

# Copper Wire

## Chemical Composition

### COPPER WIRE FOR ELECTRICAL APPLICATIONS

#### COMPOSITION OF Cu-ETP (CW004A) AND Cu-OF (CW008A) COPPER EN 13602

Designation of the material		European Standard (EN)	Composition in % (mass fraction)					Other elements (please see note)	
			Min. Cu	Max. Bi	Max. O	Max. Pb	total max.	excluded	
Symbolic	Numerical	EN							
Cu-ETP	CW004A	EN 13602	99.90	0.0005	0.04	0.005	0.03	Ag, O	
Cu-OF	CW008A	EN 13602	99.95	0.0005	-	0.005	0.03	Ag	

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## COPPER WIRE FOR GENERAL USES

### CHEMICAL COMPOSITION EN 12166

Designation of the material		European Standard (EN)	Composition in % (mass fraction)								Other elements (please see note)		
			Min. Cu	Min. P	Max. P	Min. Be	Max. Be	Max. Co	Max. Fe	Max. Ni	total	excluded	
Symbolic	Numerical	EN											
Cu-DHP	CW024A	EN 12166	99.9 <sup>1)</sup>	0.015	0.04	-	-	-	-	-	-	-	-
Cu-Be2	CW101C	EN 12166	Remainder	-	-	1.8	2.1	0.3	0.2	0.3	-	0.6	

1) Including up to a maximum of 0.015% silver.

NOTE - The total of other elements (other than copper) is defined as the sum of Ag, As, Bi, Cd, Co, Cr, Fe, Mn, Ni, O, P, Pb, S, Sb, Se, Si, Sn, Te and Zn, subject to the exclusion of any individual elements specified.

Cu-ETP, Cu-OF, Cu-DHP, Cu-DHP, CuBe2 copper wire

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## COPPER WIRE: CORROSION RESISTANCE

### COMPOSITION AND MECHANICAL CHARACTERISTICS

At VINCO we are specialists in the supply of high quality wire manufactured with the best materials. In terms of uses and applications, we differentiate between two options:

- Those intended for **electrical applications**, which are governed by the EN 13602 Standard applicable to round and drawn wires with diameters from 0.04 mm up to and including 5.0 mm. This type of wires are intended for the manufacture of electrical conductors for the production of bare and insulated cables and flexible electric strands as specified in the Standard.
- On the other hand, we also have copper wire for **generic applications** as indicated in the EN 12166 Standard.

The **mechanical characteristics** are included in the corresponding section of the product sheet and are differentiated according to the type of application. In the case of copper wires for electrical applications, the diameter, tensile strength and elongation are specified for uncoated wire. The mechanical characteristics detailed for general purpose wires are nominal diameter, tensile strength and conventional yield strength at 0.2%.

## FINISHES AND TOLERANCES

The copper wires we have available at VINCO can be supplied with a variety of surface finishes so that you can make use of the material in different applications: tinned, nickel plated and others under commercial consultation.

In the **tolerances** section of the product data sheet you will find three classifications referring to diameter tolerances and length tolerances: diameter tolerances for round wires are subject to the EN 12166 Standard which applies to general purpose wires made of copper and copper alloys. Diameter tolerances for round and drawn wires intended for the manufacture of electrical conductors are established according to EN 13602. Finally, length tolerances are divided into wires with a length of less than 1000 mm and those between 1000 and 4000 mm.

## COPPER WIRE SUPPLY AND PACKAGING

VINCO offers you a variety of packaging options for copper wires as summarized in the following table:

Packaging format	Maximum weight in kg
Roll	500

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Packaging format	Maximum weight in kg
Coil Z	800
DIN 160 plastic trolley	7
Rods	-

In addition to these packaging options, you can also request at the time of order the type of palletizing that best suits your company's needs: pallet type - square or europallet - together with the orientation of the reels - horizontal or vertical axis. In addition, we provide our customers with protection elements such as covers, VCI damp-proof paper, VCI damp-proof plastic, phytosanitary packaging, maritime packaging and damp-proof bags.

## Equivalentents

EUROPEAN (EN)	AMERICAN ASTM	JAPANESE (JIS)	CHINESE GB
Cu-ETP	C11000	C1100	-
Cu-OF	C10200	C1020	-
Cu-DHP	C12200	C1220 / C1221	-
Cu-Be2	-	-	-

## Mechanical properties

### MECHANICAL PROPERTIES EN 13602

Mechanical properties for wires without coatings

Designations		Metallurgical condition <sup>a)</sup>	Nominal diameter		Tensile strength R <sub>m</sub>	Elongation
			mm		N/mm <sup>2</sup>	At or A <sub>200</sub> mm
Material			above	up to & including	min.	
Symbolic	Numerical					min. %
Cu-ETP Cu-OF	CW004A CW008A	A010	0.04 <sup>b)</sup>	0.08	(200)	10
		A015	0.08	0.16	(200)	15
		A021	0.16	0.32	(200)	21
		A022	0.32	0.50	(200)	22
		A024	0.50	1.00	(200)	24
		A026	1.00	1.50	(200)	26
		A028	1.50	3.00	(200)	28
		A033	3.00	5.00	(200)	33
		R460	0.16	1.12	460	-
		R440	1.12	1.50	440	-
		R430	1.50	2.00	430	-
		R420	2.00	2.40	420	-
		R400	2.40	3.00	400	-
		R390	3.00	3.55	390	-
		R380	3.55	4.00	380	-
		R370	4.00	4.50	370	-
		R360	4.50	5.00	360	-

