

موسسه

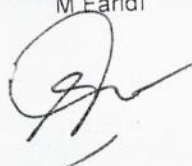
کتابخانه

Flexible Copper Wire Stranded Rope

Technical Terms of Delivery



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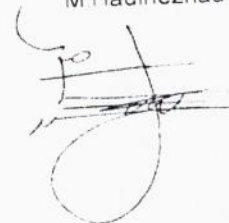


IRAN TRANSFO STANDARD
Iran Transformer Research Institute

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FOREWORD

Iran Transfo Standard consists of a series of standards which are prepared on the basis of valid International standards, in conformity with Iran Transfo's technical requirements.

The initial draft has been prepared in Iran Transformer Research Institute (ITRI) which is also responsible to issue the final documents approved by professional committees in the form of ITS standards. It should be mentioned that all departments of Iran Transfo Co. are obligated to apply the issued ITS Standards.

All users must be assured that the latest edition of this standard will be used. The latest edition of ITS standards is also available on the ITRI web site:

<http://itri.com>

About this standard

The present standard has been approved in Iran Transfo Co.'s wire technical Committee by:

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All users should ensure that they have the latest edition of this publication.

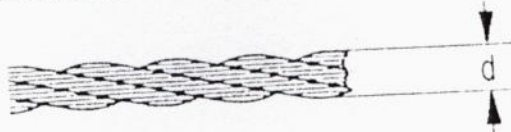
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1 Scope

This specification covers bare flexible copper wire stranded rope having bunch-stranded members made from round copper wires. For "high flexible copper wire stranded rope" referee to ITS-MM02-11.

2 Dimensions Designation



Cross lay acc. to
BS EN 12385 part 2

Designation of a flexible round rope of nominal cross-section 150 mm²:

Flexible Round Wire ITS-MM02-12- Cu-CATH-1- 150 - BR

Table 1

Nominal Cross-Section [mm ²]	Number of individual single wires [piece]	Single wire		Outer diameter of the round rope [mm]		*Weight [Kg/1000 m] ≈
		Diameter [mm]	Tolerance		Tolerance	
6	7×11=77	0.315	±0.007	3.8	±0.2	55
10	7×12=84	0.400	±0.009	4.8		90
16 ✓	19×7=133			5.8		145
25	19×11=209			7.8	±0.3	225
35	19×15=285			9.0		315
50	19×21=399	0.500	±0.009	10.9	±0.4	445
70 ✓	19×19=361			13.1		625
95 ✓	27×18=486			15.0		850
120 ✓	19×11=209	0.850	±0.012	16.7		1070
150 ✓	27×10=270			18.8		1340
185 ✓	27×12=324			20.6		1650
240 ✓	37×12=444			23.8		2140
300 ✓	48×11=528			26.5	±0.5	2670
400 ✓	48×15=720			31.0		3565
500 ✓	61×15=915			35.0	±0.6	4455
600 ✓	91×12=1092			37.0		5345

* Due to the different types of stranding and lay lengths, the specified weights are only guide values and no acceptance values.

3 Technical Requirement

3.1 Surface Condition

3.1.1 Single wire

The surface of the single wire must be smooth and free of defects such slivers, depressions, scratches, scales, laps and rust. Any out of roundness of the single wire must not exceed half the permissible total tolerance on the wire diameter.

3.1.2 Stranded Rope

The surfaces of stranded rope wire shall be smooth, clean, free from grease, dust and other contaminants.

3.2 Dimensions

Dimensions shall be according to Table 1.

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3.3 The length of lay of the strand

The lay lengths of the outer layer shall not be less than 8 nor more than 12 times the outside diameter of the completed conductor. The length of lay of the other layers shall be at the option of the manufacturer unless specifically agreed upon.

3.4 DC Resistance

The resistance of single and stranded rope wire at 20 °C, shall not exceed the appropriate maximum value given in Tables 2 or 3.

Table 2: Single wire

Single wire diameter [mm]	DC Resistance at 20°C [Ω/m]
0.315	0.23140
0.4	0.14359
0.5	0.09105
0.85	0.03126

Table 3: standard rope wire

Nominal cross-sectional area [mm ²]	Resistance of conductor at 20°C [Ω/km]
6	3.30
10	1.91
16	1.21
25	0.780
35	0.554
50	0.386
70	0.272
95	0.206
120	0.161
150	0.129
185	0.106
240	0.0801
300	0.0641
400	0.0486
500	0.0384
630	0.0287

3.5 Elongation for single wires

The wire shall conform to the requirements for elongation prescribed in Table 4. No requirements for tensile strength are specified.

Table 4: Elongation Requirements

Diameter [mm]	Elongation in 254 mm % min
0.315	20
0.40	
0.50	
0.85	25

4 Inspection

4.1 Sampling

- For visual and dimension controls, inspection has to be performed for all drums.
- To measure and test requirements (3.3), (3.4) and (3.5) sections at least one drum has to be chosen.

