BRONMETAL

Alloys

COPPER-ZINC ALLOYS

Material Designation		Chemical Composition in % (m/m)									Density g/cm^3
Symbolic	Numerical	Elemento	Cu	Al	Fe	Ni	Pb	Sn	Zn	total others	approx.
CuZn10	**CW501L**	min.	89,0	–	–	–	–	–	Rest	–	8,8
		max.	91,0	0,02	0,05	0,3	0,05	0,1	–	0,1	
CuZn15	**CW502L**	min.	84,0	–	–	–	–	–	Rest	–	8,8
		max.	86,0	0,02	0,05	0,3	0,05	0,1	–	0,1	
CuZn20	**CW503L**	min.	79,0	–	–	–	–	–	Rest	–	8,7
		max.	81,0	0,02	0,05	0,3	0,05	0,1	–	0,1	
CuZn30	**CW505L**	min.	69,0	–	–	–	–	–	Rest	–	8,5
		max.	71,0	0,02	0,05	0,3	0,05	0,1	–	0,1	
CuZn36	**CW507L**	min.	63,5	–	–	–	–	–	Rest	–	8,4
		max.	65,5	0,02	0,05	0,3	0,05	0,1	–	0,1	
CuZn37	**CW508L**	min.	62,0	–	–	–	–	–	Rest	–	8,4
		max.	64,0	0,05	0,1	0,3	0,1	0,1	–	0,1	

COPPER-ZINC-LEAD ALLOYS

BRONMETAL

Material Designation		Chemical Composition in % (m/m)									Density g/cm³
Symbolic	Numerical	Elemento	Cu	Al	Fe	Ni	Pb	Sn	Zn	total others	approx.
CuZn35Pb1	CW600M	min.	62,5	–	–	–	0,8	–	Rest	–	8,5
		max.	64,0	0,05	0,1	0,3	1,6	0,1	–	0,1	
CuZn35Pb2	CW601N	min.	62,0	–	–	–	1,6	–	Rest	–	8,5
		max.	63,5	0,05	0,1	0,3	2,5	0,1	–	0,1	
CuZn36Pb3	CW603N	min.	60,0	–	–	–	2,5	–	Rest	–	8,5
		max.	62,0	0,05	0,3	0,3	3,5	0,2	–	0,2	
CuZn37Pb2	CW606N	min.	61,0	–	–	–	1,6	–	Rest	–	8,4
		max.	62,0	0,05	0,2	0,3	2,5	0,2	–	0,2	
CuZn38Pb2	CW608N	min.	60,0	–	–	–	1,6	–	Rest	–	8,4
		max.	61,0	0,05	0,2	0,3	2,5	0,2	–	0,2	
CuZn38Pb4	CW609N	min.	57,0	–	–	–	3,5	–	Rest	–	8,4
		max.	59,0	0,05	0,3	0,3	4,2	0,3	–	0,2	
CuZn39Pb0,5	CW610N	min.	59,0	–	–	–	0,2	–	Rest	–	8,4
		max.	60,5	0,05	0,2	0,3	0,8	0,2	–	0,2	
CuZn39Pb2	CW612N	min.	59,0	–	–	–	1,6	–	Rest	–	8,4
		max.	60,0	0,05	0,3	0,3	2,5	0,3	–	0,2	
CuZn39Pb3	CW614N	min.	57,0	–	–	–	2,5	–	Rest	–	8,4
		max.	59,0	0,05	0,3	0,3	3,5	0,3	–	0,2	

BRONMETAL

Material Designation		Chemical Composition in % (m/m)									Density g/cm³
Symbolic	Numerical	Elemento	Cu	Al	Fe	Ni	Pb	Sn	Zn	total others	approx.
CuZn40Pb2	CW617N	min.	57,0	–	–	–	1,6	–	Rest	–	8,4
		max.	59,0	0,05	0,3	0,3	2,5	0,3	–	0,2	

