



उत्पाद मैनुअल

श्रतप्त शीर्षन /श्रतप्त बहिवेधन प्रयोग के लिए इस्पात - पिटवाँ कार्बन और मिश्रधातु इस्पात

IS 11169 (Part 1):2022 के अनुसार

PRODUCT MANUAL FOR Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Alloy Steels ACCORDING TO IS 11169 (Part 1):2022

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम 2018 की स्कीम- I के तहत यह उत्पाद मैनुअल प्रमाणीकरण की संचालन रीति में सुसंगता और पारदर्शिता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence 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 licence/certificate.

1.	उत्पाद Product	:	IS 11169 (Part 1):2022
	शीर्षक Title	:	Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Alloy Steels
	संशोधनों की संख्या No. of amendments	:	NIL
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	No specific raw material requirement
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer Annex-A
c)	नमूने का आकार Sample Size	:	For chemical tests: 5 pieces of 5 cm length For mechanical and metallographic tests: 1 piece of 2 m length Test for the requirements of Shape, Dimensions and

			Tolerances (cl.17.) shall be carried out in factory as far as possible
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer Annex-B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please refer Annex-C
5.	एक दिन में संभावित परीक्षण Possible tests in a day		
	All tests		
6.	लाइसेंस का दायरा /Scope of the Licence:		
	Licence is granted to use Standard Mark as per IS 11169 (Part 2) :2022 with the following Scope :		
	Name of the product	Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Alloy Steels	
	Grade Designation	i) Steels not intended for heat treatment : 2C3, 4C3,8C3,.... ii) Case Hardening Steels: a)10C4, 10C4GC, 11C15,, 18C10BT, iii) Steels for Quenching and Tempering: 20C8, 20C15,25C8,....	
	Delivery Condition	Untreated (as hot-rolled) +AR, Untreated + Peeled +AR+PE,....	
	Product Form	Wire Rod/Wire/Bar/Bright Products (Bars and Drawn Flats)	
	Shape/Sizes (in mm)	Wire Rods (Round, Square, Hexagonal) of Nominal Size fromxx mm to up to and including ...xx mm, Wires of Nominal Size from ...xx... mm toxx... mm Bars (Round, Square, Hexagonal) of Nominal Size fromxx mm to up to and including ...xx mm, Bright Bars (Round, Square, Hexagonal) of Nominal Size fromxx mm to up to and including ...xx mm, Bright Drawn Flats of Thickness fromxx... mm to ...xx.... Mm, Width fromxx... mm to ...xx... mm	
	Any other aspect required as per standard	Hardenability Requirements (H, HH, HL, CH) Tolerance Class (h6, h7, h8.....)	

Annex A to the

Product Manual of

Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Low Alloy Steels as per IS 11169 (Part 1):2022

GROUPING GUIDELINES

- 1) IS 11169 (Part 1):2022 covers the requirements of unalloyed and alloyed steels which are intended for cold heading or cold extruding applications and are delivered as bars, wire rods or wires with nominal sizes 2 mm to 100 mm.
- 2) This standard covers the following groups of steels for cold heading and cold extruding:-
 - a) Steels not intended for heat treatment (non-alloy steels)
 - b) Case-hardening steels which have been further sub-categorized into 2 categories:-
 - i) Non-alloy steel grades
 - ii) Alloy steel grades
 - c) Steels for quenching and tempering which have further sub-categorized into 2 categories;-
 - i) Non-alloy steel grades
 - ii) Alloy steel grades
- 3) These steels can be supplied in one of the delivery conditions as indicates in Tables A.1, B.1, C.1 as agreed at the time of enquiry and order. Annexure A.1 specifies Delivery Conditions for Steels not intended for heat treatment. Annexure B.1 specifies delivery conditions for Case-hardening steels and Annexure C.1 specifies delivery conditions for Steels for quenching and tempering.
- 4) Mechanical Properties for each group of steels are specific to the delivery condition and the type of steel i.e. non-alloy or alloy steel. Further, case-hardening steels and steels for quenching and tempering can also be supplied with Hardenability requirements (cl.8.2) which can be of 3 types i.e. Standard Hardenability (HH), Restricted Hardenability (HL) and Core Hardenability (CH) (only applicable in case of Steels for Quenching and Tempering).
- 5) Shapes, Dimensions and Tolerances have been specified at cl.17. for Wire Rods/Bars/Wires. For Bright Steel Products, separate tolerances classes (h6 to h12) have been specified in accordance with IS 919 (part 2) with h6 being the most stringent tolerances class.

