

bonos

Brass

Brass is a metal alloy composed of copper (Cu) and zinc (Zn) atoms. Widely used by mankind for over 4,000 years, this alloy has a luster similar to gold and it is highly malleable. Some of its characteristics are:

- ▶ High resistance to corrosion.
- ▶ Ease machining
- ▶ Ductility
- ▶ Wear resistance
- ▶ Electrical and thermal conductivity
- ▶ Corrosion resistance

Brass is a product that can be found in arms, taps, valves, electrical terminals, vehicle radiators, screws, musical instruments, medical and dental devices, jewelry, among others.



brass

MAIN ALLOYS, SHAPES, CHARACTERISTICS AND APPLICATIONS

part 1/3

Name	Alloy ASTM/UNS	Shape	Characteristics	Applications
Tombac Brass 90/10	C22000	Coils, sheets, strips	Excellent cold formability and good hot formability. Excellent weldability and brazing.	Jewelry in general, ornamental decoration, enameled items, ammunition cartridges.
Tombac Brass 85/15	C23000	Coils, sheets, strips	Excellent cold formability and reasonable hot formability. Excellent weldability and brazing.	Fire extinguishers, eyelets, zippers, push buttons, jewelry, ammunition cartridges.
Cartridge Brass 70/30	C26000	Coils, Sheets, Strips, Tubes	Excellent cold formability and reasonable hot formability. Excellent weldability and brazing.	Pipes for radiators, musical instruments, rivets, screws, reflectors, sockets, push buttons, zippers, hinges, ammunition cartridges, sanitary metals.
Wire Rod Brass 67/33	C26800	Coils, sheets, strips, rectangular bars	Excellent cold formability and reasonable hot formability. Excellent weldability and brazing.	Reflectors, lamp sockets, eyelets, hinges, locks, components made by deep drawing and spinning, fins, rivets, pins, screws, springs.
Wire Rod Brass 65/35	C27000	Wires, Rectangular Bars	Excellent cold formability and poor hot formability. Excellent weldability and brazing.	Pins, rivets, screws, springs, hinges, eyelets, decorative objects.
Latón 63/37	C27200	Tubes	Buena confortabilidad a frio y a caliente. Excelente soldadura y brazaje.	Pipes for radiators, antennas for radio, television and vehicles, sanitary metals.

brass

MAIN ALLOYS, SHAPES, CHARACTERISTICS AND APPLICATIONS

Name	Alloy ASTM/UNS	Shape	Characteristics	Aplicaciones
Forjaflex Brass	C35300	Strips	Reasonable cold and hot formability. Excellent weldability and good brazability.	Keys, lock components, gears in general, engraved plates.
American Free-Cutting Brass CLA	C36000	Rods, Rectangular Bars	Limited cold formability and reasonable hot formability. Excellent weldability and good brazability.	Parts to be produced on automatic lathes with high cutting speed, such as: Screws, pins, nuts, washers, bushings, bearings, tubular parts, machined parts in general.
Forge Brass	C37700	Rods	Limited cold formability and excellent hot formability. Excellent weldability and good brazability.	Parts to be forged or hot pressed, such as: Sanitary metals, hardware for doors and windows, valves and stopcocks, automotive parts, gears, nuts, joints, etc. Gears and similar products that require high precision machining.
European Free-Cutting Brass CLE	C38500	Rods	Limited cold formability and good hot formability. Excellent weldability and good brazability.	Parts to be machined on automatic high-speed cutting lathes such as: Screws, pins, nuts, washers, bushings, bearings, hinges, padlocks, sockets, switches.
Admiralty Brass (Arsenical)	C44300	Tubes	Good cold formability and reasonable hot formability. Excellent weldability and brazing.	Condensers, evaporators, heat exchangers, salt water pipes.

