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GOST
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GOST 2685-75

HAL (LD)	STATE STANDARD	GOST 2685-75
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ALUMINIUM CASTING ALLOYS		GOST 2685-75
GRADES, SPECIFICATION AND		Supersedes
TESTS METHODS		GOST 2685-63

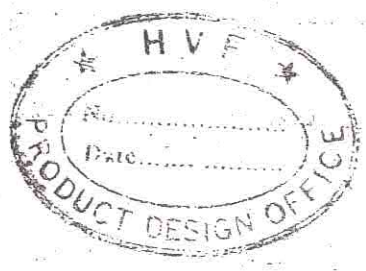
This standard pertains to the aluminium casting alloys, used for section casting.

Requirements recommended by C-→B as per standardisation PC 1591-73 are described in standard.

GRADES

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

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TABLE-1

Chemical composition %
 Grades of alloys
 Group of alloys

Group of alloys	Grades of alloys	Basic components										Admixtures not more than			
		Aluminium	Magnesium	Silicon	Manganese	Copper	Nickel	Titanium	Berillium	% Vanadium	Other elements	3.O.B	A		
I Alloys on aluminum and silicon base	AЛ2	Base	0.17-0.3	10.0-13.0	—	—	—	—	—	—	—	—	0.70	1.00	1.50
	AЛ4	"	0.28-0.3	8.0-10.5	0.2-0.5	—	—	—	—	—	—	—	0.60	0.90	1.00
	AЛ4-1	"	0.28-0.3	9.0-10.5	0.2-0.35	—	—	—	—	—	—	—	0.30	0.30	0.30
	AЛ9	"	0.2-0.4	6.0-8.0	—	—	—	—	—	—	—	—	0.60	1.00	1.50
	AЛ9-1	"	0.25-0.4	7.0-8.0	—	—	—	—	—	—	—	—	0.30	0.30	0.30
	AЛ34(ВАЛ5)	"	0.35-0.55	6.5-8.5	—	—	—	—	—	—	—	—	0.60	0.60	—
	AK9(AЛ4B)	"	0.2-0.4	8.0-11.0	0.2-0.5	—	—	—	—	—	—	—	0.90	1.20	1.30
	AK7(AЛ9B)	"	0.2-0.5	6.0-8.0	—	—	—	—	—	—	—	—	1.10	1.20	1.30
	AЛ6	Base	0.35-0.6	4.5-5.5	0.6-0.9	1.5-3.0	—	—	—	—	—	—	0.60	1.20	1.60
	AЛ5-1	"	0.35-0.6	4.5-5.5	—	1.0-1.5	—	—	—	—	—	—	0.60	1.00	1.50
II Alloys on aluminum and silicon copper base)	AЛ6	"	0.40-0.55	4.5-5.5	—	1.0-1.5	—	—	—	—	—	0.30	0.30	0.30	
	AЛ6	"	—	4.5-6.0	—	2.0-3.0	—	—	—	—	—	1.10	1.40	1.50	
	AЛ32	"	0.3-0.5	7.5-8.5	0.3-0.6	1.0-1.5	—	—	—	—	—	—	1.00	1.30	1.30
