO

No sub-cooling required, i.e.

-NO VACUUM PUMP to reduce pressure on LN2 bath which can be omitted leading to simplification of system

FURTHER SIMPLIFICATIONS

(flow scheme F. Haug presented 4.11.04):

PROPOSAL TO DO

-WITHOUT WARM EXHAUST (VENT)

Which eliminates also the need for

-ELECTRICAL OR PASSIVE HEATER

i.e. further simplification and cost reduction

This means Operation simply with LN2 supply from an external dewar at surface and cold gas or LN2 return to the surface.

For this either two separate transfer lines or a so-called one "two-in-one" is used.

TRANSFER LINES

The transfer lines are of the flexible ones "KABELMETAL" or similar permitting quick and easy installation for this temporary experiment.

VALVE BOX

"Concentration" of instrumentation for "external cryogenic" in one valve box at proximity to magnet.

The current flow scheme (P. Titus et.all) foresees four (4) cold valves in the valve box

CONTROL VALVES

-Five cold valves. V1 on LN2 dewar, V2, V3, V4, V5 in valve box.

-One warm valve V6

CRYOGENIC EQUIPMENT INVENTORY AT CERN AND AVAILABILITY

F. Haug investigates on the potential use of existing equipment at CERN

- Several “two-in-one” identical transfer lines of former LEP exist
- A 6000 liter dewar, (+ alternatives)
- valve box envelopes, valves ???

Further investigations are being pursued.....

SURFACE INFRASTRUCTURE

- Concrete platform for Equipment installation at surface (site committee permission) for LN2 dewar and Nitrogen gas or Helium bottles (200 bar)

RADIATION SAFETY ISSUES

- a) Drill hole in concrete blocks for installation of short transfer lines (low cost) between valve box and magnet
- b) Residual LN2 quantity of 1 to 2 liters

In both cases preliminary answer of Thomas Otto (9.11.04) = positive. However, final answer only after simulation calculations in Jan. 2005.

MAGNET AND CRYOSTAT

- Decrease cryostat void volume from 300 l to less than 100 liters using “fillers” of appropriate material. (Reduces filling and emptying time and LN2 loss)
- Add “descrete” level sensor at bottom of cryostat to detect minimum level
- Mechanical interfaces to external cryogenics

PROCESS CONTROL SYSTEM

Cryogenic process must be fully automatized without requiring operator or engineer interventions during normal running !

Open issue remains on the type of control system. However, “Unicos” is the preferred CERN standard. ECR group could give full assistance.

PRE-COMMISSIONING

The external system can be fully commissioned without magnet and all functional tests can be made.

BASIC OPERATION PRINCIPLES

- Cooling, filling and emptying is done via the drain port.
- Exhaust is at top port
- pressurisation for emptying with N2 or He 200 bar bottles
- Exhaust only to ambient, no N2 recovery

1. Initial Cool down (so far identical with 2.)

Open: V1,V2,V5,V4

2. Cool down after pulse

Open: V1,V2,V5,V4

3. Emptying

Open: V6, V5, V3

4. Stanby mode

Open: V4