

STATE
STANDARD

GOST 2685-75

SHEET 1 OF 15

ALUMINIUM CASTING ALLOYS

GRADES, SPECIFICATION AND

TESTS METHODS

GOST 2685-75

supersedes

GOST 2685-63

This standard pertains to the aluminium casting
Alloys, used for section casting.

Requirements recommended by CAS as per
standardisation PC 1591-73 are described in standard.

1. GRADES

1.1. Groups, grades and chemical composition of aluminium
alloys should correspond to the indications in table 1.

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DECLARED BY

Andreyev Jostin.

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Table 1

GOST 2685-75

Chemical composition %

Group of alloys	Grades of alloys	Aluminum	Magnesium	Silicon	Manganese	Copper	Titanium	Zinc	Iron	Admixtures not more than
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I Alloys on aluminum and silicon base	Al2	Base	0.17-0.3	80-100	0.2-0.5	-	-	-	-	-
	Al4	-	0.23-0.3	80-100	0.2-0.35	-	0.08-0.08	-	-	-
	Al4-1	-	0.2-0.3	60-80	-	-	-	-	-	-
	Al4-1	-	0.25-0.5	70-80	-	-	0.08-0.15	-	-	-
	Al34 (BA15)	-	0.35-0.5	65-85	-	-	0.1-0.3	0.05-0.4	-	-
II Alloys on aluminum-silicon-copper base	Al5	Base	0.2-0.4	80-110	0.2-0.5	-	-	-	-	-
	Al6	-	0.2-0.5	60-80	-	-	-	-	-	-
	Al6-1	-	0.35-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al6	-	0.35-0.5	45-55	-	10-15	-	-	-	-
	Al6-2	-	0.3-0.5	75-85	0.3-0.5	10-15	0.1-0.3	-	-	-
III Alloys on aluminum-copper base	Al12	Base	0.2-0.8	40-60	0.2-0.8	15-20	-	-	-	-
	Al13	-	0.2-0.5	45-55	-	60-80	-	-	-	-
	Al13-1	-	0.2-0.5	45-55	-	60-80	-	-	-	-
	Al13-2	-	0.2-0.5	45-55	-	60-80	-	-	-	-
	Al13-3	-	0.2-0.5	45-55	-	60-80	-	-	-	-
IV Alloys on aluminum-magnesium base	Al17	Base	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al18	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al18-1	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al18-2	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al18-3	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
V Alloys on aluminum and other compound base	Al21	Base	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al22	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al23	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al23-1	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-
	Al23-2	-	0.3-0.5	45-55	0.6-0.8	15-20	-	-	-	-

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Table 1 Contd. 32

Chemical Composition %
Alloys are not more than

Group of alloys	Grade of alloy	Aluminum	Copper	Magnesium	Iron	Manganese	Chromium	Zinc	Total of all alloying elements
I		0.10	0.50	0.10	0.10	0.10	0.10	0.10	0.00
Alloys of Aluminum-silicon base	A-14	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.10
	A14-L	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.10
	A14	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40
	A14-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.50
	A14-1 (B443)	0.10	0.50	0.10	0.10	0.10	0.10	0.10	0.60
	A14-1 (B443)	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.00
Alloys on aluminum-silicon-copper base	A15	0.10	0.50	0.10	0.10	0.10	0.10	0.10	0.60
	A15-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.00
	A15-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.60
	A15-2	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.80
	A15-2	0.10	0.50	0.10	0.10	0.10	0.10	0.10	3.80
	A15-2	0.10	0.50	0.10	0.10	0.10	0.10	0.10	4.10
Alloys on aluminum-copper base	A16	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.10
	A16-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.30
	A16-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	0.60
	A16-2	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.70
	A16-2	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.10
	A16-2	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.10
Alloys on aluminum-copper-magnesium base	A17	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.30
	A17-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.30
	A17-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.30
	A17-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.30
	A17-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.30
	A17-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	2.30
Alloys on the base of aluminum and other components	A18	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40
	A18-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40
	A18-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40
	A18-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40
	A18-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40
	A18-1	0.10	0.50	0.10	0.10	0.10	0.10	0.10	1.40

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Total 100.00

NOTE: 1. Conventional denotation of casting methods

- 3 - Casting in sand mould
- 0 - Casting in shell mould
- B - Investment casting
- K - Chill mould casting
- A - Pressure die casting

2. While using alloys of grades A12 and A122 for parts working in sea water, the contents of copper should not exceed in alloys of grade A12 - 0.30%, in alloys of grade A122 - 0.10%.

