Comparison table of copper grades and standards by country

China	Germany		Europe		International Standard	USA	Japan
GB	DIN		EN		ISO	UNS	JIS
TU2	OF-Cu	2.0040	Cu-OFE	CW009A	Cu-OF	C10100	C1011
-	SE-Cu	2.0070	Cu-HCP	CW021A	-	C10300	-
-	SE-Cu	2.0070	Cu-PHC	CW020A	-	C10300	-
T2	E-Cu58	2.0065	Cu-ETP	CW004A	Cu-ETP	C11000	C1100
TP2	SF-Cu	2.0090	Cu-DHP	CW024A	Cu-DHP	C12200	C1220
-	SF-Cu	2.0090	Cu-DHP	CW024A	Cu-DHP	C12200	C1220
-	SF-Cu	2.0090	Cu-DHP	CW024A	Cu-DLP	C12200	C1220
TP1	SW-Cu	2.0076	Cu-DLP	CW023A	Cu-DLP	C12000	C1201
H96	CuZn5	2.0220	CuZn5	CE500L	CuZn5	C21000	C2100
H90	CuZn10	2.0230	CuZn10	CW501L	CuZn10	C22000	C2200
H85	CuZn15	2.0240	CuZn15	CW502L	CuZn15	C23000	C2300
H80	CuZn20	2.0250	CuZn20	CW503L	CuZn20	C24000	C2400
H70	CuZn30	2.0265	CuZn30	CW505L	CuZn30	C26000	C2600
H68	CuZn33	2.0280	CuZn33	CW506L	CuZn35	C26800	C2680
H65	CuZn36	2.0335	CuZn36	CW507L	CuZn35	C27000	C2700
H63	CuZn37	2.0321	CuZn37	CW508L	CuZn37	C27200	C2720
HPb63-3	CuZn36Pb1.5	2.0331	CuZn35Pb1	CW600N	CuZn35Pb1	C34000	C3501
HPb63-3	CuZn36Pb1.5	2.0331	CuZn35Pb2	CW601N	CuZn34Pb2	C34200	-
H62	CuZn40	2.0360	CuZn40	CW509N	CuZn40	C28000	C3712
H60	CuZn38Pb1.5	2.0371	CuZn38Pb2	CW608N	CuZn37Pb2	C35000	-
HPb63-3	CuZn36Pb3	2.0375	CuZn36Pb3	CW603N	CuZn36Pb3	C36000	C3601
HPb59-1	CuZn39Pb2	2.0380	CuZn39Pb2	CW612N	CuZn38Pb2	C37700	C3771
HPb58-2.5	CuZn39Pb3	2.0401	CuZn39Pb3	CW614N	CuZn39Pb3	C38500	C3603
-	CuZn40Pb2	2.0402	CuZn40Pb2	CW617N	CuZn40Pb2	C38000	C3771
-	CuZn28Sn1	2.0470	CuZn28Sn1As	CW706R	CuZn28Sn1	C68800	C4430
-	CuZn31Si1	2.0490	CuZn31Si1	CW708R	CuZn31Si1	C44300	-
-	CuZn20Al2	2.0460	CuZn20Al2As	CW702R	CuZn20Al2	C68700	C6870
QSn4-0.3	CuSn4	2.1016	CuSn4	CW450K	CuSn4	C51100	C5111
-	CuSn5	2.1018	CuSn5	CW451K	CuSn5	C51000	C5102
QSn6.5-0.1	CuSn6	2.1020	CuSn6	CW452K	CuSn6	C51900	C5191
QSn8-0.3	CuSn8	2.1030	CuSn8	CW453K	CuSn8	C52100	C5210
BZn12-24	CuNi12Zn24	2.0730	CuNi12Zn24	CW403J	CuNi12Zn24	C75700	-
BZn12-26	CuNi18Zn27	2.0742	CuNi18Zn27	CW410J	CuNi18Zn27	C77000	C7701
BZn18-18	CuNi18Zn20	2.0740	CuNi18Zn20	CW409J	CuNi18Zn20	C76400	C7521
-	CuNi10Fe1Mn	2.0872	CuNi10Fe1Mn	CW352H	CuNi10Fe1Mn	C70600	C7060
-	CuNi30Mn1Fe	2.8820	CuNi30Mn1Fe	CW354H	CuNi30Mn1Fe	C71500	C7150