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6) In view of above, the following Grouping Guidelines may be considered for the purpose of GoI/CSoL:-

Product	Shape/Size/Finish	Tolerance Class	Delivery Condition	Group of Steel	Grouping
Wire Rod/Wire/Bar/Bright Products	For Wire Rods/Wires/Bars: Diameter: 2 mm to up to and including 100 mm Shape: Round/Square/Hexagonal For Bright Products:- i) Bright Bars -Diameter from 2 mm to 100 mm Shape: Round/Square/Hexagonal Drawn Flats: Thickness from 3 mm to 100 mm, Width up to 400 mm Finish: Drawn, Turned, Turned and Reeled, Ground	For Wire Rods/Wires/Bars: Not Applicable For Bright Products: h6 to h12 as per IS 919 (Part 2) or any other tolerance class as per IS 919 (Part 2)	+AR, +AR+PE, +AR+C, +AR+C+AC, +AR+C+AC+LC, +AC, +AC+PE, +AC+C , Other (other delivery condition agreed at the time of order) (Table A.1)	Steels not intended for Heat Treatment (Non- Alloy Steels) (Table A.2, A.3, A.4)	One sample of any grade designation, product of any size, shape, finish of each delivery condition shall be drawn. If sample of higher tolerance class (applicable in case of Bright Products) is drawn , lower tolerance classes may also be covered
			+AR+PE, +AR+C, +AR+C+AC, +AR+C+AC+LC, +AC, +AC+PE, +AC+C, +FP, Other (other delivery condition agreed at the time of order) (Table (B.1)	Case- Hardening Steels i) Non- Alloy Steels (Table B.2, B.3, B.8)	One sample of any grade designation, product of any size, shape, finish of each delivery condition shall be drawn. If sample of higher tolerance class (applicable in case of Bright Products) is drawn , lower tolerance classes may also be covered
				Case Hardening Steels- ii) Alloy Steels (Table B.2.B.4, B.5. , B.6, B.7, B.8)	One sample of any grade designation, product of any size, shape, finish of each delivery condition shall be drawn If the grade designations of this group are intended to be supplied on the basis of Hardenability i.e. HH or HL , the above sample drawn shall also be tested for the requirements of Hardenability as per Table B.6 and B.7 (Also refer cl.8.2) If sample of higher tolerance class (applicable in case of Bright Products) is drawn , lower tolerance classes may also be covered
			+AR or +PE, +AR+C, +AR+C+AC, +AR+C+AC+LC, +AC, +AC+PE, +AC+C,	Steels for Quenching and Tempering i)Non-Alloy steels (Table C.4, C.6)	One sample of any grade designation, product of any size, shape, finish of each delivery condition shall be drawn. If sample of higher tolerance class (applicable in case of Bright Products) is drawn , lower tolerance classes may also be covered

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			+AC+C+AC+LC, Others (Table C.1)	Steels for Quenching and Tempering i) Alloy steels (Table C.2, C.3, C.5, C.6, C.7, C.8, C.9, C.10, C.11, C.12)	One sample of any grade designation, product of any size, shape, finish of each delivery condition shall be drawn If the grade designations of this group are intended to be supplied on the basis of Hardenability i.e. HH or HL or CH , the above sample drawn shall also be tested for the requirements of Hardenability as per Table C.9, C.10, C.11, C.12) (Also refer cl.8.2) If sample of higher tolerance class (applicable in case of Bright Products) is drawn, lower tolerance classes may also be covered
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- 7) In case of Other delivery conditions (agreed at the time of order), Product Form and Applicable requirements for ordering the steel grades shall be declared by the manufacturer.
- 8) However, it shall be ensured that the manufacturer has complete manufacturing and testing facilities for all steel designations, sizes, shapes, finishes, delivery conditions etc. intended to be covered in the licence.