3. While using the alloys for shell mould casting in alloys of grade A17 content of silicon upto 2% is permitted, in alloys of grade A122, absence of titanium is permitted while using the alloy of grade A17 for sand-mould casting, content of silicon not more than 1.8% is permitted, when content of titanium 0.07-0.20% during this content of admixtures of iron should be maximum 0.30%.

4. Following are permitted while using the alloys for pressure-casting: absence of magnesium in the alloy of grade A411, in the alloy of grade A422 content of magnesium 8.0-13.0%, silicon 0.8-1.6%, manganese up to 0.5% and absence of titanium.

5. For increasing the mechanical composition by 15-20%, it is necessary in alloy of grade A18 to limit the content of admixtures of iron and silicon up to 0.03% of each, in alloy of grades A12 and A19, add titanium in limits 0.08-0.20%, in the alloy of grade A7, add titanium in limits 0.08-0.20%, during this content of admixtures of iron in alloys of grades A12, A17 and A19 should not exceed 0.30%.

6. While working with alloys, content of beryllium, it is necessary to observe sanitary rules on operation with beryllium and its compounds, approved by the Ministry of Health U.S.S.R.

2. For using the alloys of grades AK5M2(A43B), AK7(A49B) and AK7M2(A44B) for utensils, the content of lead should not exceed 0.5%, arsenic - 0.015%, zinc - 0.3%.

8. Alloys of grades AK1, AK6, AK13, AK21 are not advised to use in new designs.

9. Use of alloys for manufacturing the utensils in each individual case should be approved by Ministry of Health U.S.S.R.

10. In alloys to be used for utensils, admixtures of beryllium is not permitted.

11. Admixtures, marked with dotted lines are calculated in total sum of admixtures in this, content of each of the elements should not exceed 0.020%.

12. For grades of alloys, given in brackets, letters of the end of code of grade denote, that alloys are manufactured from scrap and waste.