Copper Alloy Grade Comparison Table

一、 Lead brass grade comparison table

Chinese Brand	Japanese Brand	German Brand	American Brand	UK Brand
HPb59-1	C3710	CuZn40Pb2	C37000	CZ120
HPb59-3	C3561	CuZn40Pb3	C37710	CZ121Pb3
HPb60-2	C3771	CuZn39Pb2	C37700	CZ120
HPb62-2	C3713	CuZn38Pb2	C35300	CZ119
HPb62-3	C3601	CuZn36Pb3	C36000	CZ124
HPb63-3	C3560	CuZn36Pb3	C35600	CZ124

二、 Comparison table of common brass grades

Chinese Brand	Janpanese Brand	German Brand	American Brand	UK Brand
H59	C2800	CuZn40	C28000	CZ109
H62	C2720	CuZn40	C27400	CZ109
H65	C2680	CuZn35	C27000	CZ107
H68	C2600	CuZn30	C26000	CZ106
H70	C2600	CuZn30	C26000	CZ106
H80	C2400	CuZn20	C24000	CZ103
H85	C2300	CuZn15	C23000	CZ102
H90	C2200	CuZn10	C22000	CZ101
H96	C2100	CuZn5	C21000	--

三、Copper Grade Comparison Table

Name	Chinese Brand	Japanese Brand	German Brand	American Brand	UK Brand
Oxygen-free copper No.0	TU0	C1011	--	C10100	C110
Oxygen-free copper No.1	TU1	C1020	OF-Cu	C10200	C103
Oxygen-free copper No.2	TU2	C1020	OF-Cu	C10200	C103
Copper No. 1	T1	C1020	OF-Cu	C10200	C103
Copper No. 2	T2	C1100	SE-Cu	C11000	C101
Copper No. 3	T3	C1221	--	--	--
Phosphorus deoxidized copper No.1	TP1	C1201	SW-Cu	C12000	--
Phosphorus deoxidized copper No. 2	TP2	C1220	SF-Cu	C12000	--

Chemical composition of common copper alloy grades--Chinese grades

一、Lead Brass Series

Brand	Main Ingredients			Impurity ingredients %		Total impurities %
	Cu	Pb	Zn	Fe	Ni	
HPb59-1	57-60	0.8-1.9	Remaining quantity	≤0.5	≤1.0	≤1.0
HPb59-2	57.5-59.5	2.0-2.8	Remaining quantity	≤0.5	--	≤1.2
HPb59-3	57.5-59.5	2.0-3.0	Remaining quantity	≤0.5	≤0.5	≤1.2
HPb60-2	58-61	1.5-2.5	Remaining quantity	≤0.3	-	-
HPb62-2	60-63	1.5-2.5	Remaining quantity	≤0.15	-	-
HPb62-3	60-63	2.5-3.7	Remaining quantity	≤0.35	-	-
HPb63-3	62-65	2.4-3.0	Remaining quantity	≤0.1	≤0.5	≤0.75

二、Ordinary Brass Series

Main Ingredients	Impurity ingredients %			Total impurities %		
	Cu	Zn	Pb		Fe	Ni
H59	57-60	Remaining quantity	≤0.5	≤0.3	≤0.5	≤1.0
HP62	57-60	Remaining quantity	≤0.08	≤0.15	≤0.5	≤0.5
H65	63.5-68	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.3
H68	67-70	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.3
H70	68.5-71.5	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.3
H80	79-81	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.3
H85	84-86	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.3
H90	88-91	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.2
H96	95-97	Remaining quantity	≤0.03	≤0.1	≤0.5	≤0.2

三、Pure Copper Series

Name	Code	Cu+Ag	P	Ag	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn	O
Copper No.1	T1	99.95	0.001	-	0.001	0.002	0.002	0.005	0.002	0.003	0.002	0.005	0.005	0.02
Copper No.2	T2	99.90	-	-	0.001	0.002	0.002	0.005	-	0.005	-	0.005	-	-
Copper No.3	T3	99.70	-	-	0.002	-	-	-	-	0.01	-	-	-	-
Oxygen-free copper	TU0	99. 99	0.0003	0.0025	0.0001	0.0004	0.0005	0.0010	0.0010	0.0005	0.0002	0.0015	0.0001	0.0005
		Se: 0.001; Te: 0.001; Cd: 0.0001												
No. 1 oxygen-free copper	TU1	99.97	0.002	-	0.001	0.002	0.002	0.004	0.002	0.003	0.002	0.004	0.003	0.002
No.2 oxygen-free copper	TU2	99.95	0.002	-	0.001	0.002	0.002	0.004	0.002	0.004	0.002	0.004	0.003	0. 003
No.1 Phosphorus Deoxidized Copper	TP1	99.90	0.004-0.012	-	-	-	-	-	-	-	-	-	-	-
No.2 Phosphorus Deoxidized Copper	TP2	99.9	0.015-0.020	-	-	-	-	-	-	-	-	-	-	-

