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DRAWN WIRE FOR GENERAL PURPOSE NON-ALLOY STEEL WIRE ROPES

SPECIFICATIONS

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BRIEF HISTORY

The ISO Recommendation R 2232, *Drawn wire for general purpose non-alloy steel wire ropes – Specifications*, was drawn up by Technical Committee ISO/TC 105, *Steel wire ropes*, the Secretariat of which is held by the Nederlands Normalisatie-Instituut (NNI).

Work on this question led to the adoption of Draft ISO Recommendation No. 2232, which was circulated to all the ISO Member Bodies for enquiry in October 1970. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Austria	Ireland	Spain
Belgium	Israel	Sweden
Denmark	Italy	Switzerland
France	Netherlands	U.A.R.
Germany	Portugal	United Kingdom
India	South Africa, Rep. of	

The following Member Bodies opposed the approval of the Draft :

Japan
New Zealand
U.S.A.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

ISO Recommendation | R 2232 | August 1971

DRAWN WIRE FOR GENERAL PURPOSE NON-ALLOY STEEL WIRE ROPES

SPECIFICATIONS

1. SCOPE

This ISO Recommendation gives specifications for drawn wire intended for use in the manufacture of general purpose non-alloy steel wire ropes.

It specifies

- the dimensional tolerances;
- the mechanical characteristics, which are determined on the basis of the appropriate techniques described in the corresponding ISO Recommendations*;
- the conditions with which their covering, if any, shall comply;
- the conditions of sampling and the terms of acceptance.

2. FIELD OF APPLICATION

This ISO Recommendation does not apply to steel wires taken from a rope; it applies to bright or galvanized wires only for use in the manufacture of general purpose wire ropes.

Wires for ropes for special applications, such as the ones listed below, are outside of its scope :

- winding ropes for mining purposes for use in vertical and inclined shafts reaching to the surface and in blind shafts;
- ropes for aircraft controls;
- ropes for deep drilling equipment;
- ropes for aerial ropeways;
- ropes for elevators;
- ropes for prestressed concrete.

3. QUALITY OF COATING

For galvanized wire, the galvanizing may, at the request of the user, be

- of quality B, for all wire diameters from 0.20 mm inclusive up to 3.7 mm exclusive;
- of quality AB for all wire diameters from 0.40 mm inclusive up to 1.9 mm exclusive;
- of quality A for all wire diameters from 0.40 mm inclusive up to 3.7 mm exclusive.

These quality grades correspond to the different minimum requirements indicated in Table 4; each of them has its own mechanical characteristics.

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* Unless particularly mentioned below for certain tests.

4. DIAMETERS

4.1 Nominal diameter of the wire

The nominal diameter of the wire is the diameter specified by the ropemaker on the order, in millimetres. It should be the basis on which the values of all characteristics are determined for acceptance of the wire.

4.2 Actual diameter of the wire

The actual diameter of the wire is the diameter given by the arithmetic mean of two measurements, one being perpendicular to the other. These two measurements should not differ by more than half the total tolerance given in Table 1 and their arithmetic mean must be within the limits of tolerance specified in Table 1.

TABLE 1 — **Dimensional limits and tolerances**

Values in millimetres

Diameter		Tolerances		
from (incl.)	to (excl.)	Bright and galvanized wire Quality B	Galvanized wire Quality AB	Galvanized wire Quality A
0.20	0.25	± 0.010		
0.25	0.40			
0.40	0.50	± 0.015	± 0.015	± 0.030
0.50	0.60			
0.60	0.70			
0.70	0.80			
0.80	1.00			
1.00	1.20	± 0.020	± 0.020	± 0.040
1.20	1.30			
1.30	1.50			
1.50	1.60			
1.60	1.80	± 0.025	± 0.025	± 0.050
1.80	1.90			
1.90	2.00			
2.00	2.30			
2.30	2.40			
2.40	2.50	± 0.030		± 0.060
2.50	3.00			
3.00	3.20			
3.20	3.50			
3.50	3.70			

5. BREAKING STRENGTH

5.1 Nominal strength

This ISO Recommendation is prepared on the basis of three nominal breaking strengths, as follows :

(1) for galvanized wires of quality A and AB only, strength referred to as 145, corresponding to 1420 N/mm^2 minimum (i.e. 145 kgf/mm^2);

(2) for all qualities of wire, strength referred to as 160, corresponding to 1570 N/mm^2 minimum (i.e. 160 kgf/mm^2);

(3) for bright wires, galvanized quality B wires and galvanized wires quality AB only, strength referred to as 180, corresponding to 1760 N/mm^2 minimum (i.e. 180 kgf/mm^2).

