
	Manufacturing, testing and supply of vacuum vessels for HNB3 (Beam Line Vessel and Beam Source Vessel) and DNB <i>Annexure 6C: Welding_Qualification of Welders and Operators</i>	INDUS Ref No II-YL4QP3G- v1.1
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1. Scope

This section covers the rules to be applied for qualifying the welders and welding operators, for the production welding of DNB Vessel and HNB3 Vessel.

2. Reference standard

ITER Vacuum Handbook

RCC-MR 2007; Section 4: RS 4000 Qualification of Welders and Operators

EN ISO 9606: Qualification testing of welders — Fusion welding — Part 1: Steels

EN ISO 14732: ISO 14732:2013: Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials

3. Welder and welding operator Qualification

3.1 General

3.1.1 The welder qualification is intended to show the competence of the welder/operator for implementing the specified WPS. These qualification tests shall demonstrate that the welder is able to follow the instructions and that he has the necessary skill to perform welds to the required level of quality.

3.1.2 Welder qualification (manual welding and partially mechanized welding process) shall be in accordance with **ISO 9606** along with the additional requirements mentioned in this section.

(A welding process is said to be manual if the welding torch or electrode is hand-guided by the welder.


A welding process is said to be partially mechanized if the operator can intervene during the course of welding.)

3.1.3 Welding operator (completely mechanized, automatic or robotized welding process) qualification shall be in accordance with **ISO 14732** along with the additional requirements mentioned in this section.

(A completely mechanized, automatic or robotized welding process is one in which no human intervention is possible during the course of the welding operation.)

Each performance qualification welder testing shall be done under full supervise and control by a third party (or inspection body) or ITER-India. Third party (or inspection body) shall be accepted by IO

3.1.4 The supplier shall establish and maintain a list of qualified welders and operators. This list shall include their individual identification and range of welds for which they are

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qualified. This list shall have traceability with respect to the WPQR certificate of the respective welder. This list is a living document and the same shall be updated as the additional welder / welding operators are qualified. Each time the list is updated, it is required to be sent to ITER-India and IO for review and approval. Only those Welder / welding operators, who are in the approved list, shall be deputed for the welding activity related to this contract.

- 3.1.5 The qualification procedure must take place prior to any fabrication work in order to verify that the welders and operators have the necessary skills to properly execute welds using qualified welding procedures in accordance with this section.

3.2 Responsibility of Manufacturers

The Manufacturer shall establish procedures for qualifying welders in accordance with the requirements of this section.

No production welding operation shall be undertaken unless the specified qualifications have been obtained.

The technical skill of the welders is the responsibility of the Manufacturer.

3.3 Documents to be Prepared

All welder qualification procedures shall be performed by applying a Welding Procedure Specification as defined in **Section 2 of Annexure 6** of this specification and as per the scope of validity of the qualification.

3.4 Range of approvals (additional requirements)

3.4.1 Procedural conditions

Any change in the procedural conditions (manual, part-mechanized, mechanized, automatic etc.), or the number of welders working with the same melt shall require the welder(s) to be re-qualified.

3.4.2 Group of Material


Standards **ISO 9606 and ISO 14732** shall be applicable.

3.4.3 Dimensions

Standards **ISO 9606 and ISO 14732** shall be applicable.

In addition to this requirement, in the case of qualification for repairs to welds or bevel edges, the welder shall obtain qualification for all repair depths less than the maximum limit stipulated **ISO 9606 and ISO 14732**.

For full-penetration welded joints of thickness above 50 mm executed manually, the range of approval in thickness shall be limited to 5 mm and 2 t (where t is the qualification thickness)

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3.4.4 Type of Weld:

Standards **ISO 9606 and ISO 14732** shall be applicable.

In addition, a qualification obtained on a butt weld shall also qualify fillet welds provided the other range of approval defined in this section is met regarding the thickness, diameter, type of weld, base metal, filler material and welding position, with the following additional requirements:

- For tube fillet welds, the range of approval for diameter applies to the external diameter of the inserted tube.
- For a full penetration T-butt joint in plate, the range of approval for thickness applies to the thickness of the beveled plate.

3.4.5 Control and Examination Method:

Standards **ISO 9606 and ISO 14732** shall be applicable.

In addition to this requirement, each qualification test coupon with full-penetration butt welds shall be subjected to radiographic examination.

Fillet weld qualification test coupons shall be subjected to macroscopic examination in at least two sections, one of which shall be located in the area where the weld is interrupted and restarted.

Anti-counterfeit measures to be put in place following NF A09-283 “Non-destructive testing - Traceability and securing of radiographic testing” to ensure full reliability of controls. Refer: **Template_Traceability of radiographic control Supervision_Observation_Report**

The results from all these tests shall be included in Manufacturer’s Construction Records. All Radiographic testing records shall be digitalized with a quality allowing full exploitation of the test result as the original (e.g. standard NF_EN_14096-1, Non-destructive testing - Qualification of the radiographic films digitalization systems).


Refer Clause 4 of Annexure 5 for the requirements related to LDP.

3.4.6 Period of validity of the qualification

Standards **ISO 9606 and ISO 14732** shall be applicable.

Any computerized system used for welder work recording may be substituted to the certificate signature, required each six months, if all the data required for the prolongation of the certificate validity are recorded.

The renewal file shall identify the test pieces executed by the welder.

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If qualification cannot be renewed in accordance with paragraph 9.3 d) of standard NF EN 287-1 (to be replaced by ISO 9606), the prolongation shall be limited to the range covered by the welds performed during the previous 6 months and which meet the requirements of paragraphs 9.3 a) b) c) of standard NF EN 287-1 (to be replaced by ISO 9606); a new report shall be necessary.