ANNEXURE B to the
Product Manual of

Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Low Alloy Steels as per IS 11169 (Part 1):2022

LIST OF TEST EQUIPMENTS

Major test equipment required to test as per the Indian Standard

Sl. No.	Tests Used In With Clause Reference	Test Equipment/Chemical
1	Chemical Composition Cl 7.1, 7.2 for C, Si, Mn, P, S, Cr, Ni, Mo, Al, B, Cu Mn, S, P, Si	Instrumental methods Spectrometer: atomic-absorption spectrometry, inductively coupled plasma atomic emission, inductively coupled plasma mass spectrometry techniques, spark source optical emission spectrometry. Spectrophotometer
2	cl. 7.1, 7.2 – C & S (chemical method, alternative to instrumental method)	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 (NML) 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
3	Phosphorus content Cl 7.1, cl. 7.2 (chemical method, alternative to	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

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	instrumental method)	pad, Standard Reference Material (NML) with certificate Potassium Permanganate (KMnO ₄), Sodium Nitrite (NaNO ₂), Ammonium Molybdate [(NH ₄) ₂ MoO ₇], Ammonium Phosphate [(NH ₄) ₃ PO ₄], Potassium Nitrate (KNO ₃), Phenolphthalein Solution, Rectified spirit or methyl alcohol, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO ₄), Sulphurous Acid, Hydrobromic Acid (HBr), other chemicals and reagents as applicable
4	Manganese content Cl 7.1, cl.7.2 (chemical method, alternative to instrumental method)	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
5	Silicon content Cl 7.1, cl.7.2 (chemical method, alternative to instrumental method)	Medium textured filter paper, Porcelain casserole, platinum crucible, filter paper pulp, hot plate, hot air oven, muffle furnace Reagents: Silver nitrate solution, concentrated nitric acid, concentrated sulphuric acid, Dilute Hydrochloric Acid, Dilute Sulphuric Acid, Perchloric Acid, Tartaric acid and hydrofluoric acid
6	Copper content cl.7.1, cl.7.2 (chemical method, alternative to instrumental method)	Plate, Muffle Furnace, porcelain or silica crucible, Reagents: Hot Wash Solution (dilute sulphuric acid solution 1:99 v/v with hydrogen sulphide), dilute sulphuric acid, hydrogen sulphide, Dilute Nitric Acid, Sodium Fluoride, solid, Dilute Ammonium Hydroxide, Acetic Acid, Potassium Iodide, Starch Solution, Sodium Thiosulphate Solution, Ammonium Bifluoride Solution
7	Nickel content cl.7.1, cl.7.2 (chemical method, alternative to instrumental method)	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
8	Cr content cl.7.1, cl.7.2 (chemical method, alternative to instrumental method)	Hot plate, stop watch Reagents: dilute sulphuric acid and phosphoric acid mixture, concentrated nitric acid, ammonium

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	instrumental method)	persulphate, silver nitrate, dilute hydrochloric acid, ferrous ammonium sulphate, standard potassium permanganate solution
9	Tensile Test cl. 8.1.1., Table-A.3, B.3, B.5, B.6, B.7, C.4, C.5, C.7	Universal Tensile Testing Machine with Extensometer
10	Hardness Test, cl.8.1.1, Table A.4, B.8, C.6.C.8	Brinell Hardness Tester, Standard Calibration Blocks
11	Hardenability, cl.8.2.5, Table B.6, B.7, C.9, C.10, C.11	Unit having Quenching fixtures, arrangement for keeping specimen in place wait water jet emerging from cone at the bottom to touch the lower end of the sample. Muffle furnace, safety equipment, Rockwell hardness tester.
12	Core Hardenability, cl.8.2.6, Table C.12	Laboratory Furnace, Quenching Bath, Broaching Machine, Polishing Machine, Rockwell Hardness Tester with Standard Hardness Blocks
13	Grain Size, cl.10., Carbide Spheroidization cl.11., Non-Metallic Inclusions cl.12.	Laboratory Furnace, Metallographic Sample Preparation Equipment, Etching Reagent(either natal or picral), Metallurgical Microscope (x500)
14	Upsetting Test cl.13.1	Punch-Die arrangement with press for heading load
15	Surface Quality cl.14., Internal Soundness cl.14.1.1, 14.1.3.1, 14.1.4	Macro-etch test: Machine grinding unit with metallographic polish paper No. 00, 000 for finer finish, etchant (see Table-1&2 of IS 7739 Pt.3), glycerin, photographic paper, 2 percent aqueous solution of sulphuric acid, hypo, ammonium molybdate (5 g per 100 ml of water), nitric acid (r.d. 1.2) , developer-made up of 5 ml of saturated stanneous chloride solution, 50 ml hydrochloric acid, 100 ml water and 1 g alum.

