

Technical Requirements Specification

Copper plate for non-DT in-vessel usage

This specification covers the supply of Copper plate for non-DT in-vessel usage.

Approval Process			
	<i>Name</i>	<i>Action</i>	<i>Job Title / Affiliation</i>
<i>Signatory</i>	Bao L.	23 Apr 2026:signed	First Wall Engineer
<i>Co-signatories</i>			
<i>Reviewers</i>	Rem M.	24 Apr 2026:recommended (Short Cycle)	Quality Engineer
<i>Previous Versions</i>	Barabash V.	15 Apr 2026:recommended v1.0	IO/DG/ESD/NSE
<i>Reviews</i>	Kim G.	15 Apr 2026:recommended v1.0	IO/DG/ESD/IMES
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<i>Read Access</i>	LG: Blanket add right persons, LG: Blanket Assembly Section Team, AD: ITER, AD: External Collaborators, AD: IO_Director-General, AD: OBS - Configuration Management Section (CMS), AD: External Management Advisory Board, AD: IDM_Controller, AD: OBS - Configuration Management Section (CMS) - EXT, AD: N...		

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<i>Change Log</i>			
Copper plate for non-DT in-vessel usage (DUDS8V)			
<i>Version</i>	<i>Latest Status</i>	<i>Issue Date</i>	<i>Description of Change</i>
v0.0	In Work	03 Jun 2025	
v1.0	Signed	14 Apr 2026	The first version
v1.1	Signed	22 Apr 2026	Incorporating QARO's comments
v1.2	Approved	23 Apr 2026	Incorporating QARO's comments on Quality Assurance Requirements

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1 Scope

This specification covers the supply of plates of Oxygen Free (OF) without residual deoxidants copper (previous designation OF), UNS C10200, to be used for non DT in-vessel usage (VQC-1B application as per ITER Vacuum Handbook, [ITER_D_2EZ9UM](#)).

2 Referenced Documents

The following Codes and Standards shall be referred. The edition of codes and standards at the date of Procurement Arrangements enforced shall be used.

Other equivalent national or international codes and standards may be acceptable subject to the IO's written acceptance through deviation request. To this aim, the DA shall provide evidence that the proposed code and standard are equivalent to the corresponding one, which is specified.

ASTM B 152/152M-24	Standard Specification for Copper Sheet, Strip, Plate and Rolled Bar [Metric]
ASTM B248M-22	Standard Specification for General Requirements for Wrought Copper and Copper Alloy Plate, Sheet, Strip, and Rolled Bar [Metric]
ASTM B577-16	Test Methods for Hydrogen Embrittlement of Copper
ASME 2023, Section V, Article 9	Visual Examination
EN 10204:2004	Metallic products: Type of inspection documents

Following documents are applicable for implementation of the contract:

- [ITER_D_82MXQK – General Management Specification for Service and Supply](#)
- [ITER_D_22MFG4 – Quality Requirements for IO Performers](#)
- [ITER_D_2LZJHB – Procedure for the management of Deviation Request](#)
- [ITER_D_22F53X – MQP L2 Procedure for Management of Nonconformities](#)

3 Ordering Information

It is responsibility of the Contractor to specify the requirements for dimensions and permissible variations in the material purchase order.

A lot shall consist of plates of the same heat, produced with the same manufacturing conditions, with the same thickness, and the same heat treatment. Lot weight shall be limited by 1000 kg.

4 Temper

The temper for product described in this specification is given in Tables 2-4 of ASTM B 152/152M and shall be Q25.

5 Chemical Requirements and Physical Characteristics

5.1 Chemical composition

The chemical composition has to satisfy the requirement given in Table 1. One test per lot shall be performed.

Table 1 Chemical composition of Oxygen Free Copper, UNS C10200

Element	Alloying elements and impurities, wt. %
Copper inc. silver, min wt. %	99.95
O, max, wt. %	<0.0010
Co*	<0.05
Ta*	<0.01

* Radioprotection requirement

5.2 Electrical resistivity and conductivity

The electrical resistivity determined on samples of annealed OF Cu shall not exceed 0.15328 Ohm*g/m² (conductivity 100%, minimum, IACS) when tested at temperature of 20°C as described in ASTM B152M. One test per lot shall be performed.

5.3 Microscopical Examination

Samples of Copper UNS C10200 shall be substantially free of cuprous oxide as determined by Procedure A of Test Method B577 (as per ASTM B152/152M).

5.4 Hydrogen Embrittlement test

Samples of Copper UNS C10200 shall be capable to of passing the embrittlement test in accordance with Procedure B of Test Method B577. In case of a dispute, a referee method in accordance with Procedure C shall be used. One test per lot shall be performed.