	AK5M2(AЛ3B)	"	0.2-0.8	4.0-6.0	0.2-0.8	1.5-3.5	—	—	—	—	—	—	1.00	1.30	1.30
	AK5M7(AЛ40B)	"	0.2-0.5	4.5-6.5	—	6.0-8.0	—	—	—	—	—	—	1.20	1.20	1.30
	AK7M2(AЛ4B)	"	0.2-0.6	6.0-8.0	0.2-0.6	1.5-3.0	—	—	—	—	—	—	1.10	1.30	1.30
	AK4M4(AЛ5B)	"	—	3.0-5.0	0.2-0.6	3.5-5.0	—	—	—	—	—	—	1.20	1.30	—
	AЛ7	Base	—	—	—	4.0-5.0	—	—	—	—	—	—	1.00	1.00	—
	AЛ9	"	—	—	—	4.5-5.3	—	—	—	—	—	—	0.20	0.30	—
	AЛ33(ВАЛ1)	"	—	—	—	5.5-6.2	0.8-1.2	—	—	0.05-0.20	—	—	0.30	0.30	—
IV Alloys on aluminum magnesium base	AЛ8	Base	9.3-10.0	0.8-1.3	—	—	—	—	—	—	—	—	0.30	0.60	—
	AЛ13	"	4.5-5.5	0.8-1.2	—	—	—	—	—	—	—	—	0.50	0.50	1.50
	AЛ22	"	10.5-13.0	—	—	—	—	—	—	—	—	—	0.50	1.00	1.20
	AЛ23	"	6.0-7.0	—	—	—	—	—	—	—	—	—	0.20	0.20	—
	AЛ23-1	"	6.0-7.0	—	—	—	—	—	—	—	—	—	0.05	0.05	—
	AЛ27	"	9.5-10.5	—	—	—	—	—	—	—	—	—	0.05	0.20	0.20
	AЛ27-1	"	9.5-10.5	—	—	—	—	—	—	—	—	—	0.05	0.20	0.20
	AЛ28	"	4.8-6.3	—	—	—	—	—	—	—	—	—	0.05	0.05	0.05
	AЛ28	"	4.8-6.3	—	—	—	—	—	—	—	—	—	0.05	0.05	0.05
	AЛ29	"	6.0-8.0	0.5-1.0	0.25-0.60	—	—	—	—	—	—	—	0.30	0.40	0.50
V Alloys on aluminum and other component base	AЛ1	Base	1.25-1.75	—	—	—	—	—	—	—	—	—	0.70	0.80	—
	AЛ11	"	0.1-0.3	6.0-8.0	—	—	—	—	—	—	—	—	0.70	1.20	1.50
	AЛ21	"	0.8-1.3	—	—	0.15-0.25	4.6-6.0	—	—	—	—	—	0.60	0.60	—
	AЛ24	"	1.5-2.0	—	—	0.2-0.5	—	—	—	—	—	—	0.50	—	—
	AЛ25	"	0.8-1.3	1.0-13.0	0.3-0.6	—	—	—	—	—	—	—	—	0.80	—
	AЛ30	"	0.8-1.3	1.0-13.0	—	—	—	—	—	—	—	—	—	0.70	—
	AK21M2.5H2.5 (BKXЛС-2)	"	0.20-0.50	20.0-22.0	0.2-0.4	—	—	—	—	—	—	—	—	0.90	—
	AK4M3B (AЛ17B)	"	0.1-0.3	3.5-5.5	0.4-0.7	—	—	—	—	—	—	—	1.2	1.3	—
	AЛ11	"	1.75-2.25	—	—	3.75-4.50	—	—	—	—	—	—	0.70	0.80	—
	AЛ21	"	2.6-3.6	—	—	4.6-6.0	—	—	—	—	—	—	0.60	0.60	—
AЛ24	"	0.1-0.2	—	—	—	—	—	—	—	—	—	0.50	—	—	
AЛ25	"	0.05-0.20	—	—	—	—	—	—	—	—	—	—	0.80	—	
AЛ30	"	0.1-0.3	—	—	—	—	—	—	—	—	—	—	0.70	—	
AK21M2.5H2.5 (BKXЛС-2)	"	0.1-0.3	—	—	—	—	—	—	—	—	—	—	0.90	—	
AK4M3B (AЛ17B)	"	—	—	—	—	—	—	—	—	—	—	1.2	1.3	—	

TABLE 1 (CONT'D)