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		Caustic resistant filter paper, 5 percent caustic soda, 5 percent sodium sulphide solution, distilled water. <u>Eddy Current Test:</u> Electronic Unit (Test Head with mounted probe), Signal Processing Circuitry, Audio visual alarms, Paint Marker, Strip Chart Recorder, Rotating Test Head <u>Magnetic Particle Test:</u> Magnetic Particle Test Setup, Bars of various diameters of solid copper, brass or aluminum rod, Rigid coil, Copper gauge faced C-Clamps, Heavy duty welding cables, Wooden Blocks, Jigs and Fixtures, Magnetic Field Indicators, Demagnetizer, White or Black Light source <u>Surface Defects:</u> Magnifying glass, Stereo Microscope, Acid Etching Chamber
16	Decarburization, cl.15.	Microscope with Magnification (100x, 200x, 500x, 1000x)- computer aided
17	Shape, Dimensions and Tolerances Cl.17.	Vernier Caliper Measuring Tape Ruler Steel Scale Micrometer Straight Edge Radius Gauge Cord

The list above is indicative only and may not be considered as exhaustive

ANNEX C
to the Product Manual
Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Low Alloy Steels
as per IS 11169 (Part 1):2022

SCHEME OF INSPECTION AND TESTING

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specifications shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipment.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING & MARKING – The Standard Mark as given in the Schedule of the license and Licence Number (i.e. CM/L) shall be incorporated on the product and/or the test certificate accompanying each consignment of the material, and the marking shall be done as per the provisions of the Indian Standard, provided always that the product thus marked conforms to all the requirement of the specification. In addition, details of BIS website shall be marked as follows: “For details of BIS certification please visit www.bis.gov.in”

4. CONTROL UNIT -For the purpose of this Scheme, a control unit is defined as steel wires/wire rods/bars manufactured from same cast/heat having same dimensions and processed to same delivery condition under uniform conditions of production in a day in the same place.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

6. TEST CERTIFICATE-For each consignment of BIS Certified material conforming to IS 11169 (Part 2):2022 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)

7. REJECTIONS – 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. Any rejected material which is potentially re-salable be sheared or cut or deformed in such a manner that it cannot be used for any other purpose except re-melting. A separate record shall be maintained giving information on quantity and cast number/coil number/control unit number, as applicable, relating to all such rejections/defective/sub-standard material of the production not conforming to the requirements of the Specification and the method of its disposal. Such material shall in no case be stored together with that conforming to the Specification. The Standard Mark (if already applied) on rejected material should be defaced.

TABLE 1 LEVELS OF CONTROL
(Para 5 of Scheme of Inspection and Testing)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
6	Manufacture	6.1 to 6.4	IS 11169 (Part 1)	R	----	----	Applicable for all manufacturers including: i) manufacturers with steel making facilities ii) Re-rollers: Must ensure that steel procured by them complies with Cl 6.2, cl.6.3 of IS 11169 Pt.1:2022. Accordingly, records in support of the same shall be maintained which shall include raw material certificate indicating steel manufacturing process, type of killing of steel, size of input material etc. iii) Other manufacturers, excluding manufacturers with steel making facilities and re-rollers, starting with input material as one of bars/wire rods shall ensure that the material procured by them is ISI marked only as per IS 11169 (Part 1):2022 and is received with Test Certificate.
7	Chemical Composition						

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	Ladle Analysis	7.1 , Table- A.2, B.2, C.2, C.3	IS 228 or any other established instrumental / chemical method	R	One	Each Cast	Applicable for manufacturers with steel making facilities.
	Product Analysis	7.2, Table-1		R	i) Nil	i) Nil	i) Applicable for manufacturers with steel making facilities, wherever traceability to the heat is ensured by manufacturer.
				R	ii) One	ii) Each Cast	ii) Applicable for re-rollers and manufacturers procuring wire rods/bars as input material for further drawing. Such manufacturers must ensure that the material procured by them is ISI marked only as per IS 11169 (Part 1) and is received with test certificate indicating results of ladle analysis. Further testing of chemical composition is not required for such manufacturers
8	Mechanical Properties						
8.1.1	Tensile Test	Table A.3 A.4, B.3, B.4,B.5, B.8, C.4,C.5,C.6 ,C.7 and C.8	IS 11169 (Part 1) IS 1608 (Part 1)	R	One	Each Control Unit	-----
	Hardness Test	Table A.4, B.8, C.6, C.8	IS 11169 (Part 1) IS 1500 (Part 1)	R	One	Each Control Unit	-----

