



**PRODUCT MANUAL FOR  
WIRE ROPES USED IN OIL WELLS AND OIL WELL DRILLING  
ACCORDING TO IS 4521: 2001**

*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 license/certificate.*

1.	<b>Product</b>	:	IS 4521: 2001
	<b>Title</b>	:	Wire Ropes used in Oil Wells and Oil Well Drilling
	<b>No. of Amendments</b>	:	Nil
2.	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	Round Steel Wires for ropes- IS 1835 Wires for guy strands- as per Cl. 6.1 of IS 4521
b)	<b>Grouping guidelines</b>	:	Please refer ANNEX – A
c)	<b>Sample Size</b>	:	Mechanical Tests: 4 meter Chemical Tests: 5 pieces of 5cm x 5cm
3.	<b>List of Test Equipment</b>	:	Please refer ANNEX – B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer ANNEX –C
5.	<b>Possible tests in a day :</b>		Size (Cl. 4) General requirements (Cl. 6) Tests on wire prior to rope manufacture (Cl. 10.1 of IS 6594)
6.	<b>Scope of the Licence :</b>		Please refer ANNEX –D

**ANNEX--A****GROUPING GUIDELINES**

1. IS 4521: 2001 covers Wire Ropes used in Oil Wells and Oil Well Drilling which are classified into different varieties based on the following:
  - a) Construction (as per Cl. 1)
  - b) Rope/Strand Grade – 450/ 1230/ 1570/ 1770/ 1960
  - c) Core – Fibre/ Steel
  - d) Size (Nominal Diameter)
  - e) Galvanized/ Ungalvanized (Bright)
    - Steel Core shall be of Core Wire Strand (CWS)/ Independent Wire rope Core (CWR).
2. Considering the above, the following grouping guidelines shall be followed for GoL/CSoL:
  - i) Separate samples of Wire Rope with Fibre Core and Steel Core of any Construction (Table 1 to Table 8) and Size (Nominal Diameter), preferably the largest size, shall be drawn and tested for all the requirements.
  - ii) Galvanized guy strand Wire Rope of any construction (Table 9A, 9B, 9C & 9D) and Size (Nominal Diameter), preferably the largest size, shall be drawn and tested for all the requirements.
  - iii) Well measuring wires of any size (Nominal Diameter), preferably the largest size, shall be drawn and tested for all the requirements.
  - iv) However, the following relaxation may be given when a particular variety is tested for all the requirements:

<b>Variety Tested</b>	<b>Additional Variety that may be covered</b>	<b>Remarks</b>
Rope Grade – 1960 Rope Grade – 1770	Rope Grade – 1770 & 1570 Rope Grade – 1570	For all constructions except galvanized guy strand and Well measuring wires
Rope Grade- 1570 Rope Grade- 1230	Rope Grade – 1230 and 450 Rope Grade- 450	For galvanized guy strand construction
Steel Core - Independent Wire Rope Core (CWR)	Steel Core - Core Wire Strand (CWS)	For all constructions except galvanized guy strand and Well measuring wires
Galvanized Wire Rope	Ungalvanized Wire Rope	For all constructions

3. The Firm shall declare the Varieties of various Wire Ropes they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
4. During the operation of license, it shall be ensured that all varieties covered in the license 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*

<b>Sr No</b>	<b>Tests used in with clause reference</b>	<b>Test equipment</b>
1	Minimum breaking force - Cl. 5, 6	Tensile testing machine / Breaking Load Testing Machine
2	Torsion test - Cl. 6 (Cl. 10.3.3 of IS 6594, 12.3 of IS 1835)	Torsion testing machine
3	Measurement of mass - Table 1 to 10	Weighing balance
4	Reverse Bend Test (Cl. 10.3.4 of IS 6594)	Bend testing machine
5	Rope size and Tolerance Dimensions - (Cl. 4 of IS 4521, Cl. 5 & Annex A of IS 6594)	Vernier caliper, Micrometer
6	Length of rope - Cl. 6	Measuring tape / Length Counter meter
7	Tests for Galvanizing (Cl. 10.3.5 of IS 6594 ; Cl. 11, 12.6 of IS 1835)	Weighing balance, Chemicals, mandrels of suitable size etc.
8	Wrapping test (Cl. 12.5 of IS 1835)	Suitable fixture

*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 Clause 9 of IS 4521: 2001.

**4. CONTROL UNIT** – All the wire ropes of same nominal diameter and grade manufactured using the same set of strands and same type of core under identical condition of 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.

**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				Levels of Control			
Clause	Requirement	Test Methods		Test equipment requirement Required (R) or Sub-contracting permitted (S)	No. of Sample	Frequency	Remarks
		Clause	Reference				
4	Size	4 Annex A	IS 4521 IS 6594	R	Each Rope	--	-
5	Minimum Breaking Force	5, Table 1 to 10 Annex B	IS 2266 IS 6594	R	One	Each Control Unit	
<b>6</b>	<b>General Requirements</b>						
-	Material	4.1	IS 6594	S	One	Each heat	No testing is required if the material is ISI Marked or accompanied with a test certificate.
		6.1	IS 4521				
-	Length	6.4	IS 6594	R	Each length	-	-
-	Approximate Mass	Table 1 to Table 10	IS 4521	R	Each length	-	-
		6.5	IS 6594				

-	Lay of rope	6.5 6.7	IS 4521 IS 6594	R	Each rope	-	-
-	Length of lay	6.6	IS 4521	R	Each rope		
-	Joints	6.3 6.8	IS 4521 IS 6594	R	Each rope	-	-
-	Freedom from defects	7	IS 6594	R	Each rope	-	-
-	Performing	8	IS 6594	R	One	Every loading length subject to a max. of 5 T	-
-	Lubrication	9	IS 6594	R	Each rope	-	-
-	<b>Tests on wire prior to Rope Manufacture as per 10.1 of IS 6594</b>						
-	a) Diameter	10.1	IS 1835	R	One	Each coil from which a construction and size is made	For individual wires one sample from one end of each coil wound round the bobbins for each size shall be tested for all the tests laid down. If a sample fails in any of the requirements, the particular coil shall be rejected
-	b) Tensile strength	12.2	IS 1835	R	One		
-	c) Torsion test	12.3	IS 1835	R	One		
-	d) Reverse bend test	12.4	IS 1835	R	One		
-	e) Wrapping test*	12.5	IS 1835	R	One		
-	f) Galvanizing test	11, 12.6	IS 1835	R	One		

	Tests on individual Wires*	10.3	IS 6594	-				
-	a) Tensile strength	10.3.2	IS 6594	R	As per Cl. 10.3.1.1 & 10.3.1.2 of IS 6594 (as applicable)	Each coil from which a construction and size is made		
-	b) Torsion test	10.3.3	IS 6594	R				
-	c) Reverse bend test	10.3.4	IS 6594	R				
-	d) Galvanizing test	10.3.5	IS 6594	R				One
-	e) Diameter of wire	10.3.6	IS 6594	R				One

\* To be done only when specified by purchaser.

**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 only recommendatory in nature. The manufacturer may define the control unit/batch/lot and submit his own levels of control in column 3 with proper justification for approval by BO Head.



**ANNEX D**

**Scope of Licence**

“Licence is granted to use Standard Mark as per IS 4521: 2001 with the following scope:

Name of the product	Wire Ropes used in Oil Wells and Oil Well Drilling
Size	
Construction	
Core	
Rope Grade	
Whether Galvanized or Ungalvanized	