Group of alloys	Grade of alloys	Chemical composition %											Total of calculated admixtures					
		Magnesium	Silicon	Manganese	Copper	Zinc	Tin	Lead	Nickel	Titanium	Berillium	Zirconium	S	O	B	K	A	
I Alloys on aluminum and silicon base	AJ12 AJ14	0,10	—	0,50	0,60 0,30	0,30 0,30	— 0,001	— 0,005	—	0,10	—	0,10 0,15 0,10	—	2,10 1,10	2,20 1,40	—	0,70 1,50	
	AJ14-1 AJ19	—	—	0,50	0,10 0,20	0,30 0,30	0,0005 0,01	0,03 0,05	—	0,10	0,10	0,10 0,15 0,10	—	0,60 1,10	0,60 1,50	—	0,60 2,60	
	AJ19-1 AJ134(BAJ15) AK9(AJ4B) AK7(AJ9B)	—	—	0,10 0,10 0,60	0,10 0,30 1,50	0,20 0,30 0,50	0,0005 — —	0,03 — —	— 0,30 0,30	Boron 0,10 Boron 0,10	0,10	0,10 0,10 0,20	—	0,60 1,00 2,60 3,70	0,60 1,00 2,80 3,80	—	0,60 — 3,40 4,10	
	II Alloys on aluminum and silicon (copper base)	AJ13	—	—	—	—	0,30	0,01	0,005	—	—	—	—	1,10	1,70	—	1,90	
		AJ15	—	—	0,50	—	0,30	0,01	—	—	0,10	—	—	1,00	1,30	—	1,70	
		AJ15-1 AJ16 AJ18	—	—	0,10 0,30	—	0,30 0,30	0,01	—	—	Boron 0,10	—	—	0,60 1,70	0,60 1,90	—	0,60 2,10	
		AK5M2(AJ13B) AK5M7(AJ10B) AK7M2(AJ114B) AK4M4(AJ115B)	—	—	0,50	—	0,50 0,50 0,50	—	—	0,50 0,30 0,50	—	—	—	2,00 2,70 1,80 4,00	2,10 2,80 2,00 4,10	—	0,60 2,30 2,80 2,60	
		AJ17 AJ19 AJ133(BAJ11)	0,03 0,05 0,05	1,20 0,30 0,30	0,10	—	0,20 0,20	0,01	0,01	0,01	0,10	—	—	—	2,10 0,90 0,50	2,10 0,90 0,50	—	— — —
		III Alloys on aluminum copper base	AJ18 AJ13 AJ12	—	—	0,10	0,10 0,10	0,10 0,20	—	—	—	0,07	—	—	1,00 0,60	1,00 0,60	—	1,80 1,30
	AJ123 AJ123-1 AJ127		—	0,20 0,05	0,10 0,10	0,15 0,15	0,10 0,10	—	—	—	—	—	—	0,50 0,20	0,50 0,20	—	0,50 0,50	
AJ127-1 AJ128 AJ129	—		0,05 0,30	0,10	0,05 0,30	0,05 0,2	—	—	—	—	—	—	0,20 0,15 0,20	0,20 0,15 0,20	—	0,50 0,80 1,0		

TABLE-1 (CONT'D)

Group of alloys		Grades of alloys	Chemical composition %												Total of calculated admixtures			
			Admixtures not more than															
			Magnesium	Silicon	Manganese	Copper	Zinc	Tin	Lead	Nickel	Titanium	Berillium	Zirconium	A	B	C	D	
V	Alloys on aluminum and other component base	AJ11	—	0.70	—	—	0.10	—	—	—	—	—	0.10	—	—	—	—	
		AJ11.1	—	0.50	0.50	0.60	—	—	—	—	—	—	—	—	—	—	—	2.5
		AJ121	—	0.30	—	0.20	0.30	—	—	—	—	—	0.10	—	—	—	—	—
		AJ124	—	—	—	—	0.50	0.02	—	—	—	—	—	—	—	—	—	—
		AJ125	—	—	—	—	—	0.20	0.01	0.05	—	—	—	—	—	—	—	—
		AJ130	—	—	—	0.20	—	0.20	0.01	0.04	—	—	—	—	—	—	—	—
		AK21(M2.5H2.5 (B,K,K)(C-2) AK4M2H6 (AJ11.7B)	—	—	—	—	—	—	0.5	—	—	—	—	—	1.7	—	—	

Note:

