



उत्पाद मैनुअल

अतप्त लघुकृत कार्बन इस्पात की चद्दर एवं पत्ती भाग १ शीत गठन
और ड्राइंग उद्देश्य IS 513(Pt.1):2016 के अनुसार

**PRODUCT MANUAL FOR
COLD REDUCED CARBON STEEL SHEET AND STRIP
PART 1 COLD FORMING AND DRAWING PURPOSE
According to IS 513(Pt.1):2016**

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 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.	मानक संख्या IS No.	:	IS 513 (Part 1):2016
	शीर्षक Title	:	Cold Reduced Carbon Steel Sheet and Strip Part 1 Cold Forming and Drawing Purpose
	संशोधनों की संख्या No. of amendments	:	2
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material नमूने का परिमाण Sample Size	:	No specific raw material requirement <i>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</i>
b)	समूहीकरण दिशानिर्देश Grouping Guidelines	:	Please refer Annex - A
c)	नमूने का परिमाण Sample Size	:	For mechanical tests: 2 No.s of 0.5mX0.5m For chemical tests: 5 pieces of 5 cm X 5 cm <i>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</i>

		<i>Scope of Licence/ Factory Surveillance (incase of market surveillance, effort may be made to procure therequired quantity of product sample, as far as possible since raw material sample may not be available in market)</i>
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 <i>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 readyreference regarding the tests which can be witnessed during the inspection in the factory by the officer/auditor.</i>
6.	Scope of the Licence :	
	Licence is granted to use Standard Mark as per IS 513(Pt.1):2016 with the following scope:	
	Name of the product	Cold Reduced Carbon Steel Sheet and Strip Part 1 Cold Forming and Drawing Purpose
	Grade	CR1, ...
	Surface Finish	As-rolled etc..
	Temper Designation	1/2H etc..
	Thickness, Width, Length(sheets)	Thickness: from ...mm to....mm, Width: From mm to mm, Length: fromm tom.
	Condition	Dull Finish (C), etc...

BUREAU OF INDIAN STANDARDS
Manak Bhawan, 9, Bahadur Shah Zafar Marg,
New Delhi – 110002

ANNEXURE A

GROUPING GUIDELINES

1. Grouping has been done on the basis of Designation (quality) as under:

Group	Designation(Quality)	Grade	No of sample
1	Cold Rolled	CR0	i) One sample of any size of the Grade may be drawn.
2	General Purpose	CR1, CR2 CR3, CR4 & CR5	i) One sample of any size of any Grade may be drawn. If sample is tested for grade of lower tensile strength and higher drawability(r) & stretch-ability(n),the recommendation may include Grades with higher tensile strength and lower drawability(r) & stretch-ability(n) also. ii) For example, Sample of CR5 should be drawn to cover CR1 to CR5.
3	Drawing Quality	ISC260G,ISC270C, ISC270D,ISC270E ISC270F.	i) One sample of any size of any Grade may be drawn. If sample is tested for grade of higher minimum tensile strength and higher drawability(r) & stretch-ability(n), then the recommendation may include lower Grades also. ii) For example, Sample of ISC270F should be drawn to cover ISC260G to ISC270F.
4	Interstitial Free-High Strength steel	ISC340P,ISC370P ISC390P,ISC440P	i) One sample of any size of any Grade may be drawn. If sample is tested for grade of higher minimum tensile strength then the recommendation may include lower Grades also. ii) For example, Sample of ISC440P should be drawn to cover ISC340P to ISC440P.
5	Bake Hardening	ISC270B,ISC3 00B ISC320B,ISC3 40B, ISC360B,ISC3 90B ,ISC440B	i) One sample of any size of any Grade may be drawn. If sample is tested for grade of higher minimum tensile strength then the recommendation may include lower Grades also. ii) For example, Sample of

			ISC440B should be drawn to cover ISC270B to ISC440B.
6	Re-phosphorized	ISC280R,ISC320R,ISC360R,ISC400R	i) One sample of any size of any Grade may be drawn. If sample is tested for grade of higher minimum tensile strength then the recommendation may include lower Grades also. ii) For example, Sample of ISC400R should be drawn to cover ISC280R to ISC400R.
7	C,Mn Steel	ISC340W,ISC370W ISC390W,ISC440W	i) One sample of any size of any Grade may be drawn. If sample is tested for grade of higher minimum tensile strength then the recommendation may include lower Grades also. ii) For example, Sample of ISC440W should be drawn to cover ISC340W to ISC440W.

