



**PRODUCT MANUAL FOR
STRESS-RELIEVED, LOW RELAXATION STEEL WIRE
FOR PRESTRESSED CONCRETE
ACCORDING TO IS 16644:2018**

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 16644:2018
	Title	: STRESS-RELIEVED LOW RELAXATION STEEL WIRE FOR PRESTRESSED CONCRETE
	No. of Amendments	: NIL
2.	Sampling Guidelines:	
a)	Raw material	: As per Clause 5 of IS 16644 : 2018
b)	Grouping guidelines	: Please refer ANNEX – A
c)	Sample Size	Mechanical test - 1.5 meter × 3 Nos Relaxation test – 3 meter × 1 Nos Chemical test – 0.5 meter × 1 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 : Please refer ANNEX –D	
6.	Scope of the Licence :	
	“Licence is granted to use Standard Mark as per IS 16644:2018 with the following scope:	
	Name of the product	STRESS-RELIEVED LOW RELAXATION STEEL WIRE FOR PRESTRESSED CONCRETE.
	Nominal Diameter (mm)	
	Type of Surface Configuration, Shape and Pattern	
	Nominal Tensile Strength (MPa)	

ANNEX A**Grouping Guidelines**

1. IS 16644 : 2018 covers Stress-relieved, low relaxation steel wire for pre-stressed concrete which are classified as given below:
 - a) Nominal Diameter – 3 mm , 4 mm, 5 mm, 6 mm, 7 mm and 8 mm.
 - b) Type of Surface configuration :
 - (i) Plain wire
 - (ii) Indented wire
 - (iii) Crimped wire
 - c) Tensile strength :

	Size (mm)					
	3	4	5	6	7	8
Tensile strength (MPa)	1860	1860	1860	-	-	-
	-	1770	1770	1770	-	-
	-	1670	1670	1670	1670	1670
	-	-	-	-	1570	1570
	-	-	-	-	-	1470

(Wires with tensile strength values other than above may also be supplied with mutual agreement between the purchaser and the manufacturer)

3. Considering the above, following grouping guidelines is developed for GoL/CSoL:
 - a) Wire of each nominal diameter from each type of surface configuration shall be tested for all requirements to cover that particular diameter and type of surface configuration of wire in the scope of the licence.
 - b) If wire of high tensile strength is tested, wires of low tensile strength may also be covered in the scope of the licence.
4. The Firm shall declare the varieties of wires intended to be covered 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 varieties 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 composition (Clause 5.1.1)	a) All glass wares & chemicals as per the relevant parts of IS 228 for sulphur and phosphorous testing
2	Dimension and surface configuration (Clause 6) - Size - Mass - Ovality - Straightness	a) Micrometre b) Vernier calliper c) Weighing scale d) Steel scale e) Cord f) Flat surface
3	Tensile strength (Clause 7.1) Proof Stress (Clause 7.2) Elongation at maximum force (Clause 7.4)	a) Tensile testing machine/Universal Testing Machine b) Extensometer c) Steel scale/Vernier caliper
4	Bending Ductility (Clause 7.3)	a) Bending arrangement with required mandrels
5	Relaxation (Clause 7.5)	a) Relaxation testing machine with all attachments and accessories. b) Air conditioner

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 16644:2018.

4. CONTROL UNIT – Wires of same nominal diameter, Type of surface configuration and tensile strength manufactured from steel of same cast/heat number under similar condition of manufacturing as continuous production 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 All the production which conforms to the Indian Standard and covered by the licence should be marked with Standard Mark.

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) Test Details				(2)	(3) Levels of Control		
Cl.	Requirement	Test Methods		Test equipment requirement R: required (or) S: Sub-contracting permitted	No. of Sample	Frequency	Remarks
		Clause	Reference				
5	Chemical composition – Steel/ Steel Wire Rod	5.1 , 5.1.1	IS 16644	S	1	Each cast/ heat	No further testing is required if accompanied with the Test Certificate or ISI marked
5	Manufacture	5.3 to 5.5	IS 16644	R	Each Coil	-	-
6.1	Nominal diameters, Nominal cross sectional area, Nominal mass, Permissible tolerances and ovality	6.1, 6.1.1, 6.1.2	IS 16644	R			
6.2	Surface configuration	6.2, Annex- A	IS 16644	R			
6.3	Straightness	6.3	IS 16644	R			
7	Mechanical Properties						
7.1	Tensile strength	7.1, 8.3	IS 16644 IS 1608	R	3	Every Control unit	In case of failure, the coil from which sample was drawn shall be rejected. Samples from each coil shall be tested subsequently and only conforming coils shall be marked. When samples from five consecutive coils meet the requirements, the earlier frequency may be restored.
7.2	Proof stress	7.2, 8.4	IS 16644 IS 1608	R	3		
7.3	Bending ductility	7.3, 8.5	IS 16644	R	3		
7.4	Elongation at Maximum force	7.4, 8.6	IS 16644 IS 1608	R	3		
7.5	Relaxation	7.5, 8.7	IS 16644	S	1	Once in a month	For 100 h relaxation test #
7.6	Fatigue	7.6, 8.8 IS 5074	As per agreement between the purchaser and the manufacturer.				

The relaxation test shall be carried out for 100 h and the graph shall be extrapolated to 1000 h. Relaxation test for 1000 h shall be carried out once in a year for each type of surface configuration and nominal diameter.

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note-2: Levels of control given in column 3 are obligatory in nature.

ANNEX- D

POSSIBLE TESTS IN A DAY

- (i) Finish (Clause 5.3 to 5.5)
- (ii) Nominal diameter (Clause 6.1)
- (iii) Surface configuration (Clause 6.2)
- (iv) Straightness (Clause 6.3)
- (v) Nominal Mass (Clause 6.1)
- (vi) Tensile strength (Clause 7.1)
- (vii) Proof stress (Clause 7.2)
- (viii) Bending Ductility (Clause 7.3)
- (ix) Elongation at maximum force (Clause 7.4)