1. Conventional notation of casting methods
- 3-Casting in sand mould
- O-Casting in shell mould
- B- Investment casting
- K-Chill mould casting
- J1 -Pressure die-casting
2. While using alloys of grades AJ12 & AJ12.8 for parts, working in seawater, the contents of copper should not exceed in alloys of grade AJ12 -0.30%, in alloys of grade AJ12.8-0.10%.
3. While using the alloys for chill mould casting in alloys of grade AJ17 content of silicon up to 3% is permitted, in the alloys of grade AJ12, absence of titanium is permitted.
4. While using the alloy of grade AJ17 for sand mould casting content of silicon not more than .8% is permitted, when content of titanium 0.07-0.20%, during this content of admixtures while using the alloy of grade AJ17 for pressure die casting. absence of magnesium in the alloy of grade AJ1.1 in the alloy of grade AJ1.2 content of magnesium 8.0-13.0%.
5. Of iron should be maximum 0.30%.
6. Following are permitted while using the alloys for pressure die casting. absence of magnesium in the alloy of grade AJ1.1 in the alloy of grade AJ1.2 content of magnesium 8.0-13.0%.
7. Silicon 0.8-1.6%, manganese up to 0.5% and absence of titanium.
8. For increasing the mechanical properties by 15-20%, it is necessary in alloy of grade AJ18 to limit the content of admixtures of iron and silicon up to 0.03% of each, in alloy of grades AJ12 and AJ19, add yttrium in limits 0.08-0.20%, in the alloy grade AJ17, add titanium in limit 0.08-0.20%, during this content of admixtures of iron in alloys of grades AJ12, AJ17 and AJ19 should not exceed 0.30%.
9. While working with alloys, content of berillium, it is necessary to observe sanitary rules on operation with berillium and its compounds, approved by the Ministry of Health U.S.S.R.
10. For using the alloys of grades AK 5 M2 (AJ1 3B), AK7 (AJ1 9B) and AK 7 M2 (AJ1 14B) for utensils, the content of lead should not exceed 0.15%, arsenic -0.015%, zinc -0.3%.
11. Alloys of grades AJ1 1, AJ1 6, AJ1 13, AJ1 21, are not advised to use in new designs.
12. In alloys to be used for utensils, admixtures of berillium are not permitted.
13. In admixtures, marked with dotted lines, are calculated in total sum of admixtures in this, content of each of the elements should not exceed 0.02%.
14. Admixtures, marked with bracket, letter to the end of code of grade denotes, that alloys are manufactured from scrap and waste as per GOST 1583-73.
15. For grades of alloys, given in bracket, letter to the end of code of grade denotes, that alloys are manufactured from scrap and waste as per GOST 1583-73.

2. Technical Requirements

2.1 Mechanical Properties of alloys should correspond to the indications of table 2

Table 2

Group of Alloy	Grade of Alloy	Method of casting	Type of Heat treatment	Partial Resistance σ	Specific elongation $\delta, \%$	Hardness as per Brinell HB			
				Kgs/mm ²					
Not less than									
AL2	3M, OM, BM, KM	K	—	115	4	50			
			—	116	2	50			
			—	116	4	50			
			T2	14	4	50			
			T2	15	3	50			
			T2	15	2	50			
AL4	3, O, B, K, D KD 3M, OM, BM K, KM	K	—	115	2	50			
			T1	20	1,5	60			
			T6	23	3	70			
AL4-1	3, O, B, K, D K, D 3M, OM, BM K, KM	K	—	16	2	50			
			T1	20	1,5	70			
			T6	25	3	70			
AL4-1	3, O, B, K, D K, D 3M, OM, BM K, KM	K	T6	27	3	70			
			—	16	2	50			
			—	17	1	50			
AL9	3, O, B, K D 3, O, B, K, D KM 3, O, B K, KM 3, O, B 3M, OM, BM 3M, OM, BM 3M, OM, BM 3M, OM, BM	K	—	14	2	45			
			T2	14	2	45			
			T4	19	4	50			
			T4	18	4	50			
			T5	21	2	60			
			T5	20	2	60			
			T5	20	2	60			
			T6	23	1	70			
			T7	20	2	60			
			T8	16	3	55			
			AL9-1	3, O, B K, KM 3, O, B 3M, OM, BM K, KM 3M, OM, BM K, KM D D 3M, OM, BM 3M, OM, BM	K	T4	20	5	50
						T4	23	5	50
T6	24	4				60			
T5	24	4				60			
T5	27	4				60			
T6	28	2				70			
T6	30	3				70			
—	20	1				50			
T2	17	2				45			
T7	21	2				60			
T8	17	3				55			

