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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Wrought copper and copper alloy wire — Technical conditions of delivery

Fils en cuivre et en alliages de cuivre corroyés — Conditions techniques de livraison

Reference number
ISO 1638 : 1987 (E)

c) dimensions, i.e.,

— diameter or distance across flats,
— length or weight of the coil;

d) the tests to be carried out, including those to be agreed upon, for example technological tests (see clause 5).

4 Requirements

4.1 Chemical composition

The chemical composition shall comply with the requirements as specified in the International Standards referred to in table 1.

Table 1 — Chemical composition

Material	Chemical composition in accordance with
Coppers	ISO 1336, ISO 1337
Copper-zinc alloys	ISO 426-1 and ISO 426-2
Copper-tin alloys	ISO 427
Copper-nickel-zinc alloys	ISO 430
Special copper alloys	ISO 1187

4.2 Mandatory mechanical properties

4.2.1 This International Standard embodies the principle that tensile strength and elongation are generally sufficient to define the condition of the material.

Mechanical properties are given in table 2.

Wire having dimensions outside the given ranges may not comply with the properties given in table 2.

4.2.2 Subject to agreement between the purchaser and the supplier, copper-zinc alloy wire may be supplied in the stress-relieved condition and be subject to the stress corrosion test. Test pieces subjected to this test shall not crack.

Should a lot of material fail the test, the supplier shall have the option to restress relieve the lot and to submit it to all the relevant tests.

4.3 Dimensions and tolerances

For drawn round wire, the tolerances specified in ISO 3492 apply.

4.4 Surface quality

The wire shall be clean, sound and free from injurious defects. Discoloration which is characteristic of proper heat treatment shall not be cause for rejection. A superficial film or residual light lubricant is normally present and is permissible, unless otherwise specified.

5 Methods of test

5.1 Sampling

Selection and preparation of test specimens and test pieces for mechanical testing shall be carried out in accordance with ISO 4739.

The lot size shall be subject to the agreement between supplier and purchaser.

If not otherwise specified, the rate of sampling for wire shall be one test piece per lot for each of the tests referred to in 5.2 to 5.4, as appropriate.

5.2 Tensile testing

The test shall be made in accordance with ISO 6892.

5.3 Technological testing

The technological tests and their requirements shall be agreed upon between supplier and purchaser, for example the reverse bend test according to ISO 7801, the simple torsion test according to ISO 7800.

5.4 Stress corrosion test

If required, the test is only carried out on copper-zinc alloys as listed in table 2.

The method shall be the mercury(I) nitrate test according to ISO 196. By agreement between supplier and purchaser, an ammonia test according to ISO 6957 may be specified instead of the mercury(I) nitrate test.

5.5 Retests

5.5.1 If both of the two test pieces which were originally taken from a lot fail to meet the specification for any reason, the lot shall be deemed not to comply with this International Standard.

5.5.2 If one of the two test pieces taken originally from the lot fails to meet the specification for any reason, two further test pieces shall be taken. One of these two test pieces shall be taken from the wire from which the failed test piece was originally taken, unless that wire has been withdrawn from the lot by the supplier. The other test piece shall be taken from another sample from the same lot. All appropriate tests shall be carried out.

5.5.3 Should both of the new test pieces pass the tests, the lot represented by the test pieces shall be deemed to comply with this International Standard. Should either of the additional test pieces fail, the lot represented by the test pieces shall be deemed not to comply with this International Standard.