Name	Alloy ASTM/UNS	Shape	Characteristics	Applications
Admiralty Brass (Phosphorous)	C44500	Tubes	Good cold formability and reasonable hot formability. Excellent weldability and brazing.	Condensers, evaporators, heat exchangers, salt water pipes.
Marine Brass	C46500	Rolled Products	Poor cold formability and excellent hot formability. Excellent weldability and good brazability.	Components for marine equipment, propellers, mirrors for condensers and heat exchangers.
Weld Brass	C47100	Slim Rods	Reasonable cold formability and excellent hot formability. Excellent weldability and good brazability.	Welding
Aluminum Brass	C68700	Tubes	Good cold formability and reasonable hot formability. Reasonable weldability and good brazability.	Condensers, evaporators, heat exchangers, salt water pipes.

brass

BRASS COMPOSITION

part 1/2

Name	Alloy ASTM/UNS	Cu (%)	Zn (%)	Pb (%)	P (%)	Sn (%)	Fe (%)	Al (%)	Ni (%)	Mn (%)	As (%)	Others (%)
Tombac Brass 90/10	C22000	89.00	remaining	0.05			0.05					0.10
		91.00										
Tombac Brass 85/15	C23000	84.00	remaining	0.05			0.05					0.15
		86.00										
Cartridge Brass 70/30	C26000	68.50	remaining	0.07			0.05					0.15
		71.50										
Wire Rod Brass 67/33	C26800	64.00	remaining	0.15			0.05					0.15
		68.50										
Wire Rod Brass 65/35	C27000	63.00	remaining	0.10			0.05					0.15
		68.50										
Wire Rod Brass 63/37	C27200	62.00	remaining	0.07			0.05					0.15
		65.00										
Forjaflex Brass	C35300	59.00	remaining	1.30			0.1					0.50
		64.50		2.30								

BRASS COMPOSITION

Name	Alloy ASTM/UNS	Cu (%)	Zn (%)	Pb (%)	P (%)	Sn (%)	Fe (%)	Al (%)	Ni (%)	Mn (%)	As (%)	Others (%)
Free-Cutting Brass	C36000	60.00	restante	2.50			0.35					0.50
American CLA		63.00		3.70								
Forge Brass	C37700	58.00	restante	1.50			0.3					0.50
		62.00		2.50								
Free-Cutting Brass	C38500	55.00	restante	2.50			0.35					0.50
European CLE		59.00		3.50								
Admiralty Brass	C44300	70.00	restante	0.07		0,9 1,20	0.06				0.02	0.15
(Arsenical)		73.00									0.06	
Admiralty Brass (Phosphorous)	C44500	70 73	restante	0.07	0,02 0,10	0,9 1,20	0.06					0.15
Marine Brass	C46500	59.00	restante	0.20		0.5	0.10				0.02	
		62.00				1.00					0.06	
Weld Brass	C47100	62.00 (mín.)	restante			0.50						Si=0,35

Notes:

- 1. The mentioned values represent maximum limits per chemical element, except when minimum and maximum ranges are indicated.
- 2. The indicated values do not imply a formal guarantee.

Name	Alloy ASTM/UNS	Shape	Tempering	Tensile Strength Limit (kgf/mm ²)	Yield Strength	Minimum Elongation	Brinell Hardness (HB)
					(kgf/mm ²)	"50,80 mm" (%)	
Tombac Brass 90/10	C22000	Coils, sheets, strips	Soft	28	10	48	60
			1/2 Hard	43	35	10	120
Tombac Brass 85/15	C23000	Coils, sheets, strips	Soft	31	13	40	80
			1/2 Hard	38	30	22	105
Cartridge Brass 70/30	C26000	Coils, strips	Soft	35	14	57	80
			1/2 Hard	42	32	32	120
Cartridge Brass 70/30	C26000	Tubes	1/2 Hard	48	42	15	135
Wire Rod Brass 67/33	C26800	Coils, sheets, strips, rectangular bars	Soft	34	13	58	65
			1/2 Hard	43	33	30	120
Wire Rod Brass 65/35	C27000	Wires	Soft	35	-	60	-
			1/2 Hard	62		15	
Wire Rod Brass 65/35	C27000	Rectangular bars	1/2 Hard	43	35	23	112

MECHANICAL PROPERTIES OF BRASS

Name	Alloy ASTM/UNS	Shape	Tempering	Tensile Strength Limit (kgf/mm ²)	Yield Strength	Minimum Elongation	Brinell Hardness (HB)
					(kgf/mm ²)	"50,80 mm" (%)	
Wire Rod Brass 63/37	C27200	Tubes	1/2 Hard	42	33	28	110
Forjaflex Brass	C35300	Strips	Hard	51	-	-	74
Free-Cutting Brass	C36000	Rods, rectan- gular bars	1/2 Hard	44	30	25	115
American CLA							
Forge Brass	C37700	Rods	1/2 Hard	45	30	20	120
Free-Cutting Brass	C38500	Rods	3/4 Hard	55	50	8	145
European CLE							
Admiralty Brass (Arsenical)	C44300	Tubes	Soft	37	15	65	70
Admiralty Brass (Phosphorous)	C44500	Tubes	Soft	31	10	-	-
Marine Brass	C46500	Rolled Products	Hot Rolled	35	14	35	87

