
	<p>Manufacturing, testing and supply of vacuum vessels for HNB3 (Beam Line Vessel and Beam Source Vessel) and DNB</p> <p><b><i>Annexure 15: List of applicable standards</i></b></p>	<p>INDUS Ref No</p>
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## 1. Scope

This annexure lists the standards along with the applicable editions to be used, as and when referred in the tech spec / RCC-MR 2007, and for various purposes as and when required during execution of contract


## 2. List of standards and its applicable version

Table-1 lists the applicable standard along with the applicable edition.


It is mandatory to use the mentioned edition / version of the standard. In case of doubt, purchaser shall be contacted.

It may be allowed to use the equivalent code / standard / references mentioned herein and in this specification subjected to proposal submitted by Contractor with statement of technical equivalency. In this case the purchaser shall respond with an approval/acceptance or request for modification within a reaction time of 5 working days / 7 calendar days. However, where approval from IO is needed, approval or comments will be provided within 15 calendar days from the date of submission by the contractor.


Subsequent versions, available during the execution of the contract, may be used with mutual agreement between ITER-India/ IO and contractor.

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Standards and Amendments	Applicable edition	Titles
<b>FD CEN ISO/TR 16060</b>	2014	Destructive tests on welds in metallic materials – Etchants for macroscopic and microscopic examination.
<b>EN 287-1</b>	2011	Qualification test of welders - Fusion welding - Part 1 : Steels
<b>EN 1593</b>	1999	Non-destructive testing. Leak testing. Bubble emission techniques
<b>EN 1600</b>	1997	Welding consumables. Covered electrodes for manual metal arc welding of stainless and heat resisting steels. Classification
<b>EN 1779</b>	1999	Non-destructive testing. Leak testing. Criteria for method and technique selection
<b>EN 10028-1/A1</b>	2009	Flat products made of steels for pressure purposes. Part 1 : General requirements
<b>EN 10028-7</b>	2016	Flat products made of steels for pressure purposes. Part 7: Stainless steels
<b>EN 10052</b>	1994	Vocabulary of heat treatment terms for ferrous products
<b>EN 10088-2</b>	2014	Stainless steels. Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
<b>EN 10088-3</b>	2014	finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes
<b>EN 10160</b>	1999	Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)
<b>EN 10163-1</b>	2004	Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections - Part 1: General requirements
<b>EN 10164</b>	2004	Steel products with improved deformation properties perpendicular to the surface of the product. Technical delivery conditions
<b>EN 10216-1</b>	2013	Seamless steel tubes for pressure purposes. Technical delivery conditions
<b>EN 10216-2</b>	2013	Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 2 : non-alloy and alloy steel tubes with specified elevated temperature properties

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<b>EN 10216-5</b>	2013	Seamless steel tubes for pressure purposes. Technical delivery conditions. Stainless steel tubes
<b>EN 10222-5</b>	2017	Steel forgings for pressure purposes - Part 5 : martensitic, austenitic and austenitic-ferritic stainless steels
<b>EN 10228-4</b>	2016	Non-destructive testing of steel forgings. Ultrasonic testing of austenitic and austenitic-ferritic stainless steel forgings
<b>EN 10253-4</b>	2009	Butt-welding pipe fittings – Part 4: Wrought austenitic and austenitic-ferritic (duplex) stainless steels with specific inspection requirements.
<b>EN 10269</b>	2013	Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties
<b>EN 10272</b>	2016	Stainless steel bars for pressure purposes
<b>EN 10307</b>	2001	Non-destructive testing. Ultrasonic testing of austenitic and austenitic-ferritic stainless steels flat products of thickness equal to or greater than 6 mm (reflection method)
<b>EN 12668-1</b>	2010	Non-destructive testing. Characterization and verification of ultrasonic examination equipment. Part 1 : Instruments
<b>EN 12668-2</b>	2010	Non-destructive testing. Characterization and verification of ultrasonic examination equipment. Part 2 :Probes
<b>EN 12668-3</b>	2013	Non-destructive testing. Characterization and verification of ultrasonic examination equipment. Part 3: Combined equipment
<b>EN 12681</b>	2003	Founding. (Should be Forging..!) Radiographic examination
<b>EN 13018</b>	2016	Non-destructive testing - visual testing - General principles
<b>EN 13185</b>	2001	Non-destructive testing. Leak testing. Tracer gas method
<b>EN 13192</b>	2001	Non-destructive testing – Leak testing – Calibration of reference leaks for gases.
<b>EN 25580</b>	1992	Specification for minimum requirements for industrial radiographic illuminators for non-destructive testing

