



उत्पाद मैनुअल
आई एस 18256:2023 के अनुसार
कंक्रीट प्रबलन के लिए कांच रेशा प्रबलित पॉलीमर (जीएफ़आरपी) के ठोस गोल सरिये

PRODUCT MANUAL
SOLID ROUND GLASS FIBRE REINFORCED POLYMER (GFRP)
BARS FOR CONCRETE REINFORCEMENT
ACCORDING TO IS 18256:2023

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 18256:2023
	शीर्षक Title	:	Solid Round Glass Fibre Reinforced Polymer (GFRP) Bars for Concrete Reinforcement
	संशोधनों की संख्या No. of amendments	:	Nil
2.	नमूना दिशानिर्देश Sampling Guidelines		
a)	कच्चा माल Raw material	:	Firm shall declare the raw materials being used as per Clause 4.3 of IS 18256:2023 for the manufacture of GFRP bars. 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 to Annex-A

c)	नमूने का परिमाण Sample Quantity	:	1.5m x 25 pieces 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 (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)
d)	परीक्षण अनुरोध में घोषित किए जाने वाले पैरामीटर Parameters to be Declared in Test Request		- Same as the scope of licence
3.	परीक्षण उपकरणों की सूची List of Test Equipment	:	Please refer to Annex-B
4.	निरीक्षण और परीक्षण की स्कीम Scheme of Inspection and Testing	:	Please refer to Annex-C
5.	एक दिन में संभावित परीक्षण Possible tests in a day		
	(i) Glass fiber content (Cl 5.1), (ii) Measured cross sectional area (Cl 5.4.2), (iii) Ultimate Tensile force (Cl 6.1), (iv) Tensile modulus of elasticity (Cl 6.2), (v) Ultimate Tensile Strain (Cl 6.3), (vi) Transverse shear strength (Cl 6.4)		
6.	लाइसेंस का दायरा /Scope of the Licence:		
	Licence is granted to use Standard Mark as per IS 18256:2023 with the following scope:		
	Name of the product	Solid Round Glass Fibre Reinforced Polymer (GFRP) Bars for Concrete Reinforcement	
	Type of Bar	Straight bars/ Bent bars	
	Bar size Designation	G4/ G6/ G8/ G10/ G12/ G16/ G20/ G25/ G32	
	Surface Pattern	Spiral wound ribbed surface/ Braided surface/ sand coated surface/ Indented surface/ Machined or milled surface	

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ANNEX A

Grouping Guidelines

1. Solid Round Glass Fibre Reinforced Polymer (GFRP) Bars for Concrete Reinforcement as per IS 18256:2023 are classified as given below:

(a) Type of Bar : Straight bars, Bent bars

(b) Bar size Designation : G4, G6, G8, G10, G12, G16, G20, G25, G32

(c) Surface Pattern : sand coated surface, Braided surface, Spiral wound ribbed surface, Indented Surface, Machined/ milled surface

2. GFRP bars are categorized into the following size groups based on the bar size designations:

Size group	Bar size Designation
1	G4, G6, G8
2	G10, G12, G16
3	G20, G25, G32

3. Considering the above, the grouping guidelines given below shall be followed for GoL/CSoL:

(a) GFRP bars of each Type of Bar, each Surface Pattern and the highest Size Designations from each size group shall be tested for all requirements to cover GFRP bars of all Size Designations of that size group for tested, for that particular Type of Bar and Surface Pattern.

4. The Firm shall declare the varieties of GFRP bars (i.e. Types of bar, bar size designations and surface patterns) 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 varieties covered in the Licence are tested in rotation, to the extent possible.

ANNEX B

List of Test Equipment

(INDICATIVE LIST, FOR GUIDANCE ONLY)

SN	Tests used in with Clause Reference	Test Equipment
1.	Fibre content (mass fraction) as per clause 5.1	a) Muffle furnace with digital temperature control
		b) Crucibles 25 ml
		c) Crucibles tong
		d) Test sieve brass frame
		e) Dedicator
		f) Petroleum jelly
		g) Silica gel
		h) Precision weight
		i) Air conditioner
2.	Glass transition temperature as per clause 5.2	a) Differential Scanning Calorimeter
		b) Container like pan, crucibles & Vials
		c) Analytical Balance nearest to 0.01 mg
3.	Degree of Cure as per clause 5.3	a) Differential Scanning Calorimeter
		b) Furnace with controlled temperature between 25 -600 Degrees Celsius
		C) temperature Sensor
		D) Differential Sensor
		E) Dry purge Gas
		F) Stopwatch/Recording device
		E) Container like pan, crucibles & Vials
		F) Analytical Balance nearest to +/- 1 Ug
4.	Measured cross sectional area as per clause 5.4.2	a) Vernier Calipers
		b) Volumetric cylinder
		c) Distilled water
		d) Ethanol
5.	Minimum bend radius in case of bent bars (table 1)	a) Being radius gauge or other similar equipment
6.	Ultimate Tensile force as per clause 6.1 and 8.2.3	a) Universal Testing machine
7.	Tensile modulus of elasticity as per clause 6.2	a) electronic extensometer
		b) Universal Testing machine
8.	Ultimate Tensile Strain as per clause 6.3	a) Universal Tasting machine