NOTE - The values in brackets are not required by this standard, they are given for information purposes only.

a) The metallurgical conditions specified as A... fall under the "annealed" category and those specified as R... the "cold drawn" category.

b) Including the value 0.04



## MECHANICAL PROPERTIES EN 12166

Designations		Nominal diameter				Tensile strength Rm		Conventional yield strength at 0.2% Rp 0.2
		mm				N/mm <sup>2</sup>		
Material		Metallurgical condition	from	above	to	min.	max.	N/mm <sup>2</sup>
Symbolic	Numerical							
Cu-DHP	CW024A	M						
		R200	1.5	-	20.0	200	270	(60)
		H040	1.5	-	20.0	-	-	-
		R270	1.0	-	8.0	270	-	(250)
		H065	1.0	-	8.0	-	-	-
		R250	-	8.0	20.0	250	-	(230)
		H055	-	8.0	20.0	-	-	-
		R330	1.0	-	8.0	330	-	(290)
		H090	1.0	-	8.0	-	-	-
		R300	-	8.0	15.0	300	-	(250)
		H090	-	8.0	15.0	-	-	-
		R400	1.0	-	8.0	400	-	(360)
		H105	1.0	-	8.0	-	-	-
		R350	-	8.0	12.0	350	-	(320)
		H105	-	8.0	12.0	-	-	-
		R390	0.2	-	1.0	390	540	(220)
		R410	-	1.0	10.0	410	540	(200)
		H090	0.2	-	10.0	-	-	-
R550	1.0	-	10.0	510	610	(485)		
H120	1.0	-	10.0	-	-	-		

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Designations		Nominal diameter			Tensile strength Rm		Conventional yield strength at 0.2% Rp 0.2 N/mm <sup>2</sup>	
		mm			N/mm <sup>2</sup>			
Material		Metallurgical condition	from	above	to	min.	max.	N/mm <sup>2</sup>
Symbolic	Numerical							
Cu-Be2	CW101C	R580	1.0	-	10.0	580	690	(570)
		H170	1.0	-	10.0	-	-	-
		R750	0.2	-	1.0	750	1140	(929)
		R750	-	1.0	10.0	750	1140	(800)
		H220	0.2	-	10.0	-	-	-
		R1130	0.2	-	1.0	1130	1350	(1090)
		R1100	-	1.0	10.0	1103	1520	(1050)
		H350	0.2	-	10.0	-	-	-
		R1190	1.0	-	10.0	1190	1450	(1150)
		H360	1.0	-	10.0	-	-	-
		R1270	1.0	-	10.0	1270	1450	(1250)
		H370	1.0	-	10.0	-	-	-
		R1310	0.2	-	1.0	1310	1520	(1380)
		H390	0.2	-	1.0	-	-	-
		R1310	-	1.0	10.0	1310	1520	(1300)
		H380	-	1.0	10.0	-	-	-

NOTE 1 - The values in brackets are not required by this standard, they are given for information purposes only.

NOTE 2- 1N/mm<sup>2</sup> equals 1MPa.

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## Finishes

- Can be supplied with a tinned or nickel plated surface finish, or others on request.

## Tolerances

### DIAMETER TOLERANCES OF ROUND WIRE EN12166

Nominal Diameter Value		Tolerances				
above	up to & including	Class A	Class B	Class C	Class D	Class E
-	0.25	± 0.005	-	-	-0.025;0	-0.006;0
0.25	0.5	± 0.005	-	-	-0.03;0	-0.010;0
0.5	1.0	± 0.012	-	-	-0.03;0	-0.014;0
1.0	2.0	± 0.02	-0.10;0	-0.05;0	0.0	-0.025;0
2.0	4.0	± 0.03	-0.10;0	-0.05;0	0.0	-0.025;0
4.0	8.0	± 0.04	-0.12;0	-0.05;0	-0.05;0	-0.030;0
8.0	10.0	± 0.06	-0.15;0	-0.09;0	-0.06;0	-0.035;0
10.0	18.0	± 0.08	-0.18;0	-0.11;0	-0.07;0	-0.040;0

### TOLERANCES 13602

#### Diameter tolerances

nominal diameter		max. diameter tolerance	Max. roundness.
above	up to & including		
0.08	0.25	± 0.003mm	0.006mm
0.25	0.4	± 0.004mm	0.008mm
0.4	5	± 1%	2%

**STANDARD LENGTH TOLERANCES**

NOMINAL LENGTH	TOLERANCE
L < = 1000 mm.	+/- 1 mm.
1000 < L < = 4000	- 0mm. / +3 mm.

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