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BUREAU OF INDIAN STANDARDS
DRAFT FOR COMMENTS ONLY

Draft Indian Standard

Winding Wires for Submersible Motors — Specification

Part 2 Materials for Dielectric and Jacket

(Second Revision of IS 8783 Part 2)

Winding Wire Sectional Committee, ETD 33

Last date for comments: 30-10-2025

FOREWORD

(Formal clauses of the draft will be added later)

This standard was initially published in 1978, covering PVC insulated winding wires for submersible motors designed for 85 °C operation. Subsequently, two related standards — IS 10051 : 1981, Specification for PVC insulated winding wires for submersible motors for 105 °C operation, and IS 12788 : 1989, Specification for PVC insulated winding wires overcoated with nylon for submersible motors — were introduced but later withdrawn.

This part of the series specifies the requirements of dielectric and jacket materials for winding wires for submersible motors.

In view of the prolonged absence of revision in the IS 8783 series, the associated winding wire standards for submersible motors are now being revised and circulated for public comments.

Although the committee did not observe significant technical changes in the construction or application of submersible winding wires, it approved wide circulation of the revised drafts with updated normative references to facilitate broader stakeholder consultation for following standards:

IS 8783	Winding wires for submersible motors — Specification
Part 1 : 1995	Part 1 Conductor data
Part 2 : 1995	Part 2 Materials for dielectric and jacket
Part 3 : 1995	Part 3 Methods of tests
Part 4/Sec l : 1995	Part 4 Specification for individual wires, Section 1 HR PVC insulated winding wires
Part 4/Sec 2 : 1995	Part 4 Specification for individual wires, Section 2 Cross linked polyethylene insulated and polyamide jacketed wires
Part 4/Sec 3 : 1995	Part 4 Specification for individual wires, Section 3 Polyester and polypropylene insulated winding wires

This revision includes the incorporation of amendments.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)'.The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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WINDING WIRES FOR SUBMERSIBLE MOTORS —SPECIFICATION

PART 2 MATERIALS FOR DIELECTRIC AND JACKET

(Second Revision of IS 8783 Part 2)

1 SCOPE

1.1 This draft standard (Part 2) specifies the requirements of dielectric and jacket materials for winding wires for submersible motors.

1.2 The types of materials covered by this standard are as given below:

Type 1	HR PVC insulated wires for maxi- mum rated conductor temperature of 85°C.
Type 2	XLPE insulated and polyamide jacketed wires for maximum rated conductor temperature of 105 °C.
Type 3	Polyester and polypropylene insulated wires for maximum rated conductor temperature of 105 °C.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

3 TERMINOLOGY

For the purpose of this standard, in addition to the definitions given in IS 1885 (Part 32) the following shall apply.

3.1 Dielectric (Insulation)

The prevention of the passage of electricity by using insulating materials.

3.2 Jacketing

It is the coating over the insulated wires, used to protect the insulation from environmental and mechanical abuses.

3.3 Variation

Difference between the mean value obtained after ageing and the mean value obtained without ageing, expressed as percentage of the latter.

3.4 Mean Value

Mean value for this standard shall be considered as average of 3 values eliminating maximum and minimum value taken from 5 readings.

4 REQUIREMENTS

The materials shall satisfy the requirements given in Table 1.

Table 1 Requirements for Dielectric and Jacket Materials

(*Clause* 4)

