www.bis.gov.in

उत्पाद मैन्युअल
जहाज निर्माण के लिए संरचनात्मक इस्पात
IS 3039: 2024 के अनुसार

Product Manual for
Structural Steel for Ship Construction
According to IS 3039: 2024

विभिन्न उत्पादों के लिए भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम, 2018 की योजना- I के तहत प्रमाणन के संचालन में एकरूपता और पारदर्शिता के लिए इस उत्पाद मैनुअल का उपयोग सभी क्षेत्रीय / शाखा कार्यालयों और लाइसेंसधारियों द्वारा संदर्भ सामग्री के रूप में किया जाएगा। दस्तावेज़ का उपयोग बीआईएस प्रमाणन प्राप्त करने के इच्छुक संभावित आवेदकों द्वारा भी किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure uniformity of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations,2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification.

1.	**भारतीय मानक संख्या** **IS No.**	:	IS 3039:2024
	शीर्षक **Title**	:	Structural Steel for Ship Construction
	संशोधनों की संख्या **No. of amendments**	:	0
2.	**नमूना दिशानिर्देश** **Sampling Guidelines**		
a)	**कच्चा माल** **Raw material**	:	No specific raw material requirement. **Note: This section indicates the requirements for raw material (if specified in the IS) for which compliance is to be established during Grant of Licence/Change in Scope of Licence/Factory Surveillance**
b)	**समूहीकरण दिशानिर्देश** **Grouping Guidelines**	:	**Please refer Annex-A**
c)	**नमूने का परिमाण** **Sample Quantity**	:	1. For Chemical Test: 5 pieces of 50 mm x 50 mm/ 50 gm drillings 2. For Mechanical tests- 500mm x 500mm

			Note: Prepared Pieces for Tensile Test and Impact Test may be drawn in case of higher thicknesses wherein the sample size of 500 mmx 500 mm may become bulky for transport. Subjective requirements e.g. Freedom from Defects (Cl 7) and the requirements of Dimensions and Tolerances (cl. 15 & 16) shall be tested in the factory during F/T from which samples are drawn for I/T. **Note: This section indicates the quantity of the sample of the product and/or the raw material (if applicable), required to be sent to the laboratory for testing, for the purpose of Grant of Licence/Change in Scope of Licence/ Factory Surveillance (in case of market surveillance, effort may be made to procure the required quantity of product sample, as far as possible since raw material sample may not be available in market)**
d)	**परीक्षण अनुरोध में घोषित किए जाने वाले पैरामीटर** **Parameters to be Declared in Test Request**	:	Nominal dimensions, Grade Designation, Type of Product, Killing of Steel, addition of micro alloying elements. Note: Apart from the above, any other requirements/parameters may also be declared as per the standard, as applicable.
3.	**परीक्षण उपकरणों की सूची** **List of Test Equipment**	:	**Please refer to Annex- B**
4.	**निरीक्षण और परीक्षण की स्कीम** **Scheme of Inspection and Testing**	:	**Please refer to Annex- C**
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day**		
	All tests are possible in a day. **Note: This section is for the guidance of BIS Certification Officers/Technical Auditors of BIS Authorized Outside Surveillance Agencies (OSAs) during factory inspection to provide ready reference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.**		
6.	**लाइसेंस का दायरा /Scope of the Licence:**		
	IS 3039:2024 के अनुसार मानक मुहर का उपयोग करने के लिए लाइसेंस निम्नलिखित कार्यक्षेत्र के लिए प्रदान किया जाता है. Licence is granted to use Standard Mark as per IS 3039:2024 with the following scope:		
7.	**उत्पाद का नाम** **Name of the product**		**Structural Steel for Ship Construction**
	Grade		**Normal/High Strength**
	Designation		**A, B,….AH32, DH32,……**

	Type of Product	**Plate, Flat, Section (Beam, column, channel…..), Bar**
	Size	**[Mention range of nominal sizes for various Type of Products (Plate/ flat/ sections/ bars)**
	Through Thickness Properties	**Plates With or Without through thickness properties (**Applicable for two quality classes Z25 and Z35)

ANNEX-A
TO PRODUCT MANUAL FOR
Structural Steel for Ship Construction
According to IS 3039:2024

GROUPING GUIDELINES

1. The steels are classified into two set of grades on the basis of yield strength as normal strength grades with a specified minimum yield strength 235 Mpa and higher strength grades with a specified minimum yield strength 315 Mpa or 355 Mpa or 390 Mpa. Further, on the basis of mode of de-oxidation, the grades of normal strength and higher strength are classified as given below.