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Table 2 (continue)

Group of Alloy	Grade of Alloy	Method of casting	Type of Heat treatment	Partial Resistance σ	Specific elongation $\delta, \%$	Hardness as per Brinell HB
				Kgs/mm ²		
				Not less than		
I	АЛ34(ВАЛ5)	З	T3	30	2	85
		З	T4	26	4	70
		К	T5	34	4	90
		К	T4	28	6	80
	АК9(АЛ4В)	З, К	—	16	—	70
		З	T6	24	0,5	80
		К	T6	25	0,5	90
	АК7(АЛ9В)	З	—	13	0,5	60
		К	—	16	0,5	60
З		T5	20	0,5	75	
К		T5	22	0,5	75	
II	АЛ3	К	—	17	0,5	65
		З, О, В	—	14	0,5	65
		З, О, В, К	T1	17	—	70
		З, О, В, К	T2	15	1	65
		З, О, В	T5	22	0,5	75
		К	T5	25	0,5	75
		З, О, В, К	T7	21	1	70
		З, О, В, К	T8	18	2	65
	АЛ5	Д	—	16	0,5	65
		З, О, В, К	T1	16	0,5	65
		З, О, В	T5	20	0,5	70
		К	T5	22	0,5	70
		З, О, В	T6	23	0,5	70
	АЛ5—1	З, О, В, К	T7	18	1	65
		З, О, В	T1	18	0,5	65
		К, КМ	T5	28	0,5	70
		З, О, В, К	T5	30	1	70
	АЛ6	З, О, В, К	T7	21	1	65
		Д	T2	15	1	45
	АЛ32	З	—	15	1	45
		З	T6	25	1,5	60
К		T1	20	1,5	70	
К		T6	27	2	70	
Д		—	26	2	70	
З		T5	24	2	60	
К		T5	26	2	70	
К		T7	23	2	60	
	К	T7	25	2	60	

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Table 2 (continue)

Group of Alloy	Grade of Alloy	Method of casting	Type of Heat treatment	Partial Resistance σ	Specific elongation $\delta, \%$	Hardness as per Brinell HB	
				Kgs/mm ²			
				Not less than			
II	AK5M2(AЛ3B)	З	—	12	—	65	
		К	—	16	0,5	65	
		З	T5	21	—	75	
		К	T5	24	0,5	75	
		З	T8	15	1	65	
		К	T8	18	2	65	
	Д	—	15	0,5	65		
	AK5M7(AЛ10B)	З	—	13	—	80	
		К	—	16	—	80	
		К	T1	17	—	90	
	AK7M2(AЛ14B)	З	—	13	0,5	70	
		К	—	17	0,5	70	
З		T5	20	0,5	85		
К		T5	24	0,5	85		
AK4M4(AЛ15B)	З	—	15	—	70		
	К	—	18	0,5	70		
	З	T5	20	—	80		
К	—	T5	22	0,5	85		
	III	АЛ7	З, О, В	T4	20	6	60
			К	T4	21	6	60
			З, О, В	T5	22	3	70
К			T5	23	3	70	
АЛ9	З, О, В, К	T4	30	8	70		
	З, О, В, К	T5	34	4	90		
	З	T7	32	2	80		
АЛ33(ВАЛ1)	З, К	T4	23	2,5	80		
	З, К	T5	26	1,5	85		
IV	АЛ8	З, О, В, К	T4	29	9	60	
	АЛ13	З, О, В, К	—	16	1	55	
		Д	—	17	0,5	55	
	АЛ22	З, О, В, К	—	18	1	90	
З, О, В, К		T4	23	1,5	90		
Д		—	20	1	90		
АЛ29	Д	—	21	3	60		

