1000-ton testing machine for cyclic tensile fatigue tests of poloidal coil PF1 ITER samples at liquid nitrogen temperatures

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One of the main tasks of R & D electrical installations in the cryogenic temperature range is to determine the mechanical and fatigue properties of structural materials and the critical elements of the design.

This paper describes a new facility, built based on an industrial 1000-ton (10 MN) testing machine Schenk PC10.0S. Special equipment was developed and commissioned for mechanical and cyclic tensile fatigue tests of large samples. This equipment provides testing at liquid nitrogen temperature in a given load range. The feature of the developed test equipment is the existence of the cryostat, in which the device for converting a standard compression force of testing machine Schenk PC10.0S to the tensile force affected at the test object is placed. The control system provides the remote control of the test process and capturing, information processing and presentation of measurement data.

As examples of the testing machine are programs, methods and the results of the cyclic tensile fatigue tests of full-scale helium inlet sample of the poloidal field coil PF1 ITER.