2. During preliminary inspection, before drawing samples for independent testing, it shall be ensured by IO that tests for Dimensions and Tolerances as per cl.11 of IS 513(Pt.1):2016 shall be carried out at factory premises on the samples to be drawn for independent testing as it is difficult to transport bulky samples to laboratory. In case of inclusion, factory test report for Dimensions and Tolerances as per cl.11 of IS 513(Pt.1):2016 may be accepted and conformity of the grades included to the same has to be verified during next surveillance visit.

3. The sample tested may be any of the sizes (see Cl.11), Surface condition (cl.9.5) and Temper condition (see Cl.4.3) as mentioned in the specification. It is to be ensured that at least one sample of bright finish is to be drawn/tested in case applicant/licensee has applied for bright finish. If the sample passes, the licence/inclusion can be granted for all the sizes, temper conditions and surface finishes (cl.9.5) mentioned in the specification and as applied by the applicant/licensee, provided that the firm is having all necessary manufacturing and testing facilities for manufacture and testing of all other sizes, Temper conditions and surface finishes of sheets/strips proposed to be included in the licence.

4. Scope of licence shall be restricted based on the manufacturing and testing facilities available.

5. During operation of licence, samples of each variety covered in the scope of licence, shall be tested in rotation, to the extent possible

ANNEXURE B

LIST OF TEST EQUIPMENT

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sl. No.	Tests Used in with Clause Reference	Test Equipment/Chemicals and Identification Numbers (Where applicable)
1.	Chemical Composition Cl 7.1,7.2, 7.3 for C,S,P, Mn, Si, Al, B, N and Microalloying elements content 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, 7.3 –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 (chemical method, instrumental method)	CI 7.1,7.2, 7.3 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 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, Sodium Hydroxide (NaOH), Hydrofluoric Acid (HF), Perchloric Acid (HClO₄), Sulphurous Acid, ,Hydrobromic Acid (HBr) , other chemicals and reagent as applicable

4.	Manganese content Cl 7.1,7.2, 7.3 (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 7.1,7.2, 7.3 (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.	Nitrogen Content Cl. 7.1,7.2, 7.3	Determination of Nitrogen by Thermal Conductivity Method/ By Inert gas fusion followed by thermal conductivity detection/ By Steam Distillation Method
7.	Tensile Test cl.8.1. Plastic Strain Ratio cl.8.5,	Tensile Strain Hardening Component cl.8.6, Bake Hardening Index cl.8.7UTM (0-500kN)
8.	Bake Hardening Index cl 8.7	Oven type furnace/Hot-air oven(upto 300 °C) with temperature controller of accuracy of $\pm 1^{\circ}\text{C}$
9.	Cupping test cl.8.2	ERICHSEN Sheet Metal Testing Machine, bench mounted unit with a cast iron machine body and a cylindrical test head(ϕ -20mm) with Drawing force: max. 45 kN, Blank holder force: 10 kN for Sheet thickness: 0.1 - 2.0 mm
10.	Hardness test cl. 8.3	Rockwell Hardness Testing (HR 30 TM) 0-90 (HRB Scale) 0-100

11.	Bend test cl. 8.4	Steel Mandrels (for bend tests), Templates(for Bend test), UTM attachments/clamps/vice/Magnify ing glass
12.	Surface finish cl. 9.5	Surface Roughness Tester (in-house Calibration using roughness block)
13.	Dimensions & Tolerances cl. 11	i) Cord ii) Vernier Caliper iii) Flat bench iv) Measuring Tape; and Micrometer

ANNEXURE 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 : For the purpose of this scheme, material representing the same cast, grade rolled to same thickness & processed in identical conditions and heat-treatment (if any), shall constitute a 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/empaneled 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.

PACKING AND MARKING - The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on a sticker attached on the top of each bundle of package of sheets /on a tag attached to each coil and on the Test Certificate, provided always that the material so marked conforms to each requirement of the specification.

2.5 Packing and Marking shall be done as per the Indian Standard.

3. TEST CERTIFICATE - For each consignment of BIS Certified Material conforming to IS 513 (Part 1):2016, the manufacturer shall issue a Test Certificate as per the format enclosed as Annexure-I.