BRONMETAL

Technical characteristics

COPPER-ZINC

Designations			Nominal Diameter			Tensile Strength R_m N/mm²		Proof stress of 0,2% $R_{p0,2}$ N/mm² approx.	Elongation			Hardness HV		Previous Designation of Metallurgical State (only for informative purposes)
Material			from	greather than	up to and including	min.	max.		A_{100mm} % min.	$A_{11,3}$ % min.	A % min.	min.	max.	
Symbolic	Numerical	Metallurgical State												
		M	All Measurements			Rough Manufacture								
CuZn10	CW501L	R290	0,1	–	0,5	290	390	(140)	(25)	–	–	–	–	annealed
		R280	–	0,5	1,5	280	380	(130)	30	–	–	–	–	
		R270	–	1,5	4	270	370	(130)	35	–	–	–	–	
		H070	1,5	–	4	–	–	–	–	–	–	70	120	
		R240	–	4	20	240	340	(120)	–	35	40	–	–	
		R380	0,5	–	1,5	380	480	(260)	(8)	–	–	–	–	1/4 hard
		R350	–	1,5	4	350	450	(240)	(12)	–	–	–	–	
		H115	1,5	–	4	–	–	–	–	–	–	115	145	
		R330	–	4	20	330	430	(230)	–	(15)	(20)	–	–	
		H105	–	4	20	–	–	–	–	–	–	105	135	
		R470	0,5	–	1,5	470	570	(390)	–	–	–	–	–	1/2 hard
		R440	–	1,5	4	440	540	(370)	–	–	–	–	–	
		H135	1,5	–	4	–	–	–	–	–	–	135	165	
		R410	–	4	20	410	510	(350)	–	–	–	–	–	
		H125	–	4	20	–	–	–	–	–	–	125	155	
		R570	0,5	–	1,5	570	–	(560)	–	–	–	–	–	hard
		R530	–	1,5	4	530	–	(520)	–	–	–	–	–	
		H155	1,5	–	4	–	–	–	–	–	–	155	–	

BRONMETAL

Designations			Nominal Diameter			Tensile Strength R_m N/mm²		Proof stress of0,2% $R_{p0,2}$ N/mm² approx.	Elongation			Hardness HV		Previous Designation of Metallurgical State (only for informative purposes)
Material			from	greather than	up to and including	min.	max.		A_{100mm} % min.	$A_{11,3}$ % min.	A % min.	min.	max.	
Symbolic	Numerical	Metallurgical State												
		M	All Measurements											Rough Manufacture
		R310	0,1	–	0,5	310	410	(140)	(25)	–	–	–	–	annealed
		R300	–	0,5	1,5	300	400	(140)	25	–	–	–	–	
		R290	–	1,5	4	290	390	(140)	30	–	–	–	–	
		H070	1,5	–	4	–	–	–	–	–	–	70	125	
		R260	–	4	20	260	360	(120)	–	40	45	–	–	
		H065	–	4	20	–	–	–	–	–	–	65	120	
		R400	0,5	–	1,5	400	500	(270)	(10)	–	–	–	–	1/4 hard
		R370	–	1,5	4	370	470	(250)	(14)	–	–	–	–	
		H120	1,5	–	4	–	–	–	–	–	–	120	150	
CuZn15 CuZn20	CW502L CW503L	R360	–	4	20	360	460	(250)	–	-18	-20	–	–	
		H115	–	4	20	–	–	–	–	–	–	115	145	
		R480	0,5	–	1,5	480	580	(400)	–	–	–	–	–	1/2 hard
		R450	–	1,5	4	450	550	(380)	(3)	–	–	–	–	
		H140	1,5	–	4	–	–	–	–	–	–	140	170	
		R430	–	4	20	430	530	(360)	(6)	–	–	–	–	
		H135	–	4	20	–	–	–	–	–	–	135	165	
		R600	0,1	–	0,5	600	–	(590)	–	–	–	–	–	hard
		R580	–	0,5	1,5	580	–	(570)	–	–	–	–	–	
		R540	–	1,5	4	540	–	(530)	–	–	–	–	–	
		H165	1,5		4	–	–	–	–	–	–	165	–	