		b) electronic extensometer
9.	Transverse shear strength as per clause 6.4	a) Universal Tasting machine
		b) Double shear test attachment with bushes
10.	Bond Strength as per clause 6.5	A) Universal Testing Machine
		B) Loading Plate
		C) LVTD accurate to 1/1000mm
		D) Concrete Prism
11.	Fatigue Tensile Strength as per clause 6.6	A) Universal Testing Machine
		B) Electric Extensometer
		C) Strain Guage
12.	Creep Failure as per clause 6.7	A) Universal Testing Machine
		B) Electric Extensometer
		C) Strain Guage
		D) Timer with accuracy within 1% of elapse time
13.	Moisture absorption (Short term & Long Term) as per clause 7.1	a) Laboratory oven lab with digital temperature controller
		b) Precision weight balance
		c) Silica gel
		d) Dedicator
		e) Petroleum jelly
		f) 02 No. Water container
		g) Stopwatch
		h) Thermometer
14.	Resistance to Alkaline Environment as per clause 7.2	A) Alkaline Solution (NaOH, KOH, Deiodised Water) with initial Ph levels above 13
		B) Alkali resistant container with holes
		C) Alkali resistant sealant
		D) Heater maintaining temperature of 60 Degrees Celsius (+/- 3 Degrees)
		E) Plastic sheet
		F) Water container
15.	Longitudinal Wicking as per clause 7.3	A) Dye Penetrant
		B) Black Lamp
		C) Dark Room
		D) Hood Cover
		E) Shallow Pan
		F) Stopwatch/Recording device
		G) Magnifying Glass (5X)

16.	Guaranteed ultimate tensile force at 90 degree and tensile modulus of elasticity of bent bar (Clause 8.2.4)	A) concrete blocks
		B) steel stirrups
		C) debonding tube
		D) hydraulic cylinder
		E) plywood
		F) support plate

ANNEX 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 : All GFRP bars of the same Type (i.e. straight or bent), bar size designation and surface pattern manufactured in a day from the same raw materials and method of manufacture, shall be considered as 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.

3. PACKING AND MARKING - The Standard Mark as given in the Schedule of the licence shall be indelibly and legibly marked on each bar at an interval of every two meters, provided always that the product so marked conforms to each requirement of the Standard.

3.1 Marking shall be done as per Clause 12 of IS 18256:2023.

3.2 **Manufacturer’s Test Certificate:** The purchaser shall be furnished manufacturer’s test certificate as per Clause 10 of IS 18256:2023.

3.3 **Additional Marking requirements:** Tags attached to each bundle/coil of GFRP bars, shall also be marked with the following additional requirement:

“For BIS certification details, please visit www.bis.gov.in”

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 requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
5.1	Fibre Content	5.1	IS 18256 IS 18255	R	One	Each control unit	-
5.2	Glass Transition Temperature	5.2	IS 18256 IS 18255	R	One	Each control unit	-
5.3	Degree of Cure	5.3	IS 18256 IS 18255	R	One	Each control unit	-
5.4	Bar Sizes and Surface Enhancement	5.4	IS 18256 IS 18255	R	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.		
5.5, 8.2.1	Cross-sectional area	5.5, 8.2.1	IS 18256 IS 18255				
6.1, 8.2.2	Ultimate Tensile Force	6.1, 8.2.2	IS 18256 IS 18255	R	One	Each control unit	-
6.2, 8.2.3	Tensile Modulus of Elasticity	6.2, 8.2.3	IS 18256 IS 18255	R	One	Each control unit	-
8.2.4	Ultimate Tensile Force of 90° bent bar	8.2.4	IS 18256 IS 18255	R	One	Each control unit	-
6.3	Ultimate Tensile Strain	6.3	IS 18256 IS 18255	R	One	Each control unit	-
6.4	Transverse Shear Strength	6.4	IS 18256 IS 18255	S	One	Once in a year	Varieties shall be tested in rotation. These tests are to be additionally performed whenever a change is made in the chemical composition of the individual constituents or composite
6.5	Bond Strength	6.5	IS 18256 IS 18255	S	One	Once in a year	
6.6	Fatigue Tensile Strength	6.6	IS 18256 IS 18255	S	One	Once in three years	

6.7	Creep Failure	6.7	IS 18256 IS 18255	S	One	Once in three years	bar or the method of manufacture.
7.1	Moisture Absorption (short-term)	7.1	IS 18256 IS 18255	R	One	Each control unit	-
7.1	Moisture Absorption (long-term)	7.1	IS 18256 IS 18255	S	One	Once in a year	Varieties shall be tested in rotation. These tests are to be additionally performed whenever a change is made in the chemical composition of the individual constituents or composite bar or the method of manufacture.
7.2	Resistance to Alkaline Environment	7.2	IS 18256 IS 18255	S	One	Once in a year	
7.3	Longitudinal Wicking	7.3	IS 18256 IS 18255	S	One	Once in a year	