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8.2	Hardenability	8.2.1, 8.2.2., 8.2.3, 8.2.5 Table B.6, B.7, C.9, C.10, C.11	IS 11169 (Part 1) IS 3848	R	One	Each Control Unit	Applicable to Steel Grades of Annexes B and C
8.2.4	Core Hardenability	8.2.6 Table C.12	IS 11169 (Part 1) IS 1586 (Part 1)	R	One	Each Control Unit	Applicable to Grades of Annexes C only i.e. Steels for Quenching and Tempering
10	Grain Size	Annex D.2	IS 11169 (Part 1) IS 4748	R	One	Each Control Unit	Applicable to Steel Grades of Annexes B and C
11	Carbide Spheroidization	Annex D.3	IS 11169 (Part 1)	S	---	----	If requested in the order/by the purchaser
12	Non-Metallic Inclusions	12.1 12.1.1 Table 2	IS 4163	S	----	----	If specifically agreed to between the purchaser and manufacturer
12.2	Macroscopic Inclusions	12.2	IS 11169 (Part 1)	S	----	----	If verification is agreed, the method and acceptance limits shall be agreed at the time of enquiry and order
13	Aptitude to Cold Forming i) Upsetting Test	13.1	IS 11169 (Part 1)	S	---	----	If agreed at the time of enquiry and order
14	Surface Quality						
14.1	General	14.1	IS 11169 (Part 1)	R	Adequate inspection to ensure that the material conforms to the requirements of the specification		
14.1.1	Internal Soundness	14.1.1	IS 11169 (Part 1) IS 13105	R	One	Each Control Unit	----
14.1.3.1	Non-Destructive Tests i) Eddy Current test ii) Magentic Particle Test	14.1.3.1	IS 13190 IS 3703	S	---	----	The bars, wire rods and wires may be normally subjected to any non-destructive test capable of revealing all the

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							surface defects which would lead to rejection of the material on the basis of mutually agreed standard of acceptance
14.1.4	Depth of maximum allowable surface defect	Table 3	IS 11169 (Part 1)	R	One	Each Control Unit	----
14.3, 14.4, 14.5	Surface Quality i) Wire Rods ii) Bars iii) Bright Products	Table 4, Table 5	IS 11169 (Part 1)	R	One	Each Control Unit	----
15	Decarburization	Table 6 Annex D.5	IS 11169 (Part 1) IS 6396	R	One	Each Control Unit	Applicable to Steels of Annexes B and C
17	Shapes, Dimensions and Tolerances						
17.1	Bars/Wire Rods/Wire	17.1	IS 11169 (Part 1)	R	Adequate inspection to ensure that material conform to the requirements of the specification		
17.2	Bright Products	17.2.1 17.2.2 17.2.3 Table 7,8,9,10	IS 11169 (Part 1) IS 919 (Part 2)	R	Adequate inspection to ensure that material conform to the requirements of the specification		

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.

Note 3: ---- means that the Levels of Control as agreed to between the manufacturer and purchaser.

ANNEXURE I

(Para 6 of the Scheme of Inspection and
Testing)

XYZ IRON AND STEEL COMPANY
(Registered office Address and works address)

TEST CERTIFICATE FOR

Steel for Cold Heading/Cold Extrusion Applications- Wrought Carbon and Low Alloy Steels as per IS 11169 (Part 1):2022

TEST CERTIFICATE No. _____
To M/s _____

DATE _____

We certify that the material described below fully conforms to IS 11169 (Part 1):2022

. Chemical composition and Physical properties of the product, as tested in accordance with the Scheme of Inspection and Testing
contained in the BIS Certification Marks Licence No. CM/L_ are as indicated below against each order No.
(PLEASE REFER TO IS 11169 (Part 1):2022 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No.	Dimensions	Condition of Delivery	Control Unit No.	Grade Designation	Qty (Tonnage)	Chemical Composition							Mechanical Properties					Surface Quality (Depth of Defects)	Metallurgical Properties (Grain Size, Non-Metallic Inclusions, Carbide Spheroidization)	Decarburization
						C %	Si %	Mn %	S %	P %	Cr %	Al % etc.	T S %	Y S %	% R A	Hardness	Hardenability			

REMARKS
WAGON NO.
TRUCK NO.

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

FOR XYZ IRON AND STEEL COMPANY