Chemical composition of commonly used copper alloy grades--Japanese grades

一、Lead Brass Series

Brand	Main Ingredients			Impurity ingredients %		Total impurities %	Corresponding Chinese brand
	Cu	Pb	Zn	Fe	Sn		
C3601	59.0-63.0	1.8-3.7	Remaining quantity	≤0.3	Fe+Sn≤0.5	≤1.0	HPb62-3
C3602	59.0-63.0	1.8-3.7	Remaining quantity	≤0.5	Fe+Sn≤1.2	≤1.2	HPb60-2
C3603	57.0-61.0	1.8-3.7	Remaining quantity	≤0.35	Fe+Sn≤0.6	≤1.2	HPb60-2
C3604	57.0-61.0	1.8-3.7	Remaining quantity	≤0.5	Fe+Sn≤1.2	-	HPb59-3
C3605	56.0-60.0	3.5-4.5	Remaining quantity	≤0.5	Fe+Sn≤1.2	-	HPb59-3
C3771	57.0-61.0	1.0-2.5	Remaining quantity	Fe+Sn≤1.0		-	HPb59-1

二、 Ordinary Brass Series

Brand	Main Ingredients		Impurity ingredients %			Total impurities %	Corrsponding Chinese brand
	Cu	Zn	Pb	Fe	Ni		
C2800	59-62	Remaining quantity	≤0.07	≤0.1	--	--	H59
C2720	62-64	Remaining quantity	≤0.07	≤0.07	--	--	HP62
C2700	63-67	Remaining quantity	≤0.05	≤0.05	--	--	H65
C2680	64-68	Remaining quantity	≤0.05	≤0.05	Bi≤0.002	Sb≤0.005	H68
C2600	68.5-71.5	Remaining quantity	≤0.05	≤0.05	--	--	H70
C2400	78.5-81.5	Remaining quantity	≤0.05	≤0.05	--	--	H80
C2300	84-86	Remaining quantity	≤0.05	≤0.05	--	--	H85
C2200	89-91	Remaining quantity	≤0.05	≤0.05	--	--	H90
C2100	94-96	Remaining quantity	≤0.05	≤0.05	--	--	H96

三、 Purple Copper Series

Brand	Chemical Composition %													Corraponding Chinese brand
	Cu+Ag	P	Ag	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn	O	
C1020	99.96	-	-	-	-	-	-	-	-	-	-	-	-	T1
C1100	99.90	-	-	-	-	-	-	-	-	-	-	-	-	T2
C1221	99.75	0.004-0.04	-	-	-	-	-	-	-	-	-	-	-	T3
C1011	99. 99	0.0003	-	0.001	-	-	-	-	0.001	-	0.0018	0.0001	0.001	TU0
		Hg:0.0001; Se: 0.001; Te: 0.001; Cd: 0.0001												
C1020	99.96	-	-	-	-	-	-	-	-	-	-	-	-	TU1、TU2
C1201	99.90	0.004-0.015	-	-	-	-	-	-	-	-	-	-	-	TP1
C1220	99.90	0.015-0.040	-	-	-	-	-	-	-	-	-	-	-	TP2

Chemical composition of common copper alloy grades--German grades

一、Lead Brass Series

Brand	Code	Main Ingredients			Impurity ingredients %				Total impurities %	Corraponding Chinese brand
		Cu	Pb	Zn	Fe	Al	Ni	Sn		
CuZn36Pb3	--	60-62	2.5-3.5	Remaining quantity	≤0.3	≤0.05	≤0.3	≤0.2	≤0.2	HPb62-3
CuZn39Pb2	CW612N	58.5-60	1.5-2.5		≤0.4	--	≤0.3	≤0.2	≤0.2	HPb60-2
CuZn39Pb3	CW614N	57-59	2.5-3.5		≤0.5	≤0.1	≤0.5	≤0.4	≤0.2	HPb59-3
CuZn40Pb2	CW617N	57-59	1.5-2.5		≤0.4	≤0.1	≤0.4	≤0.3	≤0.2	HPb59-1