2. Grouping has been done on the basis of Grade Designation and Form of Steel & Size

A. Grouping based on Grade Designation

A.1 Manufacturer shall declare the Grade& Steel Designations intended to be covered in the scope of licence

Grade	Yield Strength	Group	Steel Designation based on de-oxidation	Grouping
Normal Strength	235 MPa Min	1	A B D E	The impact requirement becomes stringent as A < B < D < E. Therefore, sample of stringent variety may be drawn to cover the lower variety. e.g. if steel designation E is drawn and tested, A, B and D shall be covered in scope. (Also see A.2)
Higher Strength	315 MPa Min	2	AH 32 DH 32 EH 32	The impact requirement becomes stringent as AH32 < DH32 < EH32. Therefore, sample of stringent variety may be drawn to cover the lower variety. e.g. if steel designation EH32 is drawn and tested, AH32 & DH32 shall be covered in the scope. (Also see A.2)
	355 MPa Min	3	AH 36 DH 36 EH 36	The impact requirement becomes stringent as AH36 < DH36 < EH36. Therefore, sample of stringent variety may be drawn to cover the lower variety. e.g. if steel designation EH36 is drawn and tested, AH36 and DH36 shall be covered in the scope. (Also see A.2)
	390 MPa Min	4	AH 40 DH 40 EH 40	The impact requirement becomes stringent as AH40 < DH40 < EH40. Therefore, sample of stringent variety may be drawn to cover the lower variety.

				e.g. if steel designation EH40 is drawn and tested, AH40 and DH40 shall be covered in the scope. (Also see A.2)
	315 MPa Min	5	FH 32	Sample of each steel designation shall be drawn and tested to cover these steel designation in the scope.
	355 MPa Min		FH 36	
	390 MPa Min		FH 40	

A.2 Evidence of manufacturing capability such as Mill Test Certificates (MTCs) (of earlier consignments) of all Grade & Steel Designations, intended to be covered in the scope of the licence, within each Group, shall be submitted by the manufacturer and their conformity to the requirements of IS 3039 shall be ensured before endorsing all Grade & Steel Designations in the Scope of Licence. In case of non-availability of MTCs, samples of all those Grade Designations shall also be drawn and tested from each Group.

B. Grouping based on the Type of Product & Size

Type of Product	**Grouping**
Plate/Flats	Samples, drawn at A above, shall be drawn of highest thickness and tested to cover plates/flats of all the thickness in the scope of licence.
Sections	Samples, drawn at A above, shall be drawn of highest thickness and tested to cover Sections of all the thickness in the scope of licence.
Bars	Samples, drawn at A above, shall be drawn of highest thickness and tested to cover Bars of all the thickness in the scope of licence.

3. However, it shall be ensured that the firm is having all the necessary manufacturing and testing facilities for the manufacture and testing of the Type/sizes/grades of Structural Steel for ship construction to be included in the licence.

4. During the operation of licence, BO shall ensure that all the forms/sizes/grades covered in the license are drawn for independent testing on rotation over a period of time.

ANNEX – B

LIST OF TEST EQUIPMENTS
(INDICATIVE LIST, FOR GUIDANCE ONLY)

Major test equipment required to test as per requirements of Indian Standard.

Sl. No.	Test Equipment	Tests used in with Clause Reference
1	Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry. Spectrophotometer Standard Reference Material with certificate	Clause 8 and 20 C, Mn, Si, P, S, Cr, Mo, Ni, B, Al, Nb, V, Ti, Cu, N
2	Strohlein or Leco apparatus with all attachments Barometer with chart, Hot plate, Muffle furnace, Complete range of glass wares, measuring cylinders, Desiccator, porcelain boats or ceramic crucibles, Thermometer, Electronic Balance, Distilled Water, Hot air oven, Oxygen - 99.5 percent minimum purity, ether or acetone, Standard Reference Material with certificate Reagents for C: tin granules or pure iron fillings, acidulated water/brine water, methyl red, caustic potash Reagents for S: Ceramic boats/crucibles – desiccators, Fluxes - Low sulphur copper, tin or iron, Dilute hydrochloric acid, Starch Iodide solution, Potassium iodate	Clause 8 and 20 C& S -chemical method, alternative to instrumental method
3	Hot plate, Conical flask Reagents: silver nitrate, ammonium persulphate sodium arsenite solution, Dilute Nitric Acid, Phosphoric Acid, Dilute Sulphuric Acid, Concentrated .Nitric Acid, NaCl Solution, Permanganic acid	Clause 8 and 20 Manganese content - chemical method, alternative to instrumental method
4	Medium textured filter paper, Porcelain casserole, platinum crucible,filter paper pulp, hot plate, hot airoven, muffle furnace Reagents: Silver nitrate solution, concentrated nitricacid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute SulphuricAcid, PerchloricAcid, Tartaric acidand hydroflouric acid	Clause 8 and 20 Silicon Content -chemical method, alternative to instrumental method
5	Weighing balance, Heater/ Heating element along with energy regulator, Ice water bath, Vol Flask Cap – 1 litre,(Whatman) filter paper No. 040,Suction Filtration Facility, Filter paper pulp pad, Standard Reference Material (NML) with certificate. Potassium Permanganate (KMnO4), Sodium Nitrite (Na2NO3), Ammonium Molybdate [(NH4)2 Mo2O7], Ammonium Phosphate [(NH4)3 PO4], Potassium Nitrate(K2NO3), Phenolphthalein Solution, Rectified spirit or methyl alcohol,	Clause 8 and 20 Phosphorus Content - chemical method, alternative to instrumental method

	Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO4), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagent as applicable	
6	Hot plate, stop watch Reagents: dilute sulphuric acid and phosphoric acid mixture, concentrated nitric acid, ammonium persulphate, silver nitrate, dilute hydrochloric acid, ferrous ammonium sulphate, standard potassium permanganate solution.	Clause 8 and 20 Chromium Content - chemical method, alternative to instrumental method
7	Reagents: Perchloric Acid, Phosphoric Acid, Nitric Acid, Hydrochloric Acid, Dilute sulphuric acid, potassium thiocyanate solution, stannous chloride solution, n-butyl acetate, Iron-Mo free, molybdenum metal (99.9 % pure) Spectrophotometer, Volumetric flask, conical flask, titration apparatus (burette, pipette etc.), hot plate, thermometer, separating funnel, dry filter paper and other laboratory glassware and apparatus	Clause 8 and 20 Mo Content -chemical method, alternative to instrumental method
8	Ashless paper pulp, paper pulp pad, hot plate, dessicator, Reagents: ammonium nitrate, methyl red, dilute ammonium hydroxide, Concentrated hydrochloric acid Concentrated nitric acid, Perchloric acid, Hydrofluoric Acid	Clause 8 and 20 Ni Content -chemical method, alternative to instrumental method
9	Inert gas fusion followed by determination using thermal conductivity detector	Nitrogen Content (Clause 8 and 20)
10	Tensile Testing Machine	Tensile Test (Cl 10), Through Thickness Properties (Cl 31) Table-12
11	Pendulum Impact Testing Machine –for V- notch specimen	V Notch Impact Test
12	Vernier Calipers, Scale, Measuring Tape, Micrometer	Dimension and Tolerance (Clause 15 & 16)
13	Rough Polishing Machine, Cutting Machine, Micro Polisher, Grinder Machine, Automatic Mount Press, Surface grinder to remove burr, Welding Machine, Impact Temperature Bath with indicator	Sample preparation

Note: The above is an indicative list for the purpose of guidance only

ANNEX- C
SCHEME OF INSPECTION AND TESTING

1. QUALITY ASSURANCE PLAN

1.1 It is expected that manufacturers (licensees/applicants) will implement a Quality Assurance Plan i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing the Standard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan defining the control unit (i.e. lot/batch etc.) and the levels of control (i.e. the frequency and number of samples for conducting the different tests as per the Indian Standard) and submit the same to BIS Branch Office for information. The manufacturer shall comply with the same and maintain test records in accordance with para 2.4.

1.3 RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT:

1.3.1 For the guidance of manufacturers, the recommended definition of control unit is: material of same grade designation, type of product, size, subjected to same heat treatment and manufactured from the same cast of raw material in one go shall be considered as one control unit.
1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1.**

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan. Alternatively, the manufacturer has the option of adherence to the quality plan as per levels of control recommended in column 3 of Table 1.

1.4 However, all manufacturers shall ensure compliance of their products to all the requirements of the Indian Standard.

2. ENSURING COMPLIANCE THROUGH TESTING- It is expected that manufacturers (licensees/applicants) will establish a suitably equipped and staffed in house laboratory (In house testing facility) for testing at least those parameters of the Indian Standard which require routine testing for ensuring quality of the product. This includes in-process controls as may be defined and put in place by the manufacturer and testing parameters/requirements which can only be performed in the factory.

2.1 For the guidance of manufacturers, Table 1 giving the recommended levels of control is given below. Column 2 of Table 1 indicates routine tests where test equipment is required in house as “R” or other tests which can be subcontracted as “S”. Subcontracting is permitted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.2 For MSME manufacturers, the requirement of maintaining a laboratory/in-house testing facility for routine tests (indicated as “R” in Column 2 of Table 1) is also optional.

2.2.1 MSME manufacturers may utilize common cluster based facilities as per guidelines for the utilization of cluster based test facilities by MSMEs or the provisions of Sharing of testing facilities or get testing done from BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025.