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2. TECHNICAL REQUIREMENTS						
2.1 Mechanical properties of alloys should correspond to the indications of Table 2						
TABLE 2						
Group of alloy	Grade of alloys	Method of casting	Type of Heat Treatment	Partial resistance	Specific elongation	Hardness as per Brinell HB
				kg/mm ²	%	
1	2	3	4	5	6	7
I	AA2	3M, OM, BM, KM	-	15	4	50
		K	-	16	2	50
		A	-	16	1	50
		3M, OM, BM, KM	T2	14	4	50
		K	T2	15	3	50
		A	T2	15	2	50
	AA4	3, O, B, K, A	-	15	2	50
		KA	T1	20	1.5	70
		3M, OM, BM	T6	23	3	70
		K, KM	T6	24	3	70
	AA4-1	3, O, B, K, A	-	16	2	50
		KA	T1	20	1.5	70
		3M, OM, BM	T6	25	3	70
		K, KM	T6	27	3	70
	AA9	3, O, B, K	-	16	2	50
		A	-	17	1	50
		3, O, B, K, A	T2	14	2	45
		KM	T4	19	4	50
		3, O, B	T4	18	4	50
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Table 2. cont'd.						
1	2	3	4	5	6	7
AJ9	AJ9	K, KM	T5	21	2	60
		3, O, B	T5	20	2	30
3M, OM, EM		T5	20	2	60	
3M, OM, BM		T6	23	1	70	
3M, BM, BM		T7	20	2	60	
3M, OM, BM		T6	16	3	55	
	AJ9-1	3, O, B	T4	20	5	50
K, KM		T4	23	5	50	
3, O, B		T5	24	4	60	
3M, OM, BM		T5	24	4	60	
K, KM		T5	27	4	60	
3M, OM, BM		T6	28	2	70	
K, KM		T6	30	3	70	
A		-	20	1	50	
A		T2	17	2	45	
3M, OM, EM		T7	21	2	60	
		3M, OM, EM	T8	17	3	55
	AJ34 (EAD)	3	T5	20	2	85
		3	T4	26	4	70
		K	T5	24	4	90
		K	T4	28	6	60
	AK3 (AM4B)	3, A	-	16	-	70
		3	T6	24	0.5	60
		K	T6	25	0.5	50
	AK7 (AM4B)	3	-	13	0.5	60
		K	-	16	0.5	60
		3	T5	20	0.5	35
		K	T5	22	0.5	35
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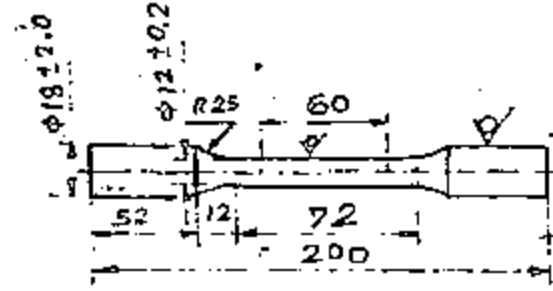
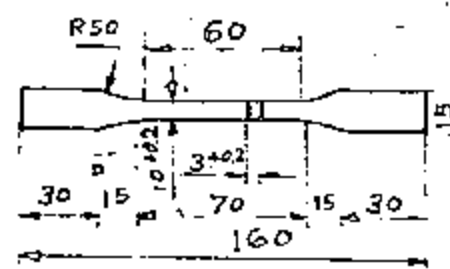
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1	2	3	4	5	6	7	
II	AM3	K	-	17	0.5	65	
		3, 0, B	-	14	0.5	65	
		3, 0, B, K	T1	17	-	70	
		3, 0, B, K	T2	15	1	65	
		3, 0, B	T5	22	0.5	75	
		K	T5	25	0.5	75	
		3, 0, B, K	T7	21	1	70	
		3, 0, B, K	T8	18	2	65	
		A	-	16	0.5	65	
		AM3	K	-	17	0.5	65
	3, 0, B		-	14	0.5	65	
	3, 0, B, K		T1	17	-	70	
	3, 0, B, K		T2	15	1	65	
	3, 0, B		T5	22	0.5	75	
	K		T5	25	0.5	75	
	3, 0, B, K		T7	21	1	70	
	3, 0, B, K		T8	18	2	65	
	A		-	16	0.5	65	
	AM5		3, 0, B, K	T1	16	0.5	65
		3, 0, B	T5	20	0.5	70	
		K	T5	22	0.5	70	
		3, 0, B	T6	23	0.5	70	
		3, 0, B, K	T7	18	1	65	
	AM5-1	3, 0, B, K	T1	18	0.5	65	
		3, 0, B	T5	28	0.5	70	
		K, KM	T5	30	1	70	
		3, 0, B, K	T7	21	1	65	
	AM6	3, 0, B, K	T2	15	1	45	
		A	-	15	1	43	
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Table 2 contd.						
1	2	3	4	5	6	7
	AM32	3	T6	25	1.5	60
		K	T1	20	1.5	70
		K	T6	27	2	70
		A	-	26	2	70
	AK5M2 (AM3B)	3	-	12	-	65
		K	-	16	0.5	65
		3	T5	21	-	75
		K	T5	24	0.5	75
		3	T3	15	1	65
		K	T8	18	2	65
		A	-	15	0.5	65
	AK5M7 (AM4B)	3	-	13	-	80
		K	-	16	-	80
		K	T1	17	-	90
		3	T1	15	-	80
	AK7M2 (AM14B)	3	-	13	0.5	70
		K	-	17	0.5	70
		3	T5	20	0.5	85
		K	T5	24	0.5	85
	AK4M4 (AM15B)	3	-	15	-	70
		K	-	18	0.5	70
		3	T5	20	-	80
		K	T5	22	0.5	85
III	Ad7	3, 0, B	T4	20	6	60
		K	T4	21	6	60
		3, 0, B	T5	22	3	70
		K	T5	23	3	70
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1	2	3	4	5	6	7
	AM19	3,0,8 3,0,8	T4 T5	30 34	8 4	70 90
	AM33 (BA-1)	3, K 3, K	T4 T5	23 20	2,5 1,5	80 85
IV	AM18	3,0,B,K	T4	29	9	60
	AM13	3,0,B,K A	- -	15 17	1,5 0,5	55 55
	AM22	3,0,B,K 3,0,B,K	- T4	18 23	1 1,5	90 90
	AM23	3,0 K, A 3,0, K	- - T4	19 22 23	4 6 6	60 60 60
	AM23-1	3,0 K, A 3,0, K	- - T4	20 24 25	5 10 10	60 60 60
	AM27	3,0, K, A	T4	35	15	75
	AM27-1	3,0, K, A	T4	35	15	75
	AM28	3,0, B K A	- - -	20 21 21	4 5 5,5	55 55 55
V	AM1	3,0, B, K 3,0, B, K	T5 T7	21 18	0,5 1	45 30
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Table 2. Contd.						
1	2	3	4	5	6	7
12	AM11	3,0,8 K A	- - -	20 21 18	2 1 1	26 30 60
