Introduction

The SPS North Experimental Area involves secondary beam lines with a high level of induced nuclear radiation. Therefore, CERN has developed a remotely controlled vacuum joint for parts of the beam line vacuum chambers near the targets.

Technical characteristics

The module presented is a double joint for vacuum pipes of 159 mm O.D. Such joints are placed between magnets weighing about 10 tons each. Each joint is composed of two conical flanges made out of austenitic stainless steel, a metallic gasket of the Helicoflex* type, based on a lead plated copper foil, and a clamp giving a 5 ton load onto the gasket. Power to the clamp is given by a three phase motor via a gear box with a 1:30 ratio. The output shaft of the gear box is connected to the two screws tightening the clamp. The final torque on each screw is about 3 mdaN, and the load on the gasket is about 80 daN per centimeter of gasket length. The clamp is guided in its motion by four wheels sliding in grooves incorporated in two plates fixed on the frame. As the clamps, when the joints are in the open position, are withdrawn perpendicularly to the chamber axis, it is possible to lift the adjacent magnets with a crane without damaging the seal. It is also possible to remove the module without touching the magnets. The motor assembly, when fitted on top of the module, serves as clamping tool, tightening both joints. When connected to a crane this assembly also serves as lifting device for the module.

Tests

Lifetime tests were performed during 1978 on the first mechanism in a series to be built. It has made more than thousand tightenings with no sign of fatigue. During these tests about 20 gaskets have been used, 50 times each on an average. The same leak tightness was obtained from the first to the last sealing operation. The leak rate was always below $10^{-9}$ torr l/s, measured with a mass spectrometer type leak detector. Four gaskets, taken at random and subjected to prolonged tests were still leak tight after 200 operations. Series modules will be assembled in the beam line during 1979.

Further information

For further information please contact Messrs. G. Corazza, M. Goujon and M. Mathieu, SPS Division.

* Trade mark, CEFILAC, Saint-Etienne (France).