PRODUCT MANUAL FOR HIGH STRENGTH DEFORMED STEEL BARS AND WIRES FOR CONCRETE REINFORCEMENT ACCORDING TO IS 1786: 2008

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.	**Product**	:	IS 1786 : 2008
	Title	:	HIGH STRENGTH DEFORMED STEEL BARS AND WIRES FOR CONCRETE REINFORCEMENT
	No. of Amendments	:	3
2.	**Sampling Guidelines:**		
a)	**Raw material**	:	Clause 4.2 of IS 1786 : 2008
b)	**Grouping guidelines**	:	Please refer ANNEX – A
c)	**Sample Size**	:	Chemical test - 50 gm or 50 mm x 5 nos Physical test - 1 m x 3 nos Pull out test - 1 m x 3 nos
3.	**List of Test Equipment**	:	Please refer ANNEX – B
4.	**Scheme of Inspection and Testing**	:	Please refer ANNEX – C
5.	**Possible tests in a day :**		
	(i) Freedom from defects (Clause 4.3.1) (ii) Deformation and surface characteristics (Clause 5.2) (iii) Nominal size (Clause 6.1) (iv) Effective cross sectional area and mass (Clause 6.3, 7.2) (v) Specified length (Clause 7.1) (vi) Proof Stress, Percentage elongation, Tensile strength (Clause 8.1) (vii) Bend and Re-bend test (Clause 9.3)		
6.	**Scope of the Licence :** Please refer ANNEX – D		

ANNEX A

Grouping Guidelines

1. High strength deformed steel bars and wires for concrete reinforcement are grouped as given below for GoL/CSoL:

2.

Strength Grade	Group 1	Fe 415, Fe 415D, Fe 415S
	Group 2	Fe 500, Fe 500D, Fe 500S
	Group 3	Fe 550, Fe 550D
	Group 4	Fe 600
	Group 5	Fe 650
	Group 6	Fe 700
Nominal Size	Group I	4 mm, 5 mm, 6 mm
	Group II	8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm, 28 mm, 32 mm
	Group III	36 mm, 40 mm, 45 mm and 50 mm.
		Other sizes are also permitted by mutual agreement.

3. Considering the above following grouping guidelines for GoL/CSoL have been developed:

   a) One sample of highest size and maximum strength grade from each size group and strength grade group shall be tested to cover all the sizes of HSDS bars in that size group for all the Strength Grades in that Strength Grade group tested.

   b) For example, if 6mm, Fe 415S is tested, then all the sizes in Group I (4 mm, 5 mm, 6 mm) for all the grades in Group 1 (Fe 415, Fe 415D, Fe 415S) shall be covered.

4. The Firm shall declare the varieties of HSDS bars they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.

5. During the operation of the Licence, BO shall ensure that all the types and sizes covered in the Licence are tested in rotation, to the extent possible.

ANNEX B

List Of Test Equipment

Major test equipment required to test as per the Indian Standard

S. No.	Tests used in with Clause Reference	Test Equipment
1.	Chemical tests (Clause 4.2)	Spectrophotometer OR Carbon Sulphur (Strohlein's type) Apparatus – Complete set consisting of glass parts, combustion furnace, oxygen cylinder , combustion tubes/ boats etc. a) Electronic Balance b) Hot plate c) Muffle furnace d) Barometer e) Thermometer f) Distilled water plant g) Burette, Pipette and Full Range of Laboratory Glassware - Conical Flasks, Beakers, Funnel, Pipettes Glass rod, watch Glass, Brush etc. h) Standard Reference Material i) Platinum/Silica Crucible for Silicon Test j) Desiccator k) Watt Man Filter Paper & Ash less clippings l) Arrangements for nitrogen testing m) Drilling machine n) Chemicals and reagents as applicable
2.	Freedom from defects (Clause 4.3)	a) Wire brush b) Vernier calliper c) Micrometre
3.	Pull out test (Clause 5.1)	a) Tensile testing machine b) Steel scale c) Micrometre d) Slip ring cross bar e) Cube moulds f) Tamping rod
4.	Deformation and surface characteristics (Clause 5.2)	a) Vernier calliper/Depth gauge b) Micrometre c) Angle protector d) Steel scale
5.	Nominal size, Mass and tolerances (Clause 6 & 7)	a) Weighing balance b) Vernier calliper c) Micrometre d) Steel scale e) Measuring tape

6.	Mechanical Properties (Clause 8.1)	a) Tensile testing Machine b) Outside/Inside caliper c) Punch and Hammer d) Measuring steel tapes e) Marking tool f) Magnetic V- Block g) Vernier caliper h) Thermometer i) Stop watch j) Extensometer
7	Bend Test (Clause 9.3)	a) Bend test arrangement b) Mandrels for bend tests c) Vernier caliper d) Micrometer
8	Re-bend Test (Clause 9.4)	a) Re-bend testing arrangement b) Mandrels for re-bend testing c) Temperature controlled water bath d) Vernier caliper e) Micrometer f) Angle protector g) Stop watch h) Magnifying glass