4.2 Testing

All requirements mentioned on section 3 has to be performed.

5 Material

The composition shall conform the requirements for the appropriate grade given in table 5.

ITS-MM02-12

Table 5: Composition of copper grades made from Cu-CATH-1(CR001A)

Material designation		Composition in % (m/m)																				Elements listed in this table other than copper, excluding		
		Element	Cu	Ag	As	Bi	Cd	Co	Cr	Fe	Mn	Ni	O	P	Pb	S	Sb	Se	Si	Sn	Te	Zn	Total	Excluding
Symbol	Number																							
Cu-CATH-1	CWCC3A	min.	-	0.0025	0.0005	0.00020	-	-	0.0010	-	-	0.040	-	0.0005	0.0015	0.0004	-	0.00020	-	-	0.00020	-	0.0065	0
		max.	-	0.0025	0.0005	0.00020	-	-	0.0010	-	-	-	-	0.0005	0.0015	0.0004	-	0.00020	-	-	0.00020	-	0.0065	0
Cu-CATH-1	CWCC3A	min.	99.99	0.0025	0.0005	0.00020	-	-	0.0010	0.0005	0.0010	-	-	0.0003	0.0005	0.0015	0.0004	0.00020	-	0.0002	0.00020	0.0001	-	-
		max.	-	0.0025	0.0005	0.00020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

6 Type

The flexible round copper wires can be provided in two blowing ways:

BR= bare (Normally)

SN= tinned (specify when ordering)

7 Delivery, Packing and Labelling

7.1 Packing

7.1.1 Drums dimensions

Drum dimension should be according to table 6. Any other dimension shall be agreed upon between the manufacturer and the purchaser in the placing of individual orders.

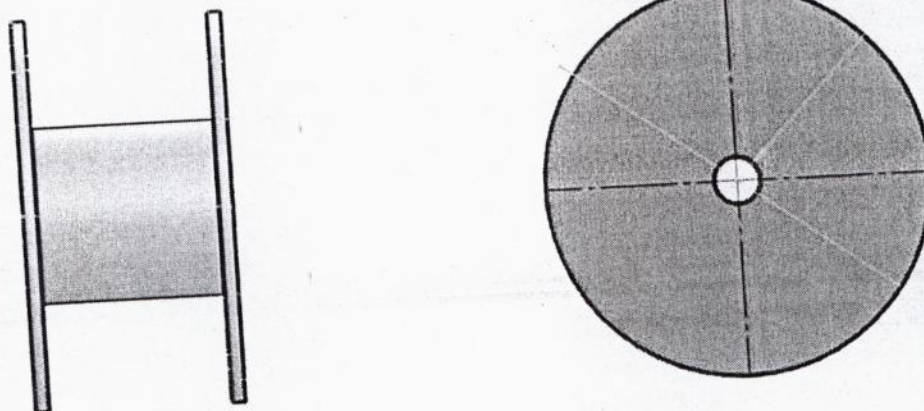


Figure 1: Drum schematic design

Table 6: drums dimensions

Inner Diameter (d1) [mm]		Outer Diameter (d2) [mm]		Inner Width (L2) [mm]		Outer Width (L1) [mm]		Central Shaft Diameter (d3) [mm]	
Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
350	700	600	1500	480	900	540	1000	66	130

7.1.2 Packing requirements

- The conductors shall be protected against damage in ordinary handling and shipping.
- All inner surfaces of the drums should be covered with "cartonplast".
- In order to prevent from dust, the surface of final products must be covered with "cellophane" and then with a layer of "cartonplast".
- All drums shipment shall be in a standing posture (vertical).
- The manufacturer use "banderole (electrical tape)" at the beginning and end of the round copper wires to prevent from single cores opening. (The use of "banderole (electrical tape)" in the overall length of the round copper wire not allowed.)

7.2 Labelling

All drums shall have a riveted metal name plate, which includes.

- Manufacturer Name
- Dimensions

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- Product standard
- Net weight
- Gross weight
- Length
- Serial number
- Date of manufacture

8 Normative References

This standard is a continuation of TUN 902032 and contains supplementary stipulations.
Other relevant standards:

BS EN 12385:2008

Steel wire ropes safety, definitions, designation and classification

ASTM B3-01:2013

Standard specifications for soft or annealed copper wire

IEC 60228:2004

Conductors of insulated cables

DIN 46431:1970

Round copper wires for electrical purposes

DIN 46391-1:1979

Delivery drums for cables and stranded conductors, Delivery drums with diameter up to 2800mm dimensions

DIN EN 1977

Copper and copper alloys, copper drawing stock (wire rod)