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<b>EN 28839</b>	1992	Mechanical properties of fasteners. Bolts, screws, studs and nuts made of non-ferrous metals.
<b>EN ISO 148-1</b>	2016	Metallic materials - Charpy pendulum impact test – Part 1: Test method
<b>EN ISO 148-2</b>	2008	Metallic materials - Charpy pendulum impact test – Part 2: Verification of testing machines
<b>EN ISO 544</b>	2011	Welding consumables. Technical delivery conditions for welding filler metals and fluxes. Type of product, dimensions, tolerances and markings
<b>EN ISO 643</b>	2012	Steels. Micrographic determination of the apparent grain size
<b>EN ISO 1127</b>	1996	Stainless steel tubes. Dimensions, tolerances and conventional masses per unit length.
<b>EN ISO 2400</b>	2012	Non-destructive testing. Ultrasonic testing. Specification for calibration block No.1
<b>EN ISO 2560</b>	2009	Welding consumables. Covered electrodes for manual metal arc welding of non-alloy and fine grain steels. Classification
<b>EN ISO 3452-1</b>	2013	Non-destructive testing. Penetrant testing. Part 1 : General principles
<b>EN ISO 3452-2</b>	2013	Non-destructive testing. Penetrant testing. Part 2: Testing of penetrant materials
<b>EN ISO 3452-3</b>	2013	Non-destructive testing. Penetrant testing. Part 3: Reference test blocks
<b>EN ISO 3452-5</b>	2008	Non-destructive testing — Penetrant testing — Part 5: Penetrant testing at temperatures higher than 50 °C
<b>EN ISO 3452-6</b>	2008	Non-destructive testing — Penetrant testing — Part 6: Penetrant testing at temperatures lower than 10 °C
<b>EN ISO 3506-1</b>	2009	Mechanical properties of corrosion-resistant stainless-steel fasteners. Part 1: bolts, screws and studs.
<b>EN ISO 3506-2</b>	2009	Mechanical properties of corrosion-resistant stainless-steel fasteners. Part 2: nuts.
<b>EN ISO 3834-2</b>	2006	Quality requirements for fusion welding of metallic materials - Part 2: comprehensive quality requirements

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<b>EN ISO 4032</b>	2012	Hexagon nuts, style 1. Product grades A and B
<b>EN ISO 4034</b>	2012	Hexagon nuts. Product grade C
<b>EN ISO 4063</b>	2010	Welding and allied processes. Nomenclature of processes and reference numbers
<b>EN ISO 4136</b>	2013	Destructive tests on welds in metallic materials. Transverse tensile test
<b>EN ISO 4288</b>	1998	Geometric product specification (GPS). Surface texture. Profile method: Rules and procedures for the assessment of surface texture
<b>EN ISO 4759-1</b>	2001	Tolerances for fasteners. Bolts, screws, studs and nuts. Product grades A, B, C
<b>EN ISO 5173</b>	2010	Destructive tests on welds in metallic materials. Bend tests
<b>EN ISO 5178</b>	2011	Destructive tests on welds in metallic materials. Longitudinal tensile test on weld metal in fusion welded joints
<b>EN ISO 6506-1</b>	2014	Metallic materials. Brinell hardness test. Test method
<b>EN ISO 6506-2</b>	2014	Metallic materials. Brinell hardness test. Verification and calibration of testing machines
<b>EN ISO 6506-3</b>	2014	Metallic materials. Brinell hardness test. Calibration of reference blocks
<b>EN ISO 6507-1</b>	2005	Conformity assessment. Supplier's declaration of conformity. General requirements
<b>NF EN ISO 6507-2</b>	2005	Metallic materials. Vickers hardness test. Verification and calibration of testing machines
<b>EN ISO 6507-3</b>	2005	Metallic materials. Vickers hardness test. Calibration of reference blocks
<b>EN ISO 6508-1</b>	2016	Metallic materials. Rockwell hardness test. Test method (scales A, B, C, D, E, F, G, H, K, N, T)
<b>EN ISO 6508-2</b>	2015	Metallic materials. Rockwell hardness test. Verification and calibration of testing machines (scales A, B, C, D, E, F, G, H, K, N, T)
<b>EN ISO 6508-3</b>	2015	Metallic materials. Rockwell hardness test. Calibration and reference blocks (scales A, B, C, D, E, F, G, H, K, N, T)
<b>EN ISO 6520-1</b>	2007	Welding and allied processes. Classification of geometric imperfections in metallic materials. Fusion welding
<b>EN ISO 6847</b>	2013	Welding consumables. Deposition of a weld metal pad for chemical analysis


