Note:

1. Designation of alloys grades:

ч- Pure;
пч-Extra pure;
оч- Special pure grade;
л- Casting alloys;
с- Selective.

Designation of alloy grades as per GOST 1583, OST 48-173 and as per Technical requirement are shown in brackets.

2. Designation of casting process:

3 -Sand casting/sand molding;
B-Casting as per melt pattern;
K-Die/ chill casting;
D-Pressure die-casting/ injection molding.

Sum of impurities for casting for melt pattern is applicable for casting in skin-dry molds.

3. Mass content of impurities in alloys may not to determined during the production of castings from metal stock of known chemical composition (excluding iron impurities).
4. While using alloys of grade АК12 (АЛ2) and АМг5Мц and (АЛ28) for parts, working in sea water, mass fraction of copper should not increase: in alloy of grade - АК12 (АЛ2) – 0.30%, in alloy of grade АМг5Мц (АЛ28) – 0.1%.
5. While using alloys of pressure die-casting, absence of magnesium in alloys is permitted for grade АК7Ц9 (АЛ11); in alloys grade АМг11 (АЛ22) contents of magnesium is 8.0-13.0 %, Silicon is 0.8-1.6%, manganese upto 0.5% and titanium is absent.
6. Alloys of grade АК5М7 (А5М7), АМг5К (АЛ13), АМг10 (АЛ27), АМг10ч (АЛ27-1) are not recommended for use in new construction.
7. In alloy АК8М3ч (ВАЛ8), absence of boron is permitted under the conditions to ensure the level of mechanical properties, as specified in the present standard. Mass of iron should not be more than 0.4% while manufacturing parts made from alloy АК8М3ч (ВАЛ8) by liquid stamping method.

8. During pressure die-casting, in alloy of grade АК8 (АЛ34), decrease of mass fraction limit of Beryllium upto 0.06% is permitted, also increase of permissible mass fraction of iron upto 1.0 % is permitted, if overall mass fracture of the impurities should not be more than 1.2 % and titanium is absent.
9. For modified structures, in alloys АК9ч (АЛ4), АК9пч (АЛ4-1), АК7ч (АЛ9), АК7пч (АЛ9-1), Strontium upto 0.08% can be introduced.
10. Impurities, which are underlined, are considered in total sum of impurities, during this content of each element should not exceed 0.020 %.
11. Refinement of alloys in ingots is indicated by the letter «р», which is placed after the alloy grade designation.
12. In the order, in the design documents, while marking the castings, it is permitted to indicate the alloy grade without additional designation of grades within the brackets.
13. As per the agreement with the customer, it is permitted to manufacture ingots, contents of which can vary from those specified in table 1 for mass fraction of various elements (main components and impurities).
14. While using alloys for pressure die-castings, in alloy АМг7 (АЛ22) content of Beryllium impurities upto 0.03% and Silicon upto 1.5 % are permitted.
15. Titanium can be absent in alloy of grade АМг11 (АЛ22).
16. Alloys, meant for manufacturing of parts for food industry are marked with letter «П», which is written after the alloy grade designation.

4.1.3. The surfaces of ingots should be free of slag and other foreign inclusion, visible to naked eyes.

Shrinkage (contraction) cavity, cracks (on ingots of mass more than 200 Kg), traces of dressing and stamping are permitted.

Paint usable for colouring of ingot mould are permitted on the surface of ingots

General surface area, occupied by oxide films and blisters on the ingots of aluminium-silicon alloys, should not exceed 5 % of the total surface of ingots.

Hypereutectoid aluminium-silicon alloy of silicon and porous segregation are permitted in the surface of the ingots.

4.1.4. In fissures of ingots upto 20 Kg, slag and other foreign particles visible to naked eyes are not permitted.

In fissures of silicon, presence of aluminium-silicon alloy, formed during the process of crystallization is permitted.

4.1.5. Ingots of refined alloys are manufactured as per the agreement of the manufacturer with the customer.

In refined alloys, hydrogen content should be maximum 0.25 cm^3/100 gm of metal for hypo eutectic silumin, 0.35 cm^3/100 gm for hyper eutectic silumin, 0.5 cm^3/100 gm for aluminium-magnesium alloys, porosity should be maximum upto 3^{rd} mark.

The manufacturer determines selection of test parameter (mark for porosity or hydrogen content).

4.1.6. Marking

4.1.6.1. Each ingot should have the following markings:

Trades mark or name & trademark of the manufacturer, melt number and grade of alloys.