	AM21	3,0,8 3,0,8	T2 T7	18 21	1 1	65 75
	AM25	K	T1	19	-	90
	AM30	K	T1	20	0.5	90
	AK 21M2SH25 (BK) AC-2	K K	T2 T1	16.0 19.0	- -	90 100
	AM24	3,0,8 3,0,8	- T5	22 27	2 2	60 70
	NOTE: Conventional denotation of types of heat treatment					
T1 - Artificial ageing without preliminary hardening;						
T2 - Annealing;						
T3 - Hardening;						
T5 - Hardening and short time (incomplete) artificial ageing;						
T6 - Hardening and complete artificial ageing;						
T7 - Hardening and stabilizing tempering.						
T8 - Hardening and soft tempering.						
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22 Mechanical properties of alloys already heat treated, are not indicated in table 2 should correspond to the requirements of standards of casting.		
3. TESTING METHODS		
3.1 Determination of chemical composition of alloys is carried out as per GOST 11739-66, GOST 11760-66 or GOST 7727-75 It is permitted to determine It is permitted to determine the chemical composition of alloys by other methods in case, if the accuracy of determination is in limits, specified in GOST 11739-66, GOST 11760-66 or GOST 7727-75. During disagreement in evaluation of the quality, analysis of chemical composition of alloys is carried out as per GOST 11739-66 or GOST 11760-66.		
3.2 Mechanical properties of alloys are determined on separately cast specimens or samples turned from poured blanks for casting		
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3.3 Shape and dimensions of separately cast specimen		
 FIG. 1		
 FIG. 2		
while casting in sand moulds, in chill moulds and in shell moulds should correspond to the requirements of fig 1 and during pressure die casting - Fig 2. Permissible difference of maximum and minimum diameter along length of working part of specimen should not be more than 0.3 mm. It is permitted to reduce the length of the head of sample, during this length of head is determined by the design of clamps of testing machine.		
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34 During all type of casting, separately cast specimens are tested with skin of casting. Damage of continuity of cast skin in place of dressing of the specimen surface is permitted. 35 Shape and dimensions of separately cast specimens while casting as per investment casting should be determined by technical document approved in the specified order, calculated length of samples should be $L_0 = 5 d_0$. 36 Samples cut to blanks, should have the dia. 6.0 mm at calculated length $L_0 = 5 d_0$. 37 While determining the mechanical properties of specimens with calculated length, less than 60 mm for alloys, in which minimum characteristics of relative elongation less than 1% is specified, the relative elongation is not determined. 38 Method of casting and type of heat treatment of samples for testing mechanical properties of alloys, =		
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should correspond to the method method of casting and heat treatment, specified for casting from these alloys. It is permitted to carry out the checking of mechanical properties of samples, cast in sandmould, for all types of casting. 3.9 Mechanical properties of samples, cut from casting, must be specified in technical document of casting. 3.10. Mechanical properties are determined as per GOST 1407-73 3.11 Testing for hardness as per Brinell is carried out as per GOST 9012-59 at dia of ball 10mm and load 1000 kg or at dia of ball 5 mm and load 250 kg.		
X		
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