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<b>EN ISO 6892-1</b>	2016	Metallic materials - Tensile testing - Part 1 : method of test at room temperature
<b>EN ISO 6892-2</b>	2011	Metallic materials - Tensile testing - Part 2 : method of test at elevated temperature
<b>EN ISO 6947</b>	2011	Welding and allied processes – Welding positions. Definitions of angles of slope and rotation
<b>EN ISO 7500-1</b>	2015	Metallic materials. Verification of static uniaxial testing machines. Tension/compression testing machines. Verification and calibration of the force- measuring system
<b>EN ISO 8492</b>	2014	Metallic materials. Tube. Flattening test
<b>EN ISO 8493</b>	2004	Metallic materials. Tube. Drift-expanding test
<b>EN ISO 9015-1</b>	2011	Destructive tests on welds in metallic materials. Hardness testing. Hardness test on arc welded joints
<b>EN ISO 9513</b>	2013	Metallic materials. Calibration of extensometers systems used in uniaxial testing
<b>EN ISO 9606-1</b>	2013	Qualification testing of welders – Fusion welding – Part 1: Steels
<b>EN ISO 9606-4</b>	1999	Approval testing of welders. Fusion welding. Nickel and nickel alloys
<b>EN ISO 9712</b>	2012	Non-destructive testing. Qualification and certification of NDT personnel.
<b>EN ISO 10675-1</b>	2016	Non-destructive testing of welds – Acceptance levels for radiographic testing – Part 1: Steel, nickel, titanium and their alloys
<b>EN ISO 10893-2</b>	2011	Non-destructive testing of steel tubes. Part 2: Automated eddy current testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of imperfections
<b>EN ISO 10893-10</b>	2011	Non-destructive testing of steel tubes. Part 10: Automated full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal and/or transverse imperfections.
<b>EN ISO 11699-1</b>	2011	Non-destructive testing. Industrial radiographic film. Classification of film for industrial radiography


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<b>EN ISO 13919-1</b>	1996	Welding. Electrons and laser beam welded joints. Guidance on quality levels for imperfections. Part 1 : steel.
<b>EN ISO 14172</b>	2015	Welding consumables. Covered electrodes for manual metal arc welding of nickel and nickel alloys. Classification
<b>EN ISO 14175</b>	2008	Welding consumables – Gases and gas mixtures for fusion welding and allied processes
<b>EN ISO 14343</b>	2017	Welding consumables – Wire electrodes, strip electrodes, wires and rods for fusion welding of stainless and heat resisting steels – Classification
<b>EN ISO 14344</b>	2010	Welding and allied processes. Flux and gas shielded electrical welding processes. Procurement guidelines for consumables
<b>EN ISO 14731</b>	2007	Welding coordination - Tasks and responsibilities
<b>EN ISO 14732</b>	2013	Welding personnel. Approval testing of welding operators for fusion welding and resistance weld setters for fully mechanized and automatic welding of metallic materials
<b>EN ISO 15607</b>	2003	Specification and qualification of welding procedures for metallic materials. General rules
<b>EN ISO 15609-1</b>	2004	Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Arc welding
<b>EN ISO 15609-3</b>	2004	Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Electron beam welding
<b>EN ISO 15609-4</b>	2009	Specification and qualification of welding procedures for metallic materials. Welding procedure specification. Part 4: Laser beam welding
<b>EN ISO 15613</b>	2004	Specification and qualification of welding procedures for metallic materials – Qualification based on pre-production welding test