These nominal values are the lower limits for strengths. The upper limits are equal to the lower limits plus :

390 N/mm^2 (40 kgf/mm^2)	for wires of diameter less than 0.5 mm;
350 N/mm^2 (36 kgf/mm^2)	for wires of diameter between 0.5 mm (inclusive) and 1 mm (exclusive);
320 N/mm^2 (33 kgf/mm^2)	for wires of diameter between 1 mm (inclusive) and 1.5 mm (exclusive);
290 N/mm^2 (30 kgf/mm^2)	for wires of diameter between 1.5 mm (inclusive) and 2 mm (exclusive);
260 N/mm^2 (27 kgf/mm^2)	for wires of 2 mm diameter and larger.

5.2 Testing

The tensile test should be carried out in accordance with the procedure given in ISO Recommendation R 89, *Tensile testing of steel wire*; however, in view of the number of tests on wire involved in the inspection of a batch, the speed of application of the load may be higher than that specified in ISO Recommendation R 89 but without exceeding a speed producing an elongation of 25 % of the distance between grips within 1 minute. A 150 mm test piece should preferably be used.

In the case of dispute, the tensile test should be performed strictly in accordance with ISO Recommendation R 89, particularly insofar as the speed of application of the load is concerned.

6. SIMPLE TORSION TEST

Depending on its diameter and tensile strength, the wire should be capable of withstanding before fracture the minimum number of turns indicated in Table 2.

The test relates only to wire having a diameter of 0.5 mm and over.

The test should be carried out in accordance with the procedure given in ISO Recommendation R 136, *Simple torsion testing of steel wire*. The length 100 ϕ of the test piece between grips is preferable. When this length is impracticable the alternative length is at the discretion of the wire manufacturer and then the minimum of twists which the wire should withstand should be in direct ratio to the number specified in Table 2 for a test length of 100 ϕ.

TABLE 2 – **Minimum number of turns**

Diameter mm		Bright and galvanized wire Quality B		Galvanized wire Quality AB			Galvanized wire Quality A	
from (incl.)	to (excl.)	Nominal strength 160	180	145	160	180	145	160
0.20	0.25							
0.25	0.40							
0.40	0.50							
0.50	0.60	30	28	30	28	26	20	19
0.60	0.70							
0.70	0.80							
0.80	1.00							
1.00	1.20	29	26	29	26	23	19	18
1.20	1.30							
1.30	1.50	28	25	28	25	22	18	17
1.50	1.60							
1.60	1.80							
1.80	1.90	26	24	26	24	21	18	17
1.90	2.00							
2.00	2.30							
2.30	2.40	24	22				16	14
2.40	2.50							
2.50	3.00							
3.00	3.20	22	20				14	12
3.20	3.50							
3.50	3.70	20	18				12	10

7. REVERSE BEND TEST

Depending on its diameter and nominal tensile strength, the wire should be capable of withstanding without fracture the minimum number of reverse bends indicated in Table 3; the bending radii for different wire diameters are also given.

The test relates only to wire having a diameter of 0.5 mm and over.

It should be carried out in accordance with the procedure given in ISO Recommendation R 144, *Reverse bend testing of steel wire.*

TABLE 3 – **Minimum number of reverse bends***

Diameter	Radius of curvature of the supports	Bright wire and galvanized wire Quality B		Galvanized wire Quality AB			Galvanized wire Quality A	
		Nominal strength		Nominal strength			Nominal strength	
mm	mm	160	180	145	160	180	145	160
0.50	1.25	7	6	7	6	5	6	5
0.55	1.75	13	12	13	12	11	11	10
0.60		11	10	11	10	9	9	8
0.65		9	8	9	8	7	8	7
0.70		8	7	8	7	6	7	6
0.75	2.5	15	14	15	14	13	13	12
0.80		14	13	14	13	12	12	11
0.85		13	12	13	12	11	11	10
0.90		12	11	12	11	10	10	9
0.95		11	10	11	10	9	9	8
1.00		10	9	10	9	8	9	8
1.10	3.75	17	16	17	16	15	15	14
1.20		15	14	15	14	13	13	12
1.30		13	12	13	12	11	11	10
1.40		11	10	11	10	9	9	8
1.50		10	9	10	9	8	8	7
1.60	5	13	12	13	12	11	11	10
1.70		12	11	12	11	10	10	9
1.80		11	10	11	10	9	9	8
1.90		10	9	10	9	8	8	7
2.00		9	8				7	7
2.10	7.5	13	12				11	10
2.20		12	11				10	9
2.30		11	10				9	8
2.40		10	9				8	7
2.50		9	8				7	7
2.60		9	8				6	6
2.70		8	7				6	6
2.80		8	7				5	5
2.90		7	6				5	4
3.00		6	5				4	3
3.10	10	9	8				8	6
3.20		8	7				7	6
3.30		8	7				7	5
3.40		7	6				6	5
3.50		7	6				6	5
3.60		7	6				6	5
3.70		7	6				6	5

NOTE. – If the diameter of the wire is between two consecutive diameters of the table, the number of bends corresponding to the next larger diameter should be taken.

* This table is likely to be amended following the revision of ISO Recommendation R 144.