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Table 2 (continue)

Group of Alloy	Grade of Alloy	Method of casting	Type of Heat treatment	Partial Resistance σ	Specific elongation $\delta, \%$	Hardness as per Brinell HB
				Not less than		
IV	АЛ23	З, О	—	19	4	60
		К, Д	—	22	6	60
		З, О, К	T4	23	6	60
	АЛ23-1	З, О	—	20	5	60
		К, Д	—	24	10	60
		З, О, К	T4	25	10	60
	АЛ27	З, О, К, Д	T4	32	12	75
АЛ27-1	З, О, К, Д	T4	35	15	75	
АЛ28	З, О, В	—	20	4	55	
	К	—	21	5	55	
	Д	—	21	3,5	55	
V	АЛ1	З, О, В, К	T5	21	0,5	95
		З, О, В, К	T7	18	1	80
	АЛ11	З, О, В	—	20	2	80
		К	—	21	1	80
		Д	—	18	1	60
	АЛ21	З, О, В	T2	18	1	65
		З, О, В	T7	21	1	75
	АЛ25	К	T1	19	—	90
	АЛ30	К	T1	20	0,5	90
	АК21М2,5Н2,5 (ВКЖЛС-2)	К	T2	16,0	—	90
		К	T1	19,0	—	100
	АЛ24	З, О, В	—	22	2	60
		З, О, В	T5	27	2	70
АК4М2Ц6 (АЛ17В)	З	—	18	1	65	
	К	—	20	1	75	
	З	T1	19	—	70	
	К	T1	22	—	80	
	З	T4	20	1	70	
	К	T4	22	1,5	80	
	З	T5	20	—	70	
	К	T5	24	—	85	

Note: Conventional denotation of types of heat treatment
T 1 - Artificial ageing without preliminary hardening;
T 2 - Annealing;
T 4 - Hardening;
T 5 - Hardening and short time (in complete) Artificial ageing
T 6 - Hardening and complete artificial ageing
T 7 - Hardening and stabilizing tempering
T 8 - Hardening and stop tempering

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STATE

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STANDARD

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3.3 Shape and dimensions of separately cast specimen

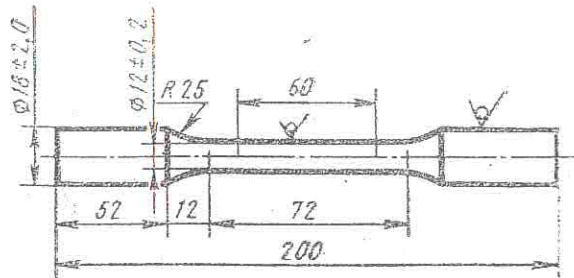


Fig. 1

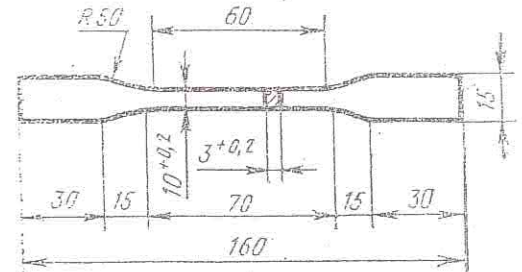


Fig. 2

While casting in sand moulds, in chillmoulds 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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3.4 During all types 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.

3.5 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 sample should be $L = 5d$

3.6 Samples cut to blanks, should have the dia. 6.0mm at calculated length $l = 5d$.

3.7 While determining the mechanical properties of specimens with calculated length, less than 60mm for alloy in which minimum characteristics of relative elongation less than 1% is not determined.

3.8 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 of casting and heat treatment, specified for casting from these alloys. It is permitted to carryout the checking of mechanical properties of samples, cast in sandmould, for all types of casting.

3.9 Mechanical properties of samples, cut from casting, should be specified in technical document of casting.

3.10 Mechanical properties are determined as per GOST 1497-73.

3.11 Testing for hardness as per Brinell is carried out as per GOST 9012-59 at dia. of ball 10 mm and load 1000 Kg or at dia of ball 5mm and load 250 kg.

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