BRONMETAL

Designations			Nominal Diameter			Tensile Strength R_m N/mm²		Proof stress of0,2% $R_{p0,2}$ N/mm² approx.	Elongation			Hardness HV		Previous Designation of Metallurgical State (only for informative purposes)
Material			from	greather than	up to and including	min.	max.		A_{100mm} % min.	$A_{11,3}$ % min.	A % min.	min.	max.	
Symbolic	Numerical	Metallurgical State												
		M	All Measurements											Rough Manufacture
CuZn30	CW505L	R350	0,1	–	0,5	350	450	(160)	(30)	–	–	–	–	annealed
		R340	–	0,5	1,5	340	440	(150)	35	–	–	–	–	
		R310	–	1,5	4	310	410	(140)	40	–	–	–	–	
		R300	–	4	20	300	400	(130)	–	45	50	–	–	
		H065	1,5	–	20	–	–	–	–	–	–	65	115	
		R430	0,1	–	0,5	430	530	(240)	(10)	–	–	–	–	1/8 hard
		R410	–	0,5	1,5	410	510	(230)	(14)	–	–	–	–	
		R380	–	1,5	4	380	480	(220)	(12)	–	–	–	–	
		H095	1,5	–	4	–	–	–	–	–	–	95	135	
		R360	–	4	20	360	460	(210)	–	(22)	-25	–	–	
		H085	–	4	20	–	–	–	–	–	–	85	130	
		R520	0,1	–	0,5	520	620	(340)	–	–	–	–	–	1/4 hard
		R500	–	0,5	1,5	500	600	(330)	–	–	–	–	–	
		R460	–	1,5	4	460	560	(310)	(7)	–	–	–	–	
		H125	1,5	–	4	–	–	–	–	–	–	125	160	
		R440	–	4	8	440	540	(290)	–	(10)	–	–	–	
		H120	–	4	8	–	–	–	–	–	–	120	155	
		R610	0,1	–	0,5	610	710	(500)	–	–	–	–	–	1/2 hard
		R590	–	0,5	1,5	590	690	(480)	–	–	–	–	–	
		R540	–	1,5	4	540	640	(440)	–	–	–	–	–	
		H150	1,5	–	4	–	–	–	–	–	–	150	180	
		R530	–	4	8	530	630	(440)	–	–	–	–	–	
		H145	–	4	8	–	–	–	–	–	–	145	175	
		R700	0,1	–	0,5	700	800	(680)	–	–	–	–	–	hard
		R670	–	0,5	1,5	670	770	(650)	–	–	–	–	–	
		R620	–	1,5	4	620	720	(600)	–	–	–	–	–	
		H170	1,5	–	4	–	–	–	–	–	–	170	200	
		R800	0,1	–	0,5	800	–	(810)	–	–	–	–	–	spring quality
		R750	–	0,5	1,5	750	–	(760)	–	–	–	–	–	
		R700	–	1,5	4	700	–	(710)	–	–	–	–	–	
		H195	1,5	–	4	–	–	–	–	–	–	195	–	

BRONMETAL

Designations			Nominal Diameter			Tensile Strength R_m N/mm²		Proof stress of0,2% $R_{p0,2}$ N/mm² approx.	Elongation			Hardness HV		Previous Designation of Metallurgical State (only for informative purposes)
Material			from	greather than	up to and including	min.	max.		A_{100mm} % min.	$A_{11,3}$ % min.	A % min.	min.	max.	
Symbolic	Numerical	Metallurgical State												
		M	All Measurements											Rough Manufacture
		R360	0,1	–	0,5	360	450	(160)	(30)	–	–	–	–	annealed
		R330	–	0,5	1,5	330	420	(150)	33	–	–	–	–	
		R300	–	1,5	4	300	380	(140)	35	–	–	–	–	
		H070	1,5	–	4	–	–	–	–	–	–	70	105	
		R280	–	4	20	280	370	(130)	–	40	45	–	–	
		H065	–	4	20	–	–	–	–	–	–	60	100	
		R420	0,5	–	1,5	420	510	(280)	(12)	–	–	–	–	1/8 hard
		R380	–	1,5	4	380	480	(260)	(16)	–	–	–	–	
		H105	1,5	–	4	–	–	–	–	–	–	105	140	
		R370	–	4	20	370	470	(250)	–	(20)	(25)	–	–	
		H095	–	4	20	–	–	–	–	–	–	95	135	
CuZn36 CuZn37	CW507L CW508L	R510	0,5	–	1,5	510	610	(420)	–	–	–	–	–	1/4 hard
		R470	–	1,5	4	470	570	(390)	(5)	–	–	–	–	
		H130	1,5	–	4	–	–	–	–	–	–	130	160	
		R460	–	4	8	460	560	(380)	–	(8)	–	–	–	
		H135	–	4	8	–	–	–	–	–	–	135	165	
		R610	0,5	–	1,5	610	750	(610)	–	–	–	–	–	1/2 hard / hard
		R560	–	1,5	4	560	700	(570)	–	–	–	–	–	
		H160	1,5	–	4	–	–	–	–	–	–	160	190	
		R550	–	4	8	550	680	(550)	–	–	–	–	–	
		H155	–	4	8	–	–	–	–	–	–	155	185	
		R800	0,1	–	0,5	800	–	(810)	–	–	–	–	–	spring quality
		R750	–	0,5	1,5	750	–	(760)	–	–	–	–	–	
		R700	–	1,5	4	700	–	(710)	–	–	–	–	–	
		H190	1,5	–	4	–	–	–	–	–	–	190	–	

