



उत्पाद मैनुअल

हस्तय धातु आर्क वेल्डिंग के लिए आवृत कार्बन और कार्बन मँगनीज इस्पात
इलैक्ट्रोड

IS 814:2004 के अनुसार

Product Manual for
Covered Electrodes for

Manual Metal Arc Welding of Carbon and Carbon Manganese Steel

According to IS 814:2004

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.	मानक संख्या IS No.	:	IS 814:2004
	शीर्षक Title	:	Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon Manganese Steel
	संशोधनों की संख्या No. of amendments	:	3
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	The core wire used for the manufacture of electrodes shall conform to IS 2879 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	:	2 cartons for each size / Variety 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)
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	:	Dimension (Cl 7.1), Bare Length of Electrode (Cl 7.21 & 7.2.2), Concentricity of Flux covering with core wire (Cl 7. 3), Coating ratio (Cl 5. 2, Annex B) 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.
6.	लाइसेंस का दायरा /Scope of the Licence:		
	Licence is granted to use Standard Mark as per IS 814:2004 with the following scope:		
	Name of the product	Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon Manganese Steel	
	Class	Code for classification of electrode as per Cl. 5 of IS 814	
	Size	Nominal Diameter of core wire expressed in mm	

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ANNEXURE A

GROUPING GUIDELINES

In IS 814:2004, Electrodes are classified according to a coding system of systems and numerals representing characteristics of electrodes like the method of manufacture (extrusion), type of covering, mechanical properties, welding positions etc. as well as additional characteristics like hydrogen controlled electrodes, electrodes with increased metal recovery etc. as described in detail in Cl. 5 of IS 814:2004

In addition, size of electrodes is designated by the nominal diameter of the core wire expressed in millimetres. Standard sizes and corresponding lengths of electrodes are given in Table 4 of IS 814:2004 but sizes and lengths other than Table 4 may be supplied by mutual agreement between manufacturer and purchaser.

Further, as per the Details of Tests described in Cl. 9 of IS 814:2004, electrodes of different specified sizes are required to be tested for the different tests e.g. for All Weld Metal Mechanical Tests for Tensile and Impact as per Cl. 9.1, 2 weld assemblies shall be prepared one using 4.00 mm (size of electrode) and the other using the highest size manufactured in accordance with Annex F. If the highest size produced is 4.00 mm, then 2 weld assemblies using 4.00 mm and 3.15 mm size respectively shall be prepared. If 3.15 mm is the highest size manufactured, only one weld test assembly shall be prepared with this size.

In view of the above, the following grouping guidelines shall apply for Grant of Licence and Change in Scope of Licence.

- i) Samples of electrodes corresponding to **each unique code** of classification as per Cl. 5 of IS 814:2004, intended to be covered in the licence shall be drawn and tested.
- ii) Samples of electrodes **of sizes as prescribed under Details of Tests in Cl. 9 of IS 814:2004 shall be drawn and tested**. However, scope of licence may cover the entire range of sizes being manufactured, provided manufacturing and testing facilities exist.

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

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 TESTING EQUIPMENT

(INDICATIVE LIST, FOR GUIDANCE ONLY)