二、 Ordinary Brass Series

Brand	Main Ingredients		Impurity ingredients %					Total impurities %	Corraponding Chinese brand
	Cu	Zn	Pb	Fe	Al	Sn	Ni		
CuZn40 2.0360	59.5-61	Remaining quantity	≤0.3	≤0.2	≤0.05	≤0.2	≤0.3	≤0.2	H59
CuZn37 2.0321	62-64		≤0.1	≤0.1	≤0.03	≤0.1	≤0.3	≤0.1	HP62
CuZn33 2.0280	66-68.5		≤0.05	--	--	≤0.05	--	≤0.1	H65
CuZn30 2.0265	69-71		≤0.05	--	--	≤0.05	--	≤0.1	H68、H70
CuZn20 2.0250	78.5-81.5		≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H80
CuZn15 2.0240	84-86		≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H85
CuZn10 2.0230	89-91		≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H90
CuZn5 2.0220	94-96		≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H96

三、Purple Copper Series

Brand	Chemical Composition %													Corraponding Chinese brand
	Cu+Ag	P	Ag	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn	O	
OF-Cu .0040	99.95	-	-	-	-	-	-	-	-	-	-	-	-	T1、TU1
SE-Cu2.0070	99.90	0.003	-	-	-	-	-	-	-	-	-	-	-	T2
SW-Cu2.0076	99.90	0.005-0.014	-	-	-	-	-	-	-	-	-	-	-	TP1
SW-Cu2.0076	99.90	0.015-0.040	-	-	-	-	-	-	-	-	-	-	-	TP2

Chemical composition of common copper alloy grades--German grades

一、Lead Brass Series

Brand	Code	Main Ingredients			Impurity Ingredients %				Total Impurities %	Corraponding Chinese brand
		Cu	Pb	Zn	Fe	Al	Ni	Sn		
CuZn36Pb3	--	60-62	2.5-3.5	Remaining quantity	≤0.3	≤0.05	≤0.3	≤0.2	≤0.2	HPb62-3
CuZn39Pb2	CW612N	58.5-60	1.5-2.5		≤0.4	--	≤0.3	≤0.2	≤0.2	HPb60-2
CuZn39Pb3	CW614N	57-59	2.5-3.5		≤0.5	≤0.1	≤0.5	≤0.4	≤0.2	HPb59-3
CuZn40Pb2	CW617N	57-59	1.5-2.5		≤0.4	≤0.1	≤0.4	≤0.3	≤0.2	HPb59-1

二、Ordinary Brass Series

Brand	Main Ingredients		Impurity Ingredients %					Total Impurities %	Corraponding Chinese brand
	Cu	Zn	Pb	Fe	Al	Sn	Ni		
CuZn40 2.0360	59.5-61	Remaining quantity	≤0.3	≤0.2	≤0.05	≤0.2	≤0.3	≤0.2	H59
CuZn37 2.0321	62-64	Remaining quantity	≤0.1	≤0.1	≤0.03	≤0.1	≤0.3	≤0.1	HP62
CuZn33 2.0280	66-68.5	Remaining quantity	≤0.05	--	--	≤0.05	--	≤0.1	H65
CuZn30 2.0265	69-71	Remaining quantity	≤0.05	--	--	≤0.05	--	≤0.1	H68、H70
CuZn20 2.0250	78.5-81.5	Remaining quantity	≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H80
CuZn15 2.0240	84-86	Remaining quantity	≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H85
CuZn10 2.0230	89-91	Remaining quantity	≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H90
CuZn5 2.0220	94-96	Remaining quantity	≤0.05	≤0.05	≤0.02	≤0.05	≤0.2	≤0.1	H96

三、 Purple Copper Series

Brand	Chemical Compositions,%													Corrapo nding Chinese Brand
	Cu+Ag	P	Ag	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn	O	
OF-Cu .0040	99.95	-	-	-	-	-	-	-	-	-	-	-	-	T1、TU1
SE-Cu2.0070	99.90	0.003	-	-	-	-	-	-	-	-	-	-	-	T2
SW-Cu2.0076	99.90	0.005-0.014	-	-	-	-	-	-	-	-	-	-	-	TP1
SW-Cu2.0076	99.90	0.015-0.040	-	-	-	-	-	-	-	-	-	-	-	TP2