brass

MECHANICAL PROPERTIES OF BRASS

Name	Alloy ASTM/UNS	Shape	Tempering	Tensile Strength Limit (kgf/mm ²)	Yield Strength	Minimum Elongation	Brinell Hardness (HB)
					(kgf/mm ²)	"50,80 mm" (%)	
Weld Brass	C47100	Slim Rods	Soft	38	18	50	100
Aluminum Brass	C68700	Tubes	Soft	38	14	60	76

Notas: The values indicated do not imply a formal guarantee.

PHYSICAL PROPERTIES OF BRASS

Name	Alloy ASTM/ UNS	Density at 20 °C ? = specific weight (g/cm ³)	Melting Point (°C)	Thermal Conductivity at 20 °C (cal/cm/ sec °C)	Specific Heat 20 °C (cal/g °C)	Electrical Resistivity at 20 °C (annealed material) (μΩ cm)	Electrical Conductivity at 20 °C (annealed material) (IACS %)	Coefficient of Thermal Expansion 20 to 300 °C (10 ⁻⁶ °C)	Modulus of Elasticity at 20 °C (kg/mm ²)	Modulus of Rigidity at 20 °C (kg/ mm ²)
Tombac Brass 90/10	C22000	8.80	1,045	0.45	0.090	3.920	44	18.4	12,000	4,500
Tombac Brass 85/15	C23000	8.75	1,025	0.38	0.090	4.660	37	18.7	12,000	4,500
Cartridge Brass 70/30	C26000	8.53	955	0.29	0.090	6.160	28	19.9	11,200	4,200
Wire Rod Brass 67/33	C26800	8.47	930	0.28	0.090	6.390	27	20.3	10,500	3,900
Wire Rod Brass 65/35	C27000	8.47	930	0.28	0.090	6.390	27	20.3	10,500	3,900
Wire Rod Brass 63/37	C27200	8.45	920	0.30	0.090	6.600	26	21.0	10,500	3,900

PHYSICAL PROPERTIES OF BRASS

Name	Alloy ASTM/UNS	Density at 20 °C ? = specific weight (g/cm ³)	Melting Point (°C)	Thermal Conductivity at 20 °C (cal/cm/sec °C)	Specific Heat 20 °C (cal/g °C)	Electrical Resistivity at 20 °C (annealed material) (μΩ cm)	Electrical Conductivity at 20 °C (annealed material) (IACS %)	Coefficient of Thermal Expansion 20 to 300 °C (10 ⁻⁶ °C)	Modulus of Elasticity at 20 °C (kg/mm ²)	Modulus of Rigidity at 20 °C (kg/mm ²)
Forjaflex Brass	C35300	8.47	908	0.28	0.090	6.630	26	20.3	10,500	3,900
American Free-Cutting Brass CLA	C36000	8.50	900	0.28	0.090	6.600	26	20.0	10,100	3,700
Forge Brass	C37700	8.40	895	0.28	0.090	6.400	27	21.0	9,800	3,600
European Free-Cutting Brass CLE	C38500	8.50	890	0.29	0.090	6.200	28	21.0	9,750	3,600
Admiralty Brass (Arsenical)	C44300	8.55	970	0.26	0.090	6.900	25	20.0	11,200	4,100




PHYSICAL PROPERTIES OF BRASS




part 3/3

Name	Alloy ASTM/UNS	Density at 20 °C ? = specific weight (g/cm ³)	Melting Point (°C)	Thermal Conductivity at 20 °C (cal/cm/sec °C)	Specific Heat 20 °C (cal/g °C)	Electrical Resistivity at 20 °C (annealed material) (μΩ cm)	Electrical Conductivity at 20 °C (annealed material) (IACS %)	Coefficient of Thermal Expansion 20 to 300 °C (10 ⁻⁶ °C)	Modulus of Elasticity at 20 °C (kg/mm ²)	Modulus of Rigidity at 20 °C (kg/mm ²)
Admiralty Brass (Phosphorous)	C44500	8.55	970	0.26	0.090	6.900	25	20.0	11,200	4,100
Marine Brass	C46500	8.41	900	0.28	0.090	6.630	26	21.2	10,500	3,900
Weld Brass	C47100	8.45	900	0.24	-	-	22	20.9	-	-
Aluminum Brass	C68700	8.35	1,010	0.24	0.090	7.500	23	20.0	11,200	4,100




Notas: Los valores indicados no darán lugar a garantía formal.