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

ANNEX C

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 specification 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 AND MARKING – As per the requirements of IS 1786: 2008. In addition to the above, following details shall be marked on bar/wire during rolling or by any other permanent marking at interval not more than 3 meter.

a) Brand name/Trade mark of manufacturer
b) Grade of bar/wire
c) Six digit identification number (Two digits are branch ID circulated as per CMD-II circular ref: CMD-II(L)/9 dated 20/10/2014, under which jurisdiction the licence is in operation and last four digits of the licence number allotted to the manufacturer)

4. CONTROL UNIT – High strength deformed steel bars and wire for concrete reinforcement of each strength grade and size manufactured from same cast/lot of raw material shall constitute a control unit.

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.

5.1 Each consignment of BIS certified material confirming to IS 1786: 2008 shall be accompanied by a test certificate as given in Annex- 1 which shall contain the Standard Mark, cast/lot number, grade, size and corresponding test results.

6. 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.

TABLE 1

(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				
4	**Chemical composition**						
	Ladle analysis ***(Primary Producers)***	4.1, 4.2	IS 1786	R	3	Each heat of 100 t or more	Sample shall be drawn from beginning/middle/end of teeming
					2	Each heat < 100 t	Sample shall be drawn from beginning/end of teeming
	Ladle analysis ***(Other than Primary producers)***	4.1, 4.2	IS 1786	R	3	Each consignment of 40 t or part thereof	No further testing is required if accompanied with test certificate or ISI marked
	Check analysis	4.2	IS 1786	R	1	100 t or less from each cast	-
4.3	Freedom from defects	4.3.1, 4.3.2	IS 1786	R	All	-	-
5.2 to 5.6	Deformation and surface characteristics	5.2 to 5.6, 8.3	IS 1786	R	1	Each size produced in a day	-
5.7	Pull out test	5.7, 8.3	IS 1786 IS 2770 (Part 1)	S	i) The frequency of bond strength test as required in 5.7 shall be as agreed to between the manufacturer and the purchaser/testing authority or there shall be adequate inspection to ensure that each item is within the limits of the Standard. ii) Pull out test shall be done in addition to 5.2 for approval of new or amended geometry for the first time.		
6, 7	Nominal size, effective cross sectional area, Mass of deformed bars	6, 7 Table 1 and 2	IS 1786	Adequate inspection to ensure that each item is within the limits of the Standard.			

8	**Physical properties**						
8.1	Tensile test	8.1, 9.2	IS 1786 IS 1608	R	3	For a cast ≥ 100 t	Separate sample shall be tested for each grade and size manufactured
8.2	Bend Test and re-bend test	8.2, 9.3, 9.4	IS 1786	R	2	For a cast < 100 t	

Note-1: 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 obligatory in nature.

ANNEX- 1

STANDARD MARK

XYZ COMPANY
(Registered office address and works address)

TEST CERTIFICATE FOR HIGH STRENGTH DEFORMED STEEL BARS AND WIRES FOR CONCRETE REINFORCEMENT ACCORDING TO IS 1786: 2008

TEST CERTIFICATE No._____DATE _____

TO M/s_____

It is certified that the material described below fully conforms to IS 1786: 2008. 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 Licence CM/L_____ are as indicated below against each order No. .

(PLEASE REFER TO IS 1786: 2008 FOR DETAILS OF SPECIFICATION REQUIREMENTS)

TEST RESULTS

Order No. & Date	Nominal size	Cast/ Heat No	Quantity (t)	Date of testing	CHEMICAL ANALYSIS					MECHANICAL PROPERTIES								REMARKS
					C %	S %	P %	S + P %	CE %	0.2 % Proof Stress/ YS N/mm^2 min	0.2 % Proof Stress/ YS N/mm^2 max	Tensile strength N/mm^2	TS/YS ratio	Elongation %	Total elongation at maximum force %	Bend test	Re-bend test	

The material supplied confirms to the standard rolling and mass tolerance

Surface defects :
a) Piping Absent/Present
b) Other defects Absent/Presnet.

REMARK

SHIPPING ADVICE No.
WAGON NOS.

SIGNATURE:

NAME & DESIGNATION:
FOR XYZ COMPANY

ANNEX- D

SCOPE OF LICENCE

"Licence is granted to use Standard Mark as per IS 1786 : 2008 with the following scope:	
Name of the product	High strength deformed steel bars and wires for concrete reinforcement
Grade	Fe 415/Fe 415D/Fe 415S Fe 500/Fe 500D/Fe 500S Fe 550/Fe 550D Fe 600 Fe 650 Fe 700
Nominal Size	4 mm, 5 mm, 6 mm, 8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm, 28 mm, 32 mm, 36 mm, 40 mm, 45 mm, 50 mm