Chemical composition of common copper alloy grades--American grades

一、Lead Brass Series

Brand	Main Ingredients			Impurity Ingredients %		Impurity Ingredients	Corranding Chinese Brand
	Cu	Pb	Zn	Fe	Sn		
C35300	60-63	1.5-2.5	Remaining quantity	≤0.15	--	--	HPb62-2
C36000	60-63	2.5-3.7		≤0.35	--	--	HPb62-3
C37700	58-61	1.5-2.5		≤0.30	--	--	HPb60-2
C38500	55-60	2.0-3.8		≤0.35	--	--	HPb59-3

二、 Ordinary Brass Series

Brand	Main Ingredients		Impurity Ingredients %			Total Impurities %	Corraponding Chinese brand
	Cu	Zn	Pb	Fe	Ni		
C28000	59-63	Remaining quantity	≤0.3	≤0.07	--	--	H59
C27400	61-64		≤0.10	≤0.05	--	--	HP62
C27000	63-68.5		≤0.10	≤0.07	--	--	H65
C26000	68.5-71.5		≤0.07	≤0.05	--	--	H68、H70
C24000	78.5-81.5		≤0.05	≤0.05	--	--	H80
C23000	84-86		≤0.05	≤0.05	--	--	H85
C22000	89-91		≤0.05	≤0.05	--	--	H90
C21000	94-96		≤0.03	≤0.05	--	--	H96

三、Purple Copper Series

Brand	Chemical Compositions,%													Corrapo nding Chinese Brand
	Cu+Ag	P	Ag	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn	O	
C10200	99.95	-	-	-	-	-	-	-	-	-	-	-	0.0010	T1
C11000	99.90	-	-	-	-	-	-	-	-	-	-	-	-	T2
C10100	99.99	0.0003	0.0025	0.001	0.0004	0.0005	0.0010	0.0010	0.0005	0.0005	0.0015	0.0001	0.0005	TU0
	Hg: 0.0001, Se: 0。0003, Te: 0.0002, Mn: 0.00005, Cd: 0.0001													
C10200	99.95	-	-	-	-	-	-	-	-	-	-	-	0.001	TU1、TU2
C12000	99.90	0.004-0.012	-	-	-	-	-	-	-	-	-	-	-	TP1
C12200	99.90	0.015-0.040	-	-	-	-	-	-	-	-	-	-	-	TP2

Chemical composition of common copper alloy grades--British grades

一、Lead Brass Series

Brand	Main Ingredients %			Impurity Ingredients %		Total Impurities %	Corraponding Chinese Brand
	Cu	Pb	Zn	Fe	Sn		
CZ120	58-60	1.5-2.5	Remaining quantity	--	--	≤0.3	HPb59-1、HPb60-2
CZ121Pb3	56.5-58.5	2.5-3.5		≤0.3	--	≤0.7	HPb59-3
CZ119	61-64	1. 0-2.5		--	--	≤0.3	HPb62-2
CZ124	60-63	2.5-3.7		≤0.3	--	≤0.5 (Except iron)	HPb62-3、HPb63-3

二、 Ordinary Brass Series

Brand	Main Ingredients %		Impurity Ingredients %			Total Impurities %	Corraponding Chinese Brand
	Cu	Zn	Pb	Fe	Ni		
CZ109	59-62	Remaining quantity	≤0.1	--	--	0.3 (Except Pb)	H59、HP62
CZ107	64-67		≤0.1	≤0.1	--	0.4	H65
CZ106	68.5-71.5		≤0.05	≤0.05	--	0.3	H68、H70
CZ103	79-81		≤0.05	≤0.1	--	0.4	H80
CZ102	84-86		≤0.05	≤0.1	--	0.4	H85
CZ101	89-91		≤0.05	≤0.1	--	0.4	H90

三、 Purple Copper Series

Brand	Chemical Compositions,%													Corrapond ing Chinese Brand
	Cu+Ag	P	Ag	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn	O	
C103	99.95	-	-	0.001	-	-	-	-	0.005	-	Total impurities <0.03 (except O and Ag)			T1、TU1
C101	99.90	-	-	0.001	-	-	-	-	0.005	-	Total impurities <0.03 (except O and Ag)			T2
C110	99.99	-	-	-	-	-	-	-	0.0010	-	Total impurities <0.0050			TU0