REBAR - WEIGHT PER LINEAR METER

Inch	Millimeter			
3/32"	2,38	0,038	0,042	0,048
1/8"	3,17	0,067	0,074	0,085
5/32"	3,97	0,105	0,116	0,134
3/16"	4,76	0,151	0,167	0,193
7/32"	5,55	0,206	0,227	0,262
1/4"	6,35	0,269	0,297	0,343
9/32"	7,14	0,340	0,375	0,433
5/16"	7,94	0,421	0,464	0,536
3/8"	9,53	0,606	0,669	0,772
7/16"	11,11	0,824	0,909	1,049
1/2"	12,70	1,077	1,187	1,371
9/16"	14,28	1,361	1,501	1,733
5/8"	15,87	1,681	1,854	2,141
11/16"	17,46	2,035	2,244	2,591
3/4"	19,05	2,423	2,671	3,085
13/16"	20,63	2,841	3,133	3,618
7/8"	22,22	3,296	3,634	4,197

Inch	Millimeter			
1 5/16"	23,81	3,785	4,173	4,819
1 "	25,40	4,307	4,749	5,484
1.1/16"	26,97	4,856	5,354	6,183
1.1/8"	28,57	5,449	6,008	6,938
1.3/16"	30,16	6,073	6,696	7,732
1.1/4"	31,75	6,730	7,420	8,569
1.5/16"	33,34	7,421	8,182	9,448
1.3/8"	34,92	8,141	8,976	10,365
1.7/16"	36,51	8,899	9,812	11,330
1.1/2"	38,10	9,691	10,685	12,339
1.9/16"	39,69	10,517	11,596	13,390
1.5/8"	41,27	11,370	12,537	14,477
5/8"	15,87	1,681	1,854	2,141
1.3/4"	44,45	13,190	14,544	16,794
1.7/8"	47,62	15,139	16,692	19,275
2"	50,80	17,228	18,996	21,935
2.1/16"	52,39	18,323	20,204	23,330

REBAR - WEIGHT PER LINEAR METER

Inch	Millimeter			
2.1/8"	53,97	19,445	21,441	24,758
2.3/16"	55,56	20,608	22,723	26,239
2.1/4"	57,15	21,804	24,042	27,762
2.5/16"	58,73	23,027	25,390	29,318
2.3/8"	60,33	24,298	26,792	30,938
2.7/16"	61,91	25,588	28,214	32,579
2.1/2"	63,50	26,919	29,681	34,274
2.5/8"	66,68	29,683	32,729	37,793
2.3/4"	69,85	32,572	35,914	41,472
2.7/8"	73,03	35,605	39,259	45,334
3"	76,20	38,763	42,741	49,355
3.1/8"	79,39	42,077	46,395	53,574
3.1/4"	82,55	45,493	50,162	57,923
3.3/8"	85,73	49,065	54,101	62,472
3.1/2"	88,90	52,761	58,176	67,177
3.5/8"	92,08	56,603	62,412	72,069
3.3/4"	95,25	60,568	66,738	77,117

Inch	Millimeter			
3.7/8"	98,43	64,679	71,319	82,352
4"	101,60	68,912	75,984	87,742
4.1/2"	114,30	87,212	96,168	111,048
5"	127,00	107,676	118,726	137,097
6"	152,40	155,053	170,965	197,419
7"	177,80	211,044	232,702	268,709
8"	203,20	275,650	303,937	350,967
9"	228,60	348,869	384,671	444,193

