Linde Kryotechnik AG

Congratulations on the Inauguration of the LHC Cryogenics

For more than 30 years Linde Kryotechnik has been proud of contributing cryogenic know-how, equipment and services to CERN. Initially Sulzer was the supplier for the early projects. The cooperation was continued and extended by Linde Kryotechnik, the new company founded in 1992, when Linde AG acquired the cryogenic department from Sulzer.

A few of the many different projects realized during this long period of time shall be highlighted in the following.

The first cryogenic plants supplied by Sulzer to CERN were a hydrogen re-liquefier for the 2 meter bubble chamber and a helium refrigerator for re-condensing hydrogen and cooling the superconducting magnet of the Big European Bubble Chamber (BEBC).

Helium refrigeration plants to serve the Omega magnet and for the extension of the BEBC project were following in 1969 and additional plants were ordered by CERN in the years 1975 to 1977.

In 1985 an order was received for two helium refrigeration plants to serve the magnets for the ALEPH and DELPHI detectors and in the early nineties both a very compact 6 kW and two 12 kW helium refrigerators were built for the Large Electron Proton collider (LEP). Later these 12 kW refrigerators were up-graded to a capacity of 17.5 kW for the LHC project.

A maximum of performance and complexity was demanded from our engineers for the design and construction of the large helium refrigeration plants for the LHC project (Large Hadron Collider). Part of the system are coldboxes housing a four stage cold compression system providing cooling at a temperature of 1.8 Kelvin. In 2003 Linde Kryotechnik and partner IHI (Ishikawajima-Harima Heavy Industry) were honored by CERN with the Golden Hadron Award for the excellent realization of that project.

Our projects for the Large Hadron Collider (LHC):

CERN-LHC18KW98
Two of the four new main LHC helium refrigeration plants (18kW cooling power at 4.5K) for cooling the 27km long LHC ring in the tunnel. These are the largest vacuum insulated helium refrigerators ever built.

CERN-LHCCCS99
Four cold compressor systems to cool the liquid helium for the magnets and cavities of LHC down to 1.8K.

CERN-COOL04
Four cryogenic pre-cooling and adsorber units for the existing LEP-12kW refrigeration plants. Further the other existing refrigerators have been equipped with new 80K adsorbers, isolation and by-pass valves.

LEP-6kW90
One 6kW helium refrigeration plant for the testing of the LHC cavities. The plant had been used earlier in the tunnel for LEP .

LEP-12kW91
Two 12kW helium refrigerator plants earlier used for the LEP modified and upgraded to 17.5kW and further to 19.5kW cooling power at 4.5K. These plants are of split design (UCB upper cold box und LCB lower cold box). The upper cold box at surface level is producing a temperature of 20K with 4 turbines and the lower cold box the final cold at 4.5K in the tunnel 40m to 140m underground.

CERN-ATLECS01
One helium refrigeration plant for the shield cooling of the ATLAS detector in the tunnel.

Linde Kryotechnik expresses its thanks to the scientists, engineers, technicians and administration staff at CERN for an all-time constructive and fruitful cooperation. It is our conviction and wish that CERN will continue to produce outstanding results in the field of particle research.

For further information please contact:
Linde Kryotechnik AG
Daettlikonerstrasse 5
CH-8422 Pfungen
Switzerland

Phone +41 52 304 05 55
Fax +41 52 304 05 50
E-mail info@linde-kryotechnik.ch
Internet www.linde-kryotechnik.ch