British standard chemical composition comparison table

Standard Number: BSG017-1981

Brand	Chemical composition (mass fraction) (%) not more than (except for those with specified margin and range)					
	Cu	Pb	Fe	Zn	Other Elements	Total Impurities
CZ101	89.0 - 91.0	0.05	0.1	Remaining quantity	-	0.4
CZ102	84.0 - 86.0	0.05			-	0.4
CZ103	79.0 - 81.0	0.05	0.1		-	0.4
CZ104	79.0 - 81.0	0.05	-		-	0.6
CZ105	70.0 - 73.0	0.075	-		As0.02 - 0.06	0.3
CZ106	68.5 - 71.5	0.05	0.05		-	0.3
CZ107	64.0 - 67.0	0.1	0.1			0.4
CZ108	62.0 - 65	0.3	0.2	Remaining quantity	-	0.5 (except Pb)
CZ109	59.0 - 62.0	0.1	-		Sb0.02 (if necessary)	0.3 (except Pb)
CZ110	76.0 - 78.0	0.04	0.06		Al1.80 - 2.30 As0.02 - 0.05	0.3
CZ111	70.0 - 73.0	0.075	0.06		As0.02 - 0.06 Sn1.0 - 1.5	0.3
CZ112	61.0 - 63.5	-	-		Sn1.0 - 1.4	0.75
CZ113	57.5 - 60.5	-	-	Remaining quantity	Sn0.6 - 1.25	0.75
CZ114	56.5 - 58.5	0.5 - 1.5	0.3 - 1.0		Sn0.2 - 0.8、Al1.5、Mn0.5 - 2.0	0.5 (excluding Al)
CZ115	56.5 - 58.5	0.5 - 1.5	0.3 - 1.0		Sn0.2 - 0.8、Al0.1、Mn0.5 - 2.0	0.5
CZ116	64.0 - 68.0	-	0.25 - 1.2		Al4.0 - 5.0、Mn0.3 - 2.0	0.5
CZ118	63.0 - 66.0	0.75 - 1.5	-		-	0.3
CZ119	61.0 - 64.0	1.0 - 2.5	-		-	0.3
CZ120	58.0 - 60.0	1.5 - 2.5	-		-	0.3
CZ121Pb3	56.5 - 58.5	2.5 - 3.5	0.3	Remaining quantity	-	0.7
CZ121Pb4	56.8 - 58.5	3.5 - 4.5	0.3		-	0.7
CZ122	56.5 - 58.5	1.5 - 2.5	0.3		-	0.7
CZ123	59.0 - 62.0	0.3 - 0.8	-		-	0.3
CZ124	60.0 - 63.0	2.5 - 3.7	0.3		-	0.5 (excluding Fe)
CZ125	95.0 - 98.0	0.02	0.05		-	0.25
CZ126	69.0 - 71.0	0.07	0.06		As0.02 - 0.06	0.3
CZ128	58.5 - 61.0	1.5 - 2.5	0.2		-	0.5
CZ129	58.5 - 61.0	0.8 - 1.5	0.2		-	0.5
CZ130	55.5 - 57.5	2.5 - 3.5	-		Al0.5	0.7 (excluding Al)
CZ131	61.0 - 63.0	1.5 - 2.5	0.2		-	0.5
CZ132	60.0 - 63.0	1.7 - 2.8	0.2	35.0 - 37.0	Sn0.2、	0.5

				Remaining quantity	As0.08－0.15	
CZ133	59.0－62	0.2	0.1		Sn0.5－1.0	0.4
CZ134	59.0－62.0	1.3－2.2	0.1		Sn0.5－1.0	0.2
CZ135	57.0－60.0	0.8	0.5		Sn0.3、Al1.0－2.0 Ni0.2、Mn1.5－3.5 Si0.3－1.3	0.5 (excluding Sn, Pb, Fe, Ni)
CZ136	56.0－59.0	3	－		Mn0.5－1.5	0.7 (excluding Pb)
CZ137	58.5－1.0	0.3－0.8	0.2		－	0.5