5.5 Hardness test

Approximate Rockwell Hardness with F Scale shall be up to 65 (Inch-Pound Units) as per ASTM B 152/152M.

6 Non-Destructive Tests

6.1 Visual inspection

All external surfaces of plates shall be examined by a visual examination in accordance with ASME Section V, Article 9. The surfaces shall be plane, uniform and free from wrinkles, buckles, blowholes, tears, cracks and inclusions

6.2 Dimension inspection

Critical dimension of all products shall be in accordance with the requirements of purchase order.

7 Number and Content of Tests / Sampling

7.1 Tests on base material - frequency

Test	Number of test samples
Chemical analysis	1/ lot
Electrical resistivity	1/ lot
Microstructure and Hydrogen Embrittlement test	1/ lot
Hardness test	1/ lot

7.2 Non-destructive tests – frequency

Test	Inspection in [%]
Visual examination	100
Dimensional check	100

8 Documentation

The Manufacturer shall provide the Inspection Certificate type 3.1 in accordance with EN 10204:2004 which include at least the following information:

- Description of the material designation and marking,
- Lot number,
- Identification of Manufacturer,
- Result of chemical analysis,
- Results of Electrical conductivity test,
- Results of embrittlement bending test,

- Results of microscopic examination,
- Results of hardness test
- Results of non-destructive tests.

All documents shall be in the English language and all measures shall be given in the metric system SI. Each document shall be provided as an electronic file in PDF format.

9 Packaging and marking

Each plate shall be legibly identified with the following information.

- Manufacturer name or symbol,
- Grade of material,
- Dimensions: plate thickness, width and length,
- Plate number or unique identification number related to quality history,
- Heat number.

The marking shall be performed by impression stamping or other acceptable means agreed between Manufacturer and purchaser.

The Manufacturer shall ensure that consignments comply with regulatory requirements applicable to transport and to the country of destination.

Requirements for packaging shall be specified in the purchase order.

10 Quality Assurance Requirements

The Quality class under this contract is QC2.

The Manufacturer shall have either an ITER Organization (IO) approved QA Program or an ISO 9001 certified Quality Management System.

The Manufacturer shall ensure that the quality of supply meets the requirements. In case of any questions, the Manufacturer shall seek clarification from the Purchaser prior to proceeding with the work.

The Manufacturer shall submit the reports according to chapter 8, including all required information.

For materials that are custom-made for this contract, i.e. materials that are not off-the-shelf, the Manufacturer shall also comply with the IO quality requirements specified in Table 2, including the following:

- submission of the Quality Plan (QP), describing the implementation of IO requirements, the Manufacturing and Inspection Plan (MIP), and the reports containing all required information for IO approval;
- conduct of the Manufacturing Readiness Review (MRR) as a gate review, and obtaining authorization for the manufacture of such materials prior to the start of manufacturing.

Table 2 IO Quality requirements

IO Quality Requirements	Associated IO Quality Documents
Overall quality requirements applicable throughout the implementation of the contract	<ul style="list-style-type: none"> Chapter 8 of “General Management Specification for Service and Supply” (ITER_D_82MXQK)
Prior to contract implementation: <ul style="list-style-type: none"> Obtain IO acceptance of a dedicated Quality Plan 	<ul style="list-style-type: none"> “Quality Requirements for IO Performers” (ITER_D_22MFG4)
Prior to start of manufacturing: <ul style="list-style-type: none"> Obtain IO acceptance and mark up of an Manufacturing and Inspection Plan (MIP) Complete MRR Gate review 	<ul style="list-style-type: none"> “Quality Requirements for IO Performers” (ITER_D_22MFG4), “Working Instruction for Manufacturing Readiness Review” (ITER_D_44SZYP) “Inspection Plan Template” (ITER_D_QV7GQF).
During manufacture: <ul style="list-style-type: none"> Notify IO representatives of any Inspection Points as marked up in the MIP Complete the relevant entries in the MIP as work progresses. 	<ul style="list-style-type: none"> “Quality Requirements for IO Performers” (ITER_D_22MFG4),
During contract implementation – issue as necessary: <ul style="list-style-type: none"> Deviation Request (DR) Non-Conformance Reports (NCR) 	<ul style="list-style-type: none"> “Procedure for the management of Deviation Request” (ITER_D_2LZJHB). “Procedure for Management of Nonconformities” (ITER_D_22F53X).
Contractor release note (CRN)	<ul style="list-style-type: none"> “Quality Requirements for IO Performers” (ITER_D_22MFG4)

The Manufacturer shall implement, in compliance with its Quality Management System, the monitoring activities including the quality audits and any inspections to verify the compliance with the requirements.

The IO reserves the right to perform the visits to any premises where the IO related work is being performed.

Documentation developed as the result of this supply shall be retained by the Contractor for a minimum of 5 years from the completion of this supply.