As per the agreement with the customer, for large sized ingots above 200 kg, marking of the ingot weight in kilograms with waterproof paint.

It is permitted to mark the melt number, trade mark or designation and trade mark of the manufacturer on 80 % of the ingot, in agreement with the customer, under conditions of making of packs from ingots of the same melt.

Ingots, meant for manufacturing of articles and equipment for food industry, are marked with additional letter «П» in the absence of coloured marking, and is marked after the alloy designation.

4.1.6.2 The sides of the ingots are marked with water proof colour paint (marking of vertical strips, cross marks, triangles) or has the following colour metallic stamp on the ingot surface:

АК12 (АЛ2) – White, green, green;
АК12П – White, White, green, green;
АК13 – Green, yellow;
АК9 (АК9) – White, yellow;
АК9П – White, white, yellow;
АК9ч (АЛ4) – Brown triangle;
АК9пч (АЛ4-1) – Two green triangles;
АК8л (АЛ34) – Two yellow triangles;
АК9с (АК9с) – White, yellow, yellow;
АК7 (АК7) – White, red;
АК7П (АК7П) – White, red, red;
АК7ч (АЛ9) – Yellow triangle;
АК7пч (АЛ9-1) – Two green cross;
АК10Су (АК10Су) – Black;
АК5М (АЛ5) – White, black, white;
АК5Мч (АЛ5-1) – Red, blue, green;
АК5М2 (АК5М2) – Black, blue;
АК5М2П (АК5М2П) – Black, blue, red;
АК6М2 (АК6М2) – Two blue cross;
АК8М (АЛ32) – Green triangle;
АК5М4 (АК5М4) – Black, blue, blue;
АК5М7 (АК5М7) – Black, Red;
АК8М3 (АК8М3) – White, Blue;
АК8М3ч (ВАЛ8) – Two white cross;
АК9М2 (АК9М2) – White, yellow, white;
АК12М2 (АК11М2, АК12М2, АК12М2р) – Two red cross;
АК12ММгН (АЛ30) – White, black, black;
АК12М2МгН (АЛ25) – White, black;
АК21М2, 5Н2.5 (ВКЖЛС-2) – Black, black, black;
АМ5 (АЛ19) – White triangle;
АМ4, 5Кд(ВАЛ10) – Blue triangle;
АМг4К1, 5М (АМ4К1, 5М1) – Red, yellow, yellow;
АМг5К (АЛ13) – Brown cross;
АМг5Мц (АЛ28) – Green cross;
АМг6л (АЛ23) – White cross;
АМг6лч (АЛ23-1) – Green cross;
АМг10 (АЛ27) – Black, black, blue;
АМг10ч (АЛ27-1) – Red triangle;
АМг11 (АЛ22) – Red cross;
АМг7 (АЛ29) – Two strips, green and red;
АК7Ц9 (АЛ11) – white, white, Green;

АК9Ц6 (АК9Ц6р) – Blue, blue, blue;
АЦ4Мг (АЛ24) – Black cross;
АК12ч (СИЛ-1) – Red letter С;
АК12пч (СИЛ-0) – White letter С;
АК12оч (СИЛ-00) – Blue letter С;
АК12Ж (СИЛ-2) – Black letter С.

As per the agreement with the user, other methods of marking are also permitted.

4.1.6.3 As per the requirement of the customer, each fissure part of the ingot should have the melt number and coloured marking.

4.1.6.4 Letter «р» is marked for refined alloys, on the upper row of ingots for each pack on all the 4 sides, with waterproof red colour.

4.1.6.5 As per the agreement with the customer, it is permitted to mark only the upper row of the ingot in the pack.

4.1.7 Packing

4.1.7.1 Ingot upto 20 kg are made into a pack having maximum weight upto 1.5 tonne, taking into consideration the general requirement of GOST 21399, GOST 24597.

The pack should consist of ingots of single grade of alloy.

Packs are fastened with two strips in two turns with aluminium wire of diameter 9 mm as per GOST 13843. While making the packs, the tying knot should be on the sides of pack. It is permitted if approved by the customer, to use other means of fastening as per GOST 21650 if conditions of preservation of packs during transportation are maintained. The weight of the aluminium wire, used for tying the packs, is considered in the net weight of the pack and the batch.

Ingot of more than 200 kg are not made into packs.