2.3 Large Scale manufacturers shall maintain an in-house laboratory equipped at least with test facilities for routine tests (indicated as "R" in Column 2 of Table 1), where different tests given in the specification shall be carried out in accordance with the method given in the specification. They shall also implement a calibration plan for the in-house test equipment.

2.3.1 Alternatively, in lieu of an in-house laboratory, large scale manufacturers can also utilize the provisions of Sharing of testing facilities as per the Guidelines for Grant of Licence available on BIS website www.bis.gov.in. (Under Conformity Assessment>Product Certification Process). Even for subcontracted tests, provisions for sharing of testing facilities can be utilized.

2.4 TEST RECORDS- The manufacturers maintaining an in-house laboratory or utilizing common cluster based facilities or shared test facilities shall maintain test records for the tests carried out to establish conformity. For the tests being subcontracted to BIS recognized/empanelled laboratory or any other laboratory having valid NABL accreditation as per IS/ISO/IEC 17025, test reports issued by the laboratories shall be available for inspection by BIS.

3. PACKING AND MARKING - The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L…) shall be suitably incorporated on each package of Plate/Flat/Section/Bar and on the test certificate issued along with each consignment, provided always that the product thus marked and packed conforms to all the requirement of the specification.
3.1 Packing and Marking shall be done as per the Indian Standard.
3.2 **Additional Marking requirements**: The material shall also be marked with the following additional requirement on each package of Plate/Flat/Section/Bar:

a) "For BIS certification details please visit www.bis.gov.in"
b) Any other requirement not specified in the Indian Standard

4. TEST CERTIFICATE – For each consignment of BIS Certified material conforming to IS 3039:2024 there shall be a test certificate which shall contain the Standard Mark, the cast/Control Unit number and the corresponding test results (as given in Annexure-I enclosed).

5. REJECTION - All the production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1
(ONLY FOR GUIDANCE PURPOSE)

(1)				(2)	(3)		(4)
TEST DETAILS					**LEVELS OF CONTROL**		**REMARKS**
Clause	**Requirements**	**Test Method**		**Test equipment requirement R: required (or) S:Sub-contracting permitted**	**No. of Samples**	**Frequency**	
		Clause	**Reference**				
7	Freedom from Defects	7.1 to 7.4	IS 3039	R	Adequate inspection to ensure each item to be within the limits of the specification		
8	Chemical Composition						
	Ladle Analysis	8.1, 8.3, 20,24.1,24.4, 29, Table 3 & Table 7	IS 3039 & IS 228 (Various Parts) Or any established Chemical/ Instrumental method -do-	R	One	Each Heat	Applicable for manufacturers with steel making facilities
	Product Analysis	8.3, 20,24, 29, Table 1		R	(i)Nil (ii)One	(i)Nil (ii) Each Heat	Applicable for manufacturers with steel making facilities Applicable for manufacturers without steel making facilities. (Note: No testing for product analysis is required if starting

							material being subjected to processing is ISI marked and received with test certificate)
10	Tensile Test	11.2,22.1,22.1.1,22.2 & Table 5 26.1, 26.2 & Table 9	IS 3039, IS 1608-Part 1) & IS 3803 (Part-1)	R	One	Each Heat	__
11	Impact Test	7.1 & Table 4	IS 3039 & IS 1757 (Part-1)	R	One	Each Heat	__
12	Other Tests	12	Subject to mutual agreement between the purchaser and manufacturer/supplier.				
15 & 16	Dimensions & Tolerances	15 & 16	IS 3039				
31	Reduction of Area	31, Table-12	IS 3039 & ISO 7778	S	One	Each Heat	Applicable for two quality classes Z25 and Z35

ISI Mark
With IS No.
and CM/L
no.

Annexure-I
(Para 4 of the Scheme of Inspection and Testing)
XYZ IRON AND STEEL COMPANY
(Registered office Address and works address)

Test Certificate for Structural Steel for Ship Construction
TEST CERTIFICATE NO._____

To M/s_____ Dated_____

We certified that the material described below fully conforms to 3039:2024 Chemical composition and Mechanical properties of the product as tested in accordance with the Scheme of Inspection and Testing contained in the BIS Certification Marks LicenceNo.CM/L_____ are as indicated below against each order No.

(PLEASE REFER TO IS 3039:2024 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Form/Size/ Shape/Type	Control unit No.	Steel Designation	Quantity (in tonnes)	Chemical Composition (in %)														Mechanical Properties			Impact Test	Optional Test#	Remarks
					C	Mn	Si	P	S	Cr	Mo	Ni	Cu	Al	Nb	V	Ti	N	YS	TS	Elongation			

If required by purchaser
Remarks
Wagon No.
Truck No.

FOR XYZ IRON AND STEEL COMPANY

(It is suggested that size A4 paper be used for this test Certificate)