4. 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
Clau s e	Requireme nt s	Test Method		Test equipme nt requirem en t R: required (or) S: Sub- contractin g permitted	No. of Sampl e s	Freque n cy	
		Clause	Reference				
7	Chemical Compositio n						
	Ladle Analysis	7.1 ,7.2 Table-3	IS 513(Pt.1) : 2016 & IS 228 (Various Parts) / any establish ed Chemical / Instr. Method. Alternativ el y, method specified in relevant ISO standard may also be used.	R	One	Each Cast	Applicable for primary steel producers only
	Check Analysis	7.3, Table-4		R	i) Nil ii)One	i)Nil ii) Eac h Cast	i) Applicable for primary steel producers with steel making and rolling facilities, wherever traceability to the heat is ensured by manufacturer. ii)Applicable for manufacturers feeding to rolling mills.No further testing is required if the raw material/input material fed to rolling mills is ISI Marked and is received with Test Certificate

8.1.	Tensile Test	8.1.1 to 8.1.5	IS 1608 (Part 1)	R	One	Each Control Unit	
8.2	Cupping Test	8.2 Fig.1	IS 513(part 1):2016 IS 10175	R	One	Each Control Unit	Applicable for steel grades of quality CR2, CR3, CR4 subject to mutual agreement between purchaser and manufacturer.
8.3	Hardness Test	8.3 Table 6	IS 513(part 1):2016 IS 1586	R	-do-	-do-	Applicable for steel grades of quality CR0, CR1.
8.4	Bend Test	8.4.1, 8.4.2, 8.4.3 & 8.4.4 Table 7	IS 513(part 1):2016 IS 1599	R	-do-	-do-	Bend test can be applied with mutual agreement between the manufacturer and the purchaser
8.5	Plastic Strain Ratio	8.5.1 8.5.2 Table 5A,5B, 5C	IS 513(part 1):2016 IS 11999	R	-do-	-do-	
8.6	Tensile strain hardening component	8.6.1 8.6.2 Table 5A,5B, 5C	IS 513(part 1):2016 IS 15756	R	-do-	-do-	
8.7	Bake hardening Index	8.7 Annex B Table 5B, 5C	IS 513(part 1):2016	R	-do-	-do-	
5	Non-ageing characteristics	5.1, 5.2& 5.3 Table 2	IS 513(part 1):2016	R	-	Each Control Unit	Applicable for steel grades of CR2, CR3, delay ageing quality and non-ageing quality.
9	Surface condition	9.1,9.2, 9.3, 9.4, 9.4.1,9.4.2,9.4.3, 9.4.4	IS 513(part 1):2016	R	Adequate inspection to ensure that the each strip/sheet conforms to the requirements of specification		

9.5	Surface Finish	9.5.1, 9.5.2 & 9.5.3	IS 513(part 1):2016 IS 15262	S	As agreed between the purchaser and the supplier.
10	Freedom from defects	10.1,10.2 & 10.3	IS 513(part 1):2016	R	Firm shall exercise adequate in-process controls to ensure that the material is free from harmful defects.
11	Dimensions & Tolerances	11.1,11.2 & 11.3	IS 513(part 1):2016 IS/ISO16162	R	Adequate inspection to ensure each item to be within the limits of specification.

4	Supply of material	4.1,4.2 & 4.3	IS 513(part 1):2016	As agreed to between the purchaser and the supplier	Records of mechanical properties as agreed to between purchaser and the manufacturer as per cl.4.3 of ISS shall be maintained.
13.3	Packing	Cl.13.3, 9.6 & Table 9	IS 513(part 1):2016	R	i) Adequate inspection to ensure that the material conforms to the requirements of the specification. ii) Weight of sheets and strips in bundles or packages shall be as agreed to between the purchaser and the manufacturer. iii) Each Sheet/strip shall be treated on both sides with non- hardening type rust preventive oil, which can be easily washed with aqueous alkali solution. iv) The product may not be oiled, only if required by the 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 COLD REDUCED CARBON STEEL SHEET AND STRIP PART 1 COLD FORMING AND DRAWING PURPOSE

BIS
STANDARD
MARK

TEST CERTIFICATE No. _____

DATE _____

To M/s _____

We certified that the material described below fully conforms to 513(Pt.1):2016 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 513(Pt.1):2016 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	(nom Size)	Control Unit No.	Grade	Quantity (in tonnes)	CHEMICAL COMPOSITION							MECHANICAL PROPERTIES			n	r	BH	Erichsen cupping test	Hardness	#Bend test	Temper Designation/ Condition
					C %	S %	P %	Si %	Mn %	Al %	@Micro Alloying Elements %	YP	TS	% elongation							

If required by purchaser

@ Micro-alloying element present should be indicated

REMARKS

WAGON NO.

TRUCK NO.

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

FOR XYZ IRON AND STEEL COMPANY