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Designations			Nominal Diameter			Tensile Strength R_m N/mm²		Proof stress of0,2% $R_{p0,2}$ N/mm² approx.	Elongation			Hardness HV		Previous Designation of Metallurgical State (only for informative purposes)
Material			from	greather than	up to and including	min.	max.		A_{100mm} % min.	$A_{11,3}$ % min.	A % min.	min.	max.	
Symbolic	Numerical	Metallurgical State												
		M	All Measurements			Rough Manufacture								
		R380	0,5	–	1,5	380	–	(200)	–	–	–	–	–	
		R380	–	1,5	8,0	380	–	(200)	18	20	–	–	–	
		H120	1,5	–	8,0	–	–	–	–	–	–	120	150	1/2 hard
		R370	–	8,0	20,0	370	–	(200)	–	–	25	–	–	
		H110	–	8,0	20,0	–	–	–	–	–	–	110	140	
CuZn35Pb1 CuZn35Pb2	CW600N CW601N	R450	0,5	–	1,5	450	–	(320)	–	–	–	–	–	
		R450	–	1,5	4,0	450	–	(320)	6	–	–	–	–	
		H155	1,5	–	4,0	–	–	–	–	–	–	155	185	
		R450	–	4,0	8,0	450	–	(320)	–	10	–	–	–	hard
		H145	–	4,0	8,0	–	–	–	–	–	–	145	175	
		R440	–	8,0	14,0	440	–	(320)	–	–	15	–	–	
		H140	–	8,0	14,0	–	–	–	–	–	–	140	170	
		R540	0,5	–	4,0	540	–	(480)	–	–	–	–	–	
		H165	1,5	–	4,0	–	–	–	–	–	–	165	–	spring quality
		M	All Measurements			Rough Manufacture								
		R380	0,5	–	1,5	380	–	(180)	–	–	–	–	–	
		R370	–	1,5	4,0	370	–	(180)	15	–	–	–	–	
		H100	1,5	–	4,0	–	–	–	–	–	–	100	130	1/4 hard
		R360	–	4,0	20,0	360	–	(180)	–	15	20	–	–	
		H090	–	4,0	20,0	–	–	–	–	–	–	90	125	
		R440	0,5	–	1,5	440	–	(300)	–	–	–	–	–	
		R420	–	1,5	4,0	420	–	(280)	6	–	–	–	–	
		H120	1,5	–	4,0	–	–	–	–	–	–	120	150	
CuZn36Pb3 CuZn37Pb2	CW603N CW606N	R410	–	4,0	8,0	410	–	(280)	–	10	–	–	–	1/2 hard
		H115	–	4,0	8,0	–	–	–	–	–	–	115	145	
		R400	–	8,0	20,0	400	–	(280)	–	–	15	–	–	
		H110	–	8,0	20,0	–	–	–	–	–	–	110	140	
		R500	1,5	–	4,0	500	–	(380)	(3)	–	–	–	–	
		H140	1,5	–	4,0	–	–	–	–	–	–	140	170	
		R490	–	4,0	8,0	490	–	(360)	–	6	–	–	–	hard
		R480	–	8,0	14,0	480	–	(360)	–	–	8	–	–	
		H130	–	4,0	14,0	–	–	–	–	–	–	130	160	
		R580	1,5	–	4,0	580	–	(520)	–	–	–	–	–	
		H155	1,5	–	4,0	–	–	–	–	–	–	155	–	spring quality