European material standard (EN12164) chemical composition

Ingredient brand	Cu	Al	Fe	Ni	Pb	Sn	Zn	Other	Density (g/cm3)
CuZn36Pb3 (CW603N)	60-62	≤0.05	≤0.3	≤0.3	2.5-3.5	≤0.2	Remaining quantity	0.2	8.5
CuZn38Pb4 (CW609N)	57-59	≤0.05	≤0.3	≤0.3	3.5-4.2	≤0.3		0.2	8.4
CuZn39Pb3 (CW614N)	57-59	≤0.05	≤0.3	≤0.3	2.5-3.5	≤0.3		0.2	8.4
CuZn40Pb2 (CW617N)	57-59	≤0.05	≤0.3	≤0.3	1.6-2.5	≤0.3		0.2	8.4
CuZn37Pb2 (CW606N)	61-62	≤0.05	≤0.2	≤0.3	1.6-2.5	≤0.2		0.2	8.4
CuZn38Pb2 (CW608N)	60-61	≤0.05	≤0.2	≤0.3	1.6-2.5	≤0.2		0.2	8.4
CuZn39Pb2 (CW612N)	59-60	≤0.05	≤0.3	≤0.3	1.6-2.5	≤0.3		0.2	8.4
CuZn35Pb1 (CW600N)	62.5-64	≤0.05	≤0.1	≤0.3	0.9-1.6	≤0.1		≤0.1	8.5
CuZn35Pb2 (CW601N)	62-63.5	≤0.05	≤0.1	≤0.3	1.6-2.5	≤0.1		≤0.1	8.5
CuZn38Pb1 (CW607N)	60-61	≤0.05	≤0.2	≤0.3	0.8-1.8	≤0.2		≤0.2	8.4
CuZn39Pb0.5(CW610N)	59-60.5	≤0.05	≤0.2	≤0.3	0.2-0.8	≤0.2		≤0.2	8.4
CuZn39Pb1 (CW611N)	59-60	≤0.05	≤0.2	≤0.3	0.8-1.6	≤0.2		≤0.2	8.4
CuZn36Pb2As(CW602N)	61-63	≤0.05	≤0.1	≤0.3	1.7-2.8	≤0.1		≤0.2	8.4

Note: CuZn36Pb2As (CW602N) As content: 0.02-0.05; Mn content <0.1.

Analysis of Common Defects of Copper Alloy Tubes and Rods

1. Overheating and overburning

Definition:
In the process of heating or processing metal, due to high temperature and long time, the island structure and grain enlargement phenomenon is called overheating. In severe overheating, the low melting point components between grains will not melt or the grain boundary will weaken, which is called overburning.

Causes:
a. High heating temperature, long time or long time in the high temperature source;
b. The temperature at the end of hot extrusion is too high or the stay time in the high temperature zone is long;
c. There are many low melting point components or low melting point impurities in the alloy.

2. Cracks or cracks

Definition:
Continuous or intermittent irregular cracks appear on the surface of tubes and rods. Slight cracks are called cracks, while severe cracks are called cracks.

Causes:
a. There are cracks, inclusions, shrinkage cavities, looseness, cold shuts or other harmful impurities in the ingot or the crystal structure and chemical composition are seriously uneven;
b. There is a large stress in the ingot or the processing technology is improper to produce a large stress;
c. The extrusion speed is too fast and the processing rate is too large;
d. The heat treatment process is improper, and the processing or heat treatment is in the brittle temperature zone of the material.

3. Tail shrinkage

Definition:
Tail shrinkage is a special defect at the tail of the extruded product. At the end of extrusion, due to metal turbulence, the oxide scale on the surface of the ingot, lubricants and other contaminants often flow into it,leading to stratification between the metals.

Causes:

a. The metal flow at the tail of the extrusion is turbulent;
b. There are defects on the surface and sub-surface of the ingot, and there are contaminants such as lubricants in the extrusion barrel.

4. Bubbling

Definition:
After extrusion, drawing and return, the surface of the product bulges in the form of elongated strips along the processing direction, and after dissection, it becomes a cavity. This bulging is called bubbling. Bubbles are mostly long strips with smooth surfaces and metallic luster inside. Some of them are accompanied by oxides or other inclusions.

Causes:
a. There are defects such as pores, shrinkage holes, and inclusions in the ingot, which form stratification along the processing direction after extrusion, stretching, and cold rolling;
b. Excessive lubricant in the extrusion barrel;
c. The shrinkage tail of the extruded product is not cut off cleanly, and stratification is formed after further stretching.

5. Dezincification

Definition:
After annealing or pickling of zinc-containing copper alloy tubes, rods and wires, gray or reddish spots appear on the surface, which is called dezincification. The above spots appear slightly, and severe dezincification causes microscopic structural changes.

Causes:
a. The annealing temperature is too high, and the flame is directly sprayed onto the surface of the product, causing the standard zinc to melt, volatilize or oxidize;
b. The extrusion temperature is too high;
c. During pickling, the acid concentration is too high and the pickling time is too long, causing surface dezincification;
d. Under the action of environmental media, chemical or electrochemical reactions occur to form dezincification.