4.2. Acceptance

4.2.1 The ingots are offered for acceptance in batches. The batch should consists of ingot of same grade of alloy, same or several melts and should have single quality certificate, giving the following details:

Trademark or name and trade mark of the manufacturer;
Alloy grade;
Melt/ melts number;
Result of chemical analysis of melt, melts;
Batch weight;
Content of hydrogen or point of porosity mark for refined alloys;
Manufacturing date;
Present standard number.

Each batch of ingots having mass more than 200 kg is accompanied by special casting samples for estimation of the chemical composition and hydrogen in refined alloys – one sample from each melt.

4.2.2. In batches of ingots of mass 20 kg, fissure of ingots not more than 5 % from the mass of total batch is permitted. Broken ingots are not permitted for export

4.2.3. Minimum 1% of ingot of 20 kg from each melt, but not less than 2 ingots and not less than one ingot of mass more than 200 kg from each melt are subjected to external appearance inspection.

4.2.4. For checking the quality of the ingot fissure, minimum two ingots of weight upto 20 kg from each melt are selected. Inspection of fissure quality is carried out as per the customers requirement.

4.2.5. For checking the chemical composition and checking the contents of hydrogen in refined alloys, minimum two ingots are selected from each melt. The manufacturer is permitted to select the samples from the molten metal.

The manufacturer checks for the contents of main components, iron impurities in the ingots, and for harmful impurities in food industry alloys for every melt. Contents of remaining impurities are checked as per the customer’s requirement.

4.2.6. For analysis of gaseous porosity in refined alloys, casted into ingots of mass 20 kg, two ingots are selected from each melt. Cross templates are cut from both the ingots, with minimum thickness of 10 mm at distance of 1/3 of the length from the ingot face/end.

Analysis of gaseous porosity of refined alloys in the form of ingots above 200 kg is carried out on cross templates of minimum thickness 10 mm, cut at a distance of 1/3 of the length of sample end, casted in ingot mould (figure 1).

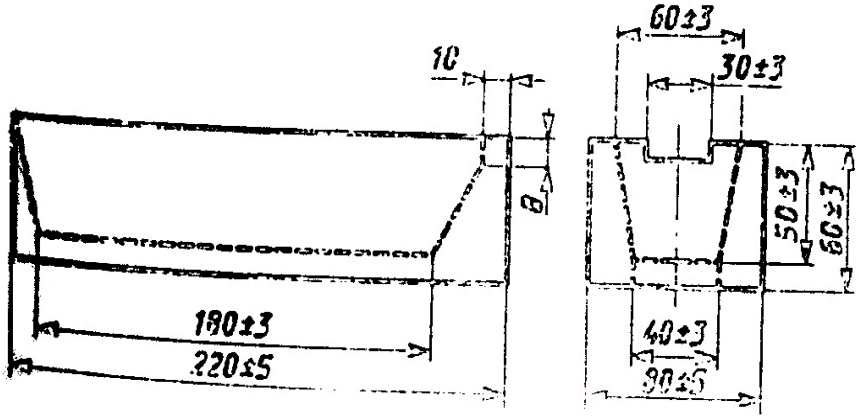

Figure 1 - Ingot mold

4.2.7. In case of unsatisfactory test results even for one of the parameters, repeat test of this parameter on double the number of samples, taken from the same melt, is carried out. Results of the repeat test are applicable for the whole melt.

4.3. Test procedures

4.3.1. Inspection for surface quality and ingots fissure is carried out visually, without using any magnifying glasses.

For seperation, it is permitted to cut the smaller side of ingots, by not more than 1/3 of its length.

4.3.2. Selection and preparation of sample for chemical analysis of ingots upto 20 kg – as per GOST 24231.

4.3.3. For checking the chemical composition and hydrogen content in refined alloys of ingots above 200 kg, the manufacturer pours sample of mass (1± 0.2 kg) in the mould at the middle of pouring of each melt. Selection & preparation of samples for chemical analysis of ingots above 200 kg is carried out as per GOST 24231 from samples, casted as per Fig.1.

4.3.4. Chemical composition of alloys is estimated as per GOST 25086, GOST 11739.1 – GOST 11739.24, GOST 7727, GOST 1762.0 – GOST 1762.7. It is permitted to estimate the chemical composition by other methods, which maintains the same accuracy standard.

During difference of opinion about the evaluation of chemical composition, carry out analysis as per GOST 25086, GOST 11739.1 – GOST 11739.24, GOST 1762.0 – GOST 1762.7

4.3.5. During selection, preparation of sample and chemical analysis, follow the safety requirements in accordance with GOST 12.2.009, GOST 12.1.005, GOST 12.1.007, and also the other standard documents for safe conductance of these jobs using protective means as per GOST 12.4.013, GOST 12.4.021.