Sr. No.	Tests used in with Clause ReferenceTest used in with clause no	Test Equipment / chemical
1	Core wire for electrodes (CI 6.0) Chemical analysis (CI 8.2) Characteristics of covering and coatingratio	Device for instrumental analysis suchas optical spectrometer or carbon sulphur (Strohlein) apparatus, muffle furnace, induction furnace along with all necessary apparatus, analytical balance and reagents for chemical analysis.
2	Dimensions (CI 7)	Micrometer (0- 25 mm, LC 0.01 mm)
3	Dimensions (CI 7)	Steel scale/measuring tape (0- 500mm LC 0.5 mm / 1mm)
4	All weld mechanical tests for tensile andimpact (CI 9.1) Butt weld bend test (CI 9.2)	- Weld assemblies as per Annex F - Machine for bevelling and machining test pieces - Heating oven - Heat treatment furnace/Muffle furnace - Dry Ice bath - Universal Testing Machine (0 – 100 KN, LC 1 kN) - Charpy Impact Testing Machine - Temperature indicating crayons/surface thermometers/other temperature indicators - Formers/Mandrels of required dimensions
5	Running performance test (CI 9.3)	Weld assembly as given in Annex H with three electrodes.
6	Increased metal recovery test (CI 9.4)	Test plates of carbon steel (max0.25% C) of approx dimensions 300 x 75 x 10 mm, Weld assembly with AC/DC source and five electrodes of same brand and batch, weighing scale, dampened ammeter (Class 2), thermometer
7	Diffusible Hydrogen Apparatus (Mercury/Glycerin/Gas Chromatograph method)	Diffusible Hydrogen Evaluation Test (CI9.5)
8	Radiography setup, weld assembly and radioactivity protection arrangements	Radiographic quality test (CI 9.6)

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 : Covered Electrodes of the same classification, size and manufactured from the same cast of Core Wire on the same line in one go 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 all 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 to 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.

2.1.1 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.

2.2 **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.

2.2.1 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.

2.3 **TEST RECORDS-** The manufacturers maintaining an in-house laboratory or utilizing commoncluster 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/empaneled 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 shall be legibly and indelibly marked on each bundle/carton of electrodes provided ~~that~~ the material thus marked conforms to the requirement of the specification.

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

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)		
TEST DETAILS				Test Equipment R: required S: Sub Contracting	LEVELS OF CONTROL		
Cl.	Requirement	Test Methods			No. of samples	Frequency	Remarks
		Clause	Reference				
6.	Core Wirefor electrodes	6	IS 814	S	1	Each Cast	No further testing is required if the raw material procured is ISI marked and is received with Test Certificate
8.1.3	Parent metalfor test pieces	8.1.3	IS 814	S	1	Each consignment	-do-
3.	Coating ingredients	As per company standard		S	1	-do-	In case accompanied with manufacturer's test certificate, no further testing is required.
7.	Dimensions						
	a) Diameter	7.1	IS 814	R	1	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity	
	b) Length	7.1	-do-	R	1	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity	
	c) Bare length	7.2.1	-do-	R	1	Firm to have adequate in-process controls to check	

	of electrodes	&7.2.2				compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity	
	d) Concentricity of flux covering with core wire	7.3	-do-	R	1	Firm to have adequate in-process controls to check compliance of this parameter as per the tolerances given in the Indian Standard. However, appropriate records shall be maintained by the manufacturer for evidence of conformity	
5.2	Coating ratio	5.2 Annex B	-do-	R	----	----	The coating ratio of an electrode is the ratio of the standard outer diameter of the covering and the nominal diameter of the core wire both expressed in millimeters. For guidance, coating ratio for various types of coating are given at Annex B.7
8.3	Initial Tests	8.3	IS 814				
	a) All weld metal mechanical tests for tensile and Impact	9.1	-do-	S	One sample from each type	Once in a year	----
	b) Butt weld bend tests	9.2	-do-	-do-	-do-	-do-	----
	c) Running performance test	9.3	-do-	-do-	-do-	-do-	----
	d) Increased metal recovery tests (for electrodes claiming recovery 110% and above)	9.4	-do-	-do-	-do-	-do-	----
	e) Diffusible hydrogen estimation test (for hydrogen controlled electrodes)	9.5	-do-	-do-	-do-	-do-	----

	f) Radiographic quality test (for radiographic quality electrodes)	9.6	-do-	-do-	-do-	-do-	----
7	Periodic check test	8.4					
	a) All weld metal mechanical tests for tensile and impact	9.1	-do-	S	One sample from each type	Once in a month	----
	b) Running Performance test	9.3	-do-	-do-	-do-	-do-	----
8.5	Quality control test	8.5	-do-	R	One	Each control unit	----