SI No.	Tests	Unit	Type of Dielectric and Jacket							Method of Test (Ref to Part No. of IS 10810)
			Type 1	Type 2			Type 3			
			HR PVC	XLPE	Polyamide	Finished wire	Polyester	Polypropylene	Finished wire	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	Volume resistivity, Min									43
	a) At 27°C. (*see* Note 1)	ohm-cm	1×10^{13}	1×10^{14}	N.A.	1×10^{14}	1×10^{16}	1×10^{16}	1×10^{16}	
	b) At test temperature (see Note 2	ohm-cm	1×10^{10}	1×10^{12}	N.A.	1×10^{12}	1×10^{13}	1×10^{13}	1×10^{13}	
ii)	Breakdown voltage, Min	kV/mm	Under Consideration							
iii)	Before ageing									7
	a) tensile strength, Min	N/mm^2	12.5	12.5	40	N.A.	Under Consideration		50	
	b) Elongation at break, Min	Percent	125	200	40	N.A.	Under Consideration		125	
iv)	Ageing in air oven									11
	a) treatment temperature (Tolerance ±2°C)	°C	135	135	135	N.A.	Under Consideration		135	
	Duration	Days	7	7	4	N.A.	Under Consideration		7	
	b) tensile strength									
	1) value after ageing, Min	N/mm^2	12.5	12.5	40	N.A.	Under Consideration		50	
	2) variation, Max	Percent	±25	±25	±25	N.A.	Under Consideration		±25	
	c) Elongation at break									
	1) value after ageing, Min	Percent	125	200	125	N.A.	Under Consideration		125	
	2) variation, Max	Percent	±35	±25	±25	N.A.	Under Consideration		±25	
v)	Shrinkage									12
	a) treatment temperature (Tolerance ±2°C)	°C	150	130	150	150	150	150	150	
	Duration	Minutes	15	60	15	15	15	15	15	
	b) Shrinkage, Max	Percent	4	4	4	4	4	4	4	
vi)	Water absorption (gravimetric)									33
	a) treatment temperature (Tolerance ±2°C)	°C	70	70	N.A.	N.A.	N.A.	N.A.	70	

SI No.	Tests	Unit	Type of Dielectric and Jacket							Method of Test (Ref to Part No. of IS 10810)
			Type 1	Type 2			Type 3			
			HR PVC	XLPE	Polyamide	Finished wire	Polyester	Polypropylene	Finished wire	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Duration	Hours	24	24	N.A.	N.A.	N.A.	N.A.	24	
	Water absorbed, Max	mg/cm^3	2	1	N.A.	N.A.	N.A.	N.A.	2	
vii)	Hot set									30
	a) treatment temperature (Tolerance ±2°C)	°C	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	
	Duration	Minutes	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	
	Mechanical stress	N/cm^3	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	
	b) elongation under load, Max	Percent	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	
	c) Permanent elongation (set) after cooling, Max	Percent	N.A.		N.A.	N.A.	N.A.	N.A.	N.A.	
viii)	Hot deformation test									15
	a)Test temperature (Tolerance ±2°C)	°C	95	N.A.	N.A.	115	N.A.	N.A.	115	
	b) Time under load	Hours	6	N.A.	N.A.	6	N.A.	N.A.	6	
	c) Depth of Indentation, Max	Percent	50	N.A.	N.A.	25	N.A.	N.A.	25	
ix)	Heat Shock Test									14
	a) treatment temperature (Tolerance ±2°C)	°C	150	N.A.	N.A.	N.A.	150	150	150	
	Duration	Hours	1	N.A.	N.A.	N.A.	1	1	1	
	b) Visual Examination		No signs of cracks or scales or separation of layers				No signs of cracks or scales or separation of layers	No signs of cracks or scales or separation of layers	No signs of cracks or scales or separation of layers	
x)	Melting Point Index		Under Consideration							

NOTES

1 Volume resistivity test may be done at room temperature instead of 27 °C. However, in case of doubt or dispute, the test results shall be confirmed by testing at 27 °C.

2 a) For Type 1 Wires test temperature is 85 °C.

b) For Type 2 and Type 3 Wires test temperature is 90 °C

3 In case of test on insulation, if insulation of wire is of such nature that it cannot be separated from finished wire easily (without damaging the insulation and/or conductor) then it shall not be applicable and only test on finished wire shall be carried out.

ANNEX A

(*Foreword*)

IS No.	*Title*
IS 1885 (Part 32) : 2019	Electrotechnical Vocabulary Part 32 Electric Cables (*second revision*)
IS 10810 :	Methods of test for cables
Part 7 : 1984	Tensile strength and elongation at break of thermoplastic and elastomeric insulation and sheath
Part 11 :1984	Thermal ageing in air
Part 12 : 1984	Shrinkage test
Part 14 : 1984	Heat shock test
Part 15 : 1984	Hot deformation test
Part 30 : 1984	Hot set test
Part 33 : 1984	Water absorption test (Gravimetric)
Part 43 : 1984	Insulation resistance test