Table 2 — Mandatory mechanical properties

Temper	Diameter or distance across flats	Tensile strength R_m N/mm² min.	Elongation		
			A_{200} % min.	A_{100} % min.	A_{50} % min.
Coppers (min. 99,85 % Cu) : Cu-ETP, Cu-FRHC, Cu-OF[1)] **Coppers (min. 97,5 % Cu) : Cu-Ag0,05, Cu-Ag0,1, Cu-Ag0,05(P), Cu-Ag0,1(P)[1)]**					
O	3 to 8	210	30	32	—
	8 to 12	210	32	35	—
HB	3 to 8	290	—	—	—
	8 to 12	270	—	—	—
HD	3 to 8	350	—	—	—
	8 to 12	320	—	—	—
CuZn15					
O	0,1 to 8	260	28	30	—
HA	0,1 to 8	310	—	12	—
HB	0,1 to 8	370	—	—	—
HD	0,1 to 8	460	—	—	—
CuZn20					
O	0,1 to 8	270	35	38	—
HC	0,1 to 8	460	—	—	—
HF	0,1 to 8	590	—	—	—
CuZn30					
O	0,1 to 8	280	35	40	—
HA	0,1 to 8	340	—	20	—
HB	0,1 to 8	460	—	—	—
HC	0,1 to 8	550	—	—	—
CuZn35/CuZn37					
O	0,1 to 8	290	25	30	—
HA	0,5 to 8	370	8	10	—
HB	0,5 to 8	460	—	—	—
HC	0,5 to 8	550	—	—	—
CuZn34Pb2					
HB	0,5 to 12	360	15	15	15
HD	0,5 to 12	440	—	5	5
CuZn37Pb2/CuZn38Pb2					
HA	3 to 12	350	15	15	15
HB	0,5 to 12	400	12	12	12
HC	0,5 to 12	460	7	7	7
CuZn36Pb3					
HB	1 to 12	400	8	8	8
HD	1 to 6	550	—	—	—
	6 to 12	480	—	—	—

1) Wire under 3 mm diameter for electrical application (for example widing wire conductors) will be the subject of a separate International Standard.

Table 2 — Mandatory mechanical properties (*continued*)

Temper	Diameter or distance across flats	Tensile strength R_m N/mm² min.	Elongation		
			A_{200} % min.	A_{100} % min.	A_{50} % min.
CuZn39Pb1					
HB	3 to 12	380	20	20	20
CuZn39Pb3					
HB	3 to 12	430	15	15	15
CuZn38Pb4					
HB	3 to 12	430	12	12	12
CuSn5					
HB	0,5 to 10	550	—	—	—
HD	0,5 to 10	750	—	—	—
HE	0,5 to 3	890	—	—	—
	3 to 6	850	—	—	—
CuSn6					
O	0,5 to 10	350	—	40	—
HA	0,5 to 10	420	—	10	—
HB	0,5 to 10	520	—	—	—
HC	0,5 to 10	650	—	—	—
HD	0,5 to 6	800	—	—	—
CuSn8					
O	0,5 to 10	380	—	45	—
HA	0,5 to 10	470	—	10	—
HB	0,5 to 10	570	—	—	—
HC	0,5 to 10	710	—	—	—
HD	0,5 to 6	850	—	—	—
CuNi18Zn20					
O	0,5 to 8	410	—	23	—
HA	0,5 to 8	500	—	5	—
HB	0,5 to 8	580	—	—	—
HC	0,5 to 8	660	—	—	—
HE	0,5 to 8	770	—	—	—
CuNi12Zn24					
O	0,5 to 8	360	—	25	—
HA	0,5 to 8	450	—	5	—
HB	0,5 to 8	540	—	—	—
HC	0,5 to 8	630	—	—	—
HE	0,5 to 8	740	—	—	—
CuBe1,7					
TB	1 to 12	390	—	—	20
TD	1 to 12	700	—	—	—
TH	1 to 12	1 230	—	—	—

Table 2 — Mandatory mechanical properties (*concluded*)

Temper	Diameter or distance across flats	Tensile strength R_m N/mm² min.	Elongation		
			A_{200} % min.	A_{100} % min.	A_{50} % min.
CuCo2Be/CuNi2Be					
TB	1 to 12	240	—	—	20
TD	1 to 12	450	—	—	8
TF	1 to 12	680	—	—	8
TH	1 to 12	740	—	—	5
CuSi1					
O	1 to 12	260	—	—	40
HA	1 to 12	340	—	—	20
HD	1 to 12	620	—	—	8

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Descriptors : wrought products, copper products, wire, specifications.

Price based on 5 pages