RECTANGULAR BARS - WEIGHT PER LINEAR METER

part 1/2

Width x Thickness		1/16" 1,58mm	3/32" 2,38mm	1/8" 3,17mm	3/16" 4,76mm	1/4" 6,35mm	5/16" 7,94mm	3/8" 9,53mm	1/2" 12,70mm	5/8" 15,87mm	3/4" 19,05mm
1,4"	6,35	0,085	0,128	0,171	0,257	--	--	--	--	--	--
5/16"	7,94	0,107	0,161	0,214	0,321	0,429	--	--	--	--	--
3/8"	9,53	0,128	0,193	0,257	0,386	0,514	0,643	--	--	--	--
7/16"	11,11	0,149	0,225	0,299	0,450	0,600	0,750	0,900	--	--	--
1/2 "	12,70	0,171	0,257	0,342	0,514	0,685	0,857	1,029	--	--	--
9/16"	14,28	0,192	0,289	0,385	0,578	0,771	0,964	1,157	1,542	--	--
5/8"	15,87	0,213	0,321	0,428	0,642	0,857	1,071	1,286	1,713	--	--
11/16"	17,46	0,234	0,353	0,470	0,706	0,942	1,178	1,414	1,885	2,355	--
3/4"	19,05	0,256	0,385	0,513	0,771	1,028	1,286	1,543	2,056	2,570	--
7/8"	22,22	0,298	0,450	0,599	0,899	1,199	1,500	1,800	2,399	2,997	3,598
1"	25,40	0,341	0,514	0,684	1,028	1,371	1,714	2,058	2,742	3,426	4,113
1.1/8"	28,57	0,384	0,578	0,770	1,156	1,542	1,928	2,314	3,084	3,854	4,626
1.1/4"	31,75	0,426	0,642	0,856	1,285	1,714	2,143	2,572	3,427	4,283	5,141
1.3/8"	34,92	0,469	0,706	0,941	1,413	1,885	2,357	2,829	3,770	4,711	5,654
1.1/2"	38,10	0,512	0,771	1,027	1,542	2,056	2,571	3,086	4,113	5,139	6,169
1.5/8"	41,27	0,554	0,835	1,112	1,670	2,228	2,785	3,343	4,455	5,567	6,683

brass

RECTANGULAR BARS - WEIGHT PER LINEAR METER

part 2/2

Width x Thickness		1/16" 1,58mm	3/32" 2,38mm	1/8" 3,17mm	3/16" 4,76mm	1/4" 6,35mm	5/16" 7,94mm	3/8" 9,53mm	1/2" 12,70mm	5/8" 15,87mm	3/4" 19,05mm
1.3/4"	44,45	0,597	0,899	1,198	1,798	2,399	3,000	3,601	4,798	5,996	7,198
1.7/8"	47,62	0,640	0,963	1,283	1,927	2,570	3,214	3,857	5,1 41	6,424	7,711
2"	50,80	0,682	1,028	1,369	2,055	2,742	3,428	4,115	5,484	6,853	8,2 26
2.1/4"	57,15	0,768	1,156	1,540	2,3 12	3,085	3,857	4,629	6,169	7,70 9	9,254
2.1/2"	63,50	0,853	1,285	1,711	2,569	3,427	4,286	5,144	6,855	8,566	10,282
2.3/4"	69,85	0,938	1,413	1,882	2,826	3,770	4,71 4	5,658	7,540	9,42 2	11,3 10
3"	76,20	1,023	1,542	2,053	3,083	4,11 3	5,143	6,173	8,2 2 6	10,279	12,33 9
3.1/4"	82,55	1,109	1,670	2,2 24	3,340	4,456	5,571	6,687	8,911	11,1 36	13,367
3.1/2"	88,90	1,194	1,798	2,395	3,597	4,798	6,000	7,201	9,597	11,992	14,395
3.3/4"	95,25	1,279	1,927	2,567	3,854	5,141	6,428	7,716	10,282	12,849	15,423
4"	10 1,60	1,364	2,055	2,738	4,111	5,484	6,857	8,2 30	10,968	13,705	16,452
4.1/2 "	114,30	1,535	2,3 12	3,080	4,62 5	6,169	7,71 4	9,2 59	12,3 39	15,418	18,508
5"	1 2 7,00	1,706	2,569	3,422	5,1 38	6,855	8,571	10,288	13,710	17,1 32	20,564
5.1/2 "	139,70	1,876	2,826	3,764	5,652	7,540	9,428	11,3 16	15,081	18,845	2 2,621
6"	152,40	2,047	3,083	4,10 6	6,166	8,226	10,285	12,345	16,452	20,558	24,677