4.3.6. While working with alloys, containing Beryllium, follow the “regulations for working with Beryllium and its combinations”, approved by the public health department.

4.3.7. Hydrogen content in alloys is estimated as per GOST 21132.0, GOST 21132.1 or as per standard technical documents.

4.3.8. Gaseous porosity is estimated by procedures, given in appendix Б. While determining the gaseous porosity, follow the safety requirements as per GOST 12.2.009, GOST 12.1.005, GOST 12.1.007, GOST 12.4.013, and GOST 12.4.021.

4.4 Transportation and storage

4.4.1. Ingots are transported by rail, sea & on road in accordance with the transportation rules for transporting the loads, effective for each type of transport vehicle. Ingots upto 20 kg are transported in packs.

4.4.2. Transportation of ingots by rail is carried out in transporting packs taking in account the general requirement of GOST 21399, GOST 24597.

Diagrams and dimensions of packs, and also their arrangement and fastening in the transportation vehicle should be established/set forth in the standard documents.

Large size ingots are transported in open rails.

4.4.3. On the side of the pack, tag is attached to the tying area.

While unloading of packs of larger batches above 50 T at the address of single customer, it is permitted if agreed with the customer, to put tags on minimum 10% of the packs from the whole batch.

Transporting marking as per GOST 14192.

4.4.4. Marking of products, meant for exports, is carried out in accordance with requirements as specified in the contract.

4.4.5. Colour making and weight of large sized ingots are written on the side of ingots. On ingots having hooks for cranes, colour marking and weight are written on the upper face part.

4.4.6. On the packs, containing ingots from different melts, on the ingots in the upper row of the pack, all melt numbers in the pack are marked with waterproof paint.

4.4.7. Ingots should be stored in closed premises. It is permitted to store the ingots of refined alloys in open spaces for a maximum period of 2 months.

5. ALLOYS CASTINGS

5.1. Technical requirements

5.1.1. The mechanical properties of the alloys should correspond to the values given in table 2.

Table 2

Alloy group	Grade of alloy	Casting process	Type of heat treatment	Ultimate tensile strength, MPa (kgf/mm^2)	Relative elongation in %	Hardness in Brinell HB
				Not less than		
I	АК12 (АЛ2)	ЗМ, ВМ, КМ	-	147(15.0)	4.0	50.0
		К	-	157(16.0)	2.0	50.0
		Д	-	157(16.0)	1.0	50.0
		ЗМ, ВМ, КМ	Т2	137(14.0)	4.0	50.0
		К	Т2	147(15.0)	3.0	50.0
		Д	Т2	147(15.0)	2.0	50.0
	АК13 (АК13)	Д	-	176(18.0)	1.5	60.0
	АК9 (АК9)	З, В, К, Д				
		ПД	-	157(16.0)	1.0	60.0
		К, Д, ПД	Т1	196(20.0)	0.5	70.0
		ЗМ, ВМ	Т6	235(24.0)	1.0	80.0
		К, КМ	Т6	245(25.0)	1.0	90.0
	АК9с (АК9с)	К, Д	-	147(15.0)	2.0	50.0
		К	Т1	196(20.0)	1.5	70.0
		К	Т6	235(24.0)	3.5	70.0
	АК9Ч (АЛ4)	З, В, К, Д	-	147(15.0)	2.0	50.0
		К, Д, ПД				
		КМ, ЗМ	Т1	196(20.0)	1.5	60.0
		ЗМ, ВМ	Т6	225(23.0)	3.0	70.0
		К, КМ	Т6	235(24.0)	3.0	70.0
		З	Т6	225(23.0)	2.0	70.0
	АК9пч (АЛ4-1)	З, В, К, Д	-	157(16.0)	3.0	50.0
		К, Д, ПД	Т1	196(20.0)	2.0	70.0
		ЗМ, ВМ	Т6	245(25.0)	3.5	70.0
		К, КМ	Т6	265(27.0)	4.0	70.0
	АК8л (АЛ34)	З	Т5	294(30.0)	2.0	85.0
		З	Т4	255(26.0)	4.0	70.0
		К	Т5	333(34.0)	4.0	90.0
		К	Т4	274(28.0)	6.0	80.0
		Д	-	206(21.0)	2.0	70.0
		Д