6. Pockmarks (commonly known as pits and sand eyes)

Definition:
The rough surface with tiny dot-shaped depressions on the surface of tube, rod and wire is called pitting. The pitting is distributed locally, periodically or in pieces. Individual pitting is called pitting, and serious pitting is called pitting.

Causes:
a. High annealing temperature and long time lead to coarse grains, and severe dezincification during annealing of zinc-containing copper alloy;
b. Over-pickling;
c. Too low processing rate and rough surface;
d. The surface of processing equipment or tools is not smooth, foreign matter sticks, and it is formed after contact with the material.

7. Surface annular marks

Definition:
The surface or inner wall of the tube and rod type wire has periodic annular protrusions, which are called surface annular marks, commonly known as bamboo joints.
Surface annular marks are produced in the stretching, peeling and straightening processes. The annular marks are generally smooth, and the edges of individual protrusions are angular. During the straightening process, special annular protrusions appear along the 450 direction.

Causes:
a. The cause of the stretching annular marks is uneven annealing temperature, poor process and lubrication, and incomplete pickling;
b. The cause of the peeling annular marks is unreasonable design of the peeling die and inappropriate stretching speed ; or the edge of the peeling die is not sharp, and the chip removal resistance is large;
c. The cause of the straightening annular marks is improper roller angle adjustment or excessive pressure.

Commonly processed copper alloy grades and uses

▲ Ordinary brass, 6 common grades

1. H96, used for condenser tubes, radiators, heat sinks and conductive parts.
2. H80, used for thin-walled tubes, bellows, etc.
3. H70, used for mechanical and electrical parts, etc.
4. H68, used for complex cold stamping parts, deep stamping parts, radiator shells, etc.
5. H65, used for small hardware, small springs, screws and machine parts, etc.
6. H62, used for rivets, pins, conduits, nuts, etc.

▲ Lead brass, 3 common grades

1. HPb63-2, used for general strength mechanical parts.
2. HPb61-1, used for high strength structural parts.
3. HPb59-1, used for hot stamping and cutting parts, such as pins, screws, etc.

▲ Manganese brass, 2 common grades

HMn58-2 and HMn57-3-1, mainly used for parts in corrosive conditions and weak current industry.

▲ Tin brass, 3 common grades

1. HSn90-1, used for elastic sleeves and other corrosion-resistant and friction-reducing parts of automobiles and tractors.
2. HSn70-1, high-temperature corrosion-resistant condenser tubes and conduits in ships and power plant equipment.
3. HSn62-1, used for parts that are in contact with seawater and gasoline.

▲ Iron brass, 2 common grades

1. HFe59-1-1, used for parts that work under friction and corrosion, such as washers, bushings, etc.
2. HFe58-1-1, used for high-strength corrosion-resistant parts for hot pressing and cutting.

▲ Nickel brass

Hni65-5, used for pressure gauge tubes, condenser tubes and papermaking mesh, etc.

▲ Tin bronze, 5 common grades

1. QSn4-3, corrosion-resistant and wear-resistant parts, anti-magnetic components and springs, etc.
2. QSn4-4-2.5, parts subject to friction, such as sleeves, bearings, discs, etc.
3. QSn6.5-0.1, spring contact pieces, wear-resistant and anti-magnetic parts in precision instruments.
4. QSn6.5-0.4, used for papermaking copper mesh, springs, wear-resistant parts, etc.
5. QSn7-0.2, used for workpieces subject to friction, such as bearing worm gears and springs, etc.

▲ Aluminum bronze, 5 common grades

1. QAI5, used for corrosion-resistant elastic elements.
2. QAI9-2, pipe fittings working in steam below 250℃.
3. QAI9-4, used for bearings, gears, valve seats, ship parts and electrical components.
4. QAI7, used for gears, friction wheels, worm gear transmission mechanisms, etc.
5. QAI10-3-1.5, used for wear-resistant parts working at high temperatures, such as bearings, gears, flywheels, etc.

▲ Beryllium bronze, 2 common grades

1. Qbe1.7, used for important springs, sensitive components of precision instruments, etc.

2. Qbe2, used for important elastic components, bearings under high-speed and high-temperature working conditions.

▲ Silicon bronze, 2 common grades

1. QSi1-3, used for friction parts working below 300℃, such as intake and exhaust valve guide sleeves.

2. Qsi3-1, used for springs, worm wheels, worm gears and corrosion-resistant parts, etc.

▲ Manganese bronze

QMn5, commonly used to manufacture steam engine parts and various pipe joints of worm wheels, steam valves and other high-temperature corrosion-resistant parts.