PIPES - WEIGHT PER LINEAR METER

part 1/2

Outside Diameter		Wall Thickness				
In.	Mm	1/32" 0,79mm	1,00mm	1/16" 1,58mm	3/32" 2,38mm	1/8" 3,17mm
1/8"	3,17	0,050	0,058	---	---	---
5/32"	3,97	0,067	0,079	0,101	---	---
3/16"	4,76	0,084	0,100	0,134	---	---
1/4"	6,35	0,117	0,143	0,201	0,252	---
5/16"	7,94	0,151	0,185	0,268	0,353	0,404
3/8"	9,53	0,184	0,228	0,335	0,454	0,538
7/16"	11, 11	0,218	0,270	0,402	0,555	0,672
1/2"	12,70	0,251	0,312	0,469	0,656	0,807
9/16"	14,28	0,285	0,355	0,536	0,756	0,940
5/8"	15,87	0,318	0,397	0,603	0,857	1,075
3/4"	19,05	0,385	0,482	0,737	1,059	1,344
7/8"	22,22	0,452	0,567	0,871	1,261	1,613
1"	25,40	0,519	0,652	1,005	1,463	1,882
1.1/8"	28,57	0,586	0,736	1,139	1,664	2,150

Outside Diameter		Wall Thickness				
In.	Mm	1/32" 0,79mm	1,00mm	1/16" 1,58mm	3/32" 2,38mm	1/8" 3,17mm
1.1/4"	31,75	0,653	0,821	1,273	1,867	2,419
1.3/8"	34,92	0,720	0,906	1,407	2,068	2,688
1.1/2"	38,10	0,787	0,991	1,541	2,270	2,957
1.5/8"	41,27	0,854	1,075	1,675	2,472	3,225
1.3/4"	44,45	0,921	1,160	1,809	2,674	3,494
1.7/8"	47,62	0,988	1,245	1,943	2,875	3,763
2"	50,80	1,055	1,330	2,077	3,077	4,032
2.1/8"	53,97	1,122	1,414	2,210	3,279	4,300
2.1/4"	57,15	1,189	1,499	2,345	3,481	4,569
2.3/8"	60,33	1,256	1,584	2,479	3,683	4,839
2.1/2"	63,50	1,323	1,669	2,613	3,884	5,107
2.5/8"	66,67	1,390	1,754	2,746	4,086	5,375
2.3/4"	69,85	1,457	1,839	2,880	4,288	5,644
3"	76,20	1,591	2,008	3,148	4,692	6,182

Outside Diameter		Wall Thickness				
In.	Mm	1/32" 0,79mm	1,00mm	1/16" 1,58mm	3/32" 2,38mm	1/8" 3,17mm
3.1/4"	82,55	---	---	3,416	5,095	6,720
3.1/2"	88,90	---	---	3,684	5,499	7,257
3.3/4"	95,25	---	---	3,952	5,902	7,795
4"	101,60	---	---	4,220	6,306	8,332
4.1/4"	107,95	---	---	4,488	6,709	8,870
4.1/2"	114,30	---	---	4,756	7,113	9,407
4.3/4"	120,65	---	---	5,024	7,517	9,945
5"	127,00	---	---	5,292	7,920	10,482

bradss

SHEETS - WEIGHT PER PIECE

(BWG)	Mm	1.200x 600mm	2.000x 1.000mm
---	25,40	155,45	431,80
---	22,22	135,99	377,74
---	19,05	116,59	323,85
---	15,87	97,12	269,79
---	12,70	77,72	215,90
---	9,52	58,26	161,84
---	7,93	48,53	134,81
---	6,35	38,86	107,95
---	4,76	29,13	80,92
---	3,97	24,30	67,49
10	3,40	20,81	57,80
---	3,17	19,40	53,89
11	3,04	18,60	51,68
12	2,77	16,95	47,09
13	2,41	14,75	40,97
14	2,11	12,91	35,87

(BWG)	Mm	1.200x 600mm	2.000x 1.000mm
15	1,83	11,20	31,11
16	1,65	10,10	28,05
17	1,47	9,00	24,99
18	1,24	7,59	21,08
19	1,07	6,55	18,19
20	0,89	5,45	15,13
21	0,81	4,96	13,77
22	0,71	4,35	12,07
23	0,64	3,92	10,88
24	0,56	3,43	9,52
25	0,51	3,12	8,67
26	0,46	2,82	---
27	0,41	2,51	---
28	0,36	2,20	---
30	0,30	1,84	---