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<b>EN ISO 15614-1</b>	2017	Specification and qualification of welding procedures for metallic materials. Welding procedure test. Arc and gas welding of steels and arc welding of nickel and nickel alloys
<b>EN ISO 15614-11</b>	2002	Specification and qualification of welding procedures for metallic materials. Welding procedure test. Electron and laser beam welding
<b>EN ISO 15792-1 NF EN ISO 15792-1/A1</b>	2008 2011	Welding consumables – Test methods – Part 1 : Test methods for all-weld metal test specimens in steel, nickel and nickel alloys
<b>EN ISO 16810</b>	2014	Non-destructive testing. Ultrasonic examination. General principles
<b>EN ISO 16811</b>	2014	Non-destructive testing. Ultrasonic testing. Sensitivity and range setting
<b>EN ISO 16827</b>	2014	Non-destructive testing. Ultrasonic testing. Characterization and sizing of discontinuities
<b>EN ISO 19232-1</b>	2013	Non-destructive testing – Image quality of radiographs – Part 1: Determination of the image quality value using wire-type image quality indicators
<b>EN ISO 19232-2</b>	2013	E : Non-destructive testing – Image quality of radiographs – Part 2: Determination of the image quality value using step/hole-type image quality indicators.
<b>EN ISO 20482</b>	2013	Metallic materials. Sheet and strip. Erichsen cupping test
<b>EN ISO 23279</b>	2010	Non-destructive testing of welds – Ultrasonic testing – Characterization of indications in welds
<b>ISO 261</b>	1998	ISO general purpose metric screw threads. General plan
<b>ISO 262</b>	998	ISO general purpose metric screw threads. Selected sizes for screws, bolts and nuts
<b>ISO 965-1</b>	2013	ISO general purpose metric screw threads – Tolerances – Part 1: Principles and basic data
<b>ISO 965-2</b>	1998	ISO general purpose metric screw threads – Tolerances – Limits of sizes for general purpose external and internal screw threads. Medium quality
<b>ISO 7438</b>	2016	Metallic materials. Bend test

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<b>ISO 5459</b>	2011	Geometrical product specifications (GPS) – Geometrical tolerancing – Datums and datum systems
<b>ISO 6708</b>	1995	Pipework components. Definition and selection of DN (nominal size)
<b>ISO 12108</b>	2012	Metallic materials. Fatigue testing. Fatigue crack growth method
<b>ISO 12135</b>	2016	Metallic materials – Unified method of test for the determination of quasistatic fracture toughness
<b>ISO/TR 15608</b>	2017	Welding – Guidelines for a metallic materials grouping system
<b>ASME/ANSI B16.5</b>	2013	Pipe Flanges and Flanged Fittings
<b>ASME B16.9</b>	2012	Factory-Made Wrought Buttwelding Fittings
<b>ASME B16.11</b>	2016	Forged Steel Fittings, Socket-Welding and Threaded
<b>ASME/ANSI B16.25</b>	2004	Buttwelding Ends
<b>ASME/ANSI B36.10M</b>	2004	Welded and Seamless Wrought Steel Pipe
<b>ASME B36.19M</b>	2004	Stainless Steel Pipe
<b>ASTM A 453</b>	2016	Standard Specification for High-Temperature Bolting Materials, with Expansion Coefficients Comparable to Austenitic Stainless Steels