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Designations			Nominal Diameter			Tensile Strength R_m N/mm²		Proof stress of0,2% $R_{p0,2}$ N/mm² approx.	Elongation			Hardness HV		Previous Designation of Metallurgical State (only for informative purposes)
Material			from	greather than	up to and including	min.	max.		A_{100mm} % min.	$A_{11,3}$ % min.	A % min.	min.	max.	
Symbolic	Numerical	Metallurgical State												
		M	All Measurements											Rough Manufacture
CuZn38Pb2 CuZn39Pb0,5 CuZn39Pb2	CW608N CW610N CW612N	R400	0,5	–	1,5	400	–	(200)	–	–	–	–	–	1/4 hard
		R400	–	1,5	4	400	–	(200)	10	–	–	–	–	
		H110	1,5	–	4	–	–	–	–	–	–	110	140	
		R390	–	4	8	390	–	(180)	–	15	–	–	–	
		R380	–	8	20	380	–	(180)	–	–	20	–	–	
		H100	–	4	20	–	–	–	–	–	–	100	130	
		R450	0,5	–	1,5	450	–	(300)	–	–	–	–	–	1/2 hard
		R440	–	1,5	4	440	–	(300)	8	–	–	–	–	
		H130	1,5	–	4	–	–	–	–	–	–	130	160	
		R430	–	4	8	430	–	(300)	–	10	–	–	–	
		R420	–	8	20	420	–	(300)	–	–	15	–	–	
		H120	–	4	20	–	–		–	–	–	120	155	
		R500	0,5	–	1,5	500	–	(400)	–	–	–	–	–	hard
		R500	–	1,5	4	500	–	(400)	4	–	–	–	–	
		H150	1,5	–	4	–	–	–	–	–	–	150	180	
		R490	–	4	8	490	–	(400)	–	5	–	–	–	
		R480	–	8	14	480	–	(400)	–	–	8	–	–	
		H140	–	4	14	–	–	–	–	–	–	140	170	
		R570	1,5	–	4	570	–	(520)	–	–	–	–	–	spring quality
		H165	1,5	–	4	–	–	–	–	–	–	165	–	
		R450	0,5	–	1,5	450	–	(200)	–	–	–	–	–	1/2 hard
		R430	–	1,5	4	430	–	(200)	6	–	–	–	–	
		H130	1,5	–	4	–	–	–	–	–	–	130	165	
		R420	–	4	8	420	–	(200)	–	8	–	–	–	
		H120	–	4	8	–	–	–	–	–	–	120	155	
		R410	–	8	14	410	–	(200)	–	–	10	–	–	
		R400	–	14	20	400	–	(200)	–	–	10	–	–	
		H110	–	8	20	–	–	–	–	–	–	110	145	
		R520	0,5	–	1,5	520	–	(400)	–	–	–	–	–	hard
		R510	–	1,5	4	510	–	(400)	(4)	–	–	–	–	
		H155	1,5	–	4	–	–	–	–	–	–	155	185	
		R500	–	4	8	500	–	(390)	–	6	–	–	–	
		R490	–	8	14	490	–	(390)	–	–	8	–	–	
		H145	–	4	14	–	–	–	–	–	–	145	175	
		R570	1,5	–	4	570	–	(520)	–	–	–	–	–	spring quality
		H170	1,5	–	4	–	–	–	–	–	–	170	–	

NOTE 1 – 1 N/mm^2 equivalent to 1 Mpa.
NOTE 2 – The numbers in brackets are not requirements for this regulation, they are given for informative purposes.

BRONMETAL

Tolerances

Diameter Tolerances of round wire

Nominal Diameter		Tolerances				
greather than	up to and including	Class A	Class B	Class C	Class D	Class E
–	0,25	± 0,005	–	–	0	0
					-0,025	-0,006
0,25	0,5	± 0,008	–	–	0	0
					-0,03	-0,010
0,5	1,0	± 0,012	–	–	0	0
					-0,03	-0,014
1,0	2,0	± 0,02	0	0	0	0
			-0,10	-0,06	-0,04	-0,025
2,0	4,0	± 0,03	0	0	0	0
			-0,10	-0,06	-0,04	-0,025
4,0	6,0	± 0,04	0	0	0	0
			-0,12	-0,08	-0,05	-0,030
6,0	10,0	± 0,06	0	0	0	0
			-0,15	-0,09	-0,06	-0,036

10,0	18,0	± 0,08	0	0	0	0
			-0,18	-0,11	-0,07	-0,043