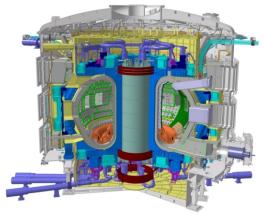




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# NDT STATUS OF PF1 COIL WELDS



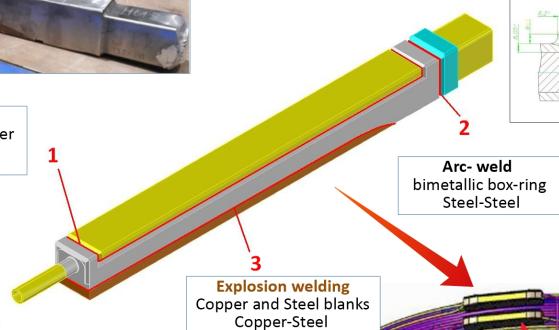
Sokolov I., Gurieva T., Belyaev A., Panteleev M., Rodin I., Marushin E., Mednikov A.

The poloidal field coil PF1 is one of the subsystems of the ITER magnetic system. PF1 coil consists of 8 double pancakes (DPs) interconnected PF1 coil contacts joints. The PF1 coil uses liquid helium as a cooling system, which is fed into contact junctions through helium inlets (HI).

## ULTRASONIC TESTING (UT) OF PF1 CONTACT JOINTS



Arc-weld  
bimetallic box-cover  
Steel-Steel



PA 1.1. P3A. RF.01  
Technical Specification

EN ISO 5817  
(level B)  
Quality levels for  
imperfections

EN ISO 17635  
General rules for UT

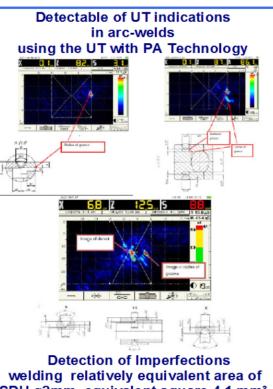
EN ISO 16810  
EN ISO 17640  
Testing techniques

EN ISO 22825  
Reference block

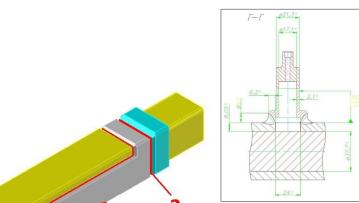
EN ISO 11666  
Acceptance levels

The use of traditional UT is not subject to the implementation of the reasons:

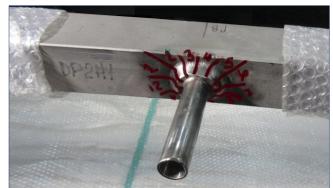
- geometric complexity profile welds
- absence of the necessary scanning area
- UT Procedure ITER\_ID TU45WL approved by IO ITER



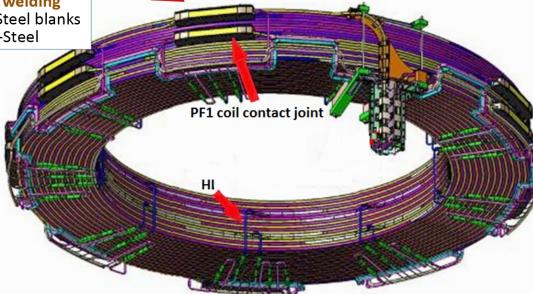
ITER UT Requirement  
(ø1.6 mm FBH) for explosion  
welding CU/SS can be formed  
when weld border will be gotten  
another welding technology  
without big "tooth"



Root of the HI weld – indirect VT with Olympus IPLEX LX IV8420L1 and XLG3 General Electric video endoscopes



CR system – DUERR HD-CR 35 NDT scanner and HD-IP image plates



The full-penetration and differences in material thickness weld

- Dimensions: 36.4\*28.4\*6.2mm
- Performed of AISI 316LN steels
- Welding process TIG
- Welding type MW
- Level of quality B by EN ISO 5817
- VT Procedure ITER\_ID QCTAXT approved by IO ITER
- RT Procedure ITER\_ID QU5YBE approved by IO ITER

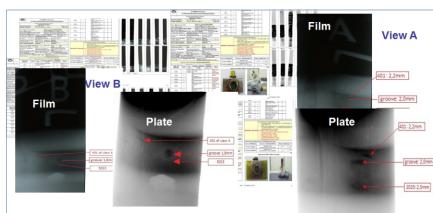
VT of the simple of the HI weld



VT and RT results of the root of the HI weld



RT-CR of the simple of the HI weld



CR System class - IP3; SNRn – 78 Table A.1 , ISO 16371-1 Required spatial system resolution X-ray Up  $\leq$  150 kV, max. pixel size - 40m, b >13 IQI value - 0,125 (W15) for  $t_n = 6,2$ mm Min number of exposure - N=12, size of view – 9mm

PA 1.1. P3A. RF.01  
Technical Specification

EN ISO 5817  
(level B)  
Quality levels for  
imperfections

EN ISO 17635  
General rules for VT  
and RT-CR

EN ISO 17637  
EN ISO 17636-2  
EN ISO 14784-2  
Testing techniques

EN ISO 10675-1  
(level 1)  
Acceptance levels

NDT is capable to detect both surface imperfections and internal indications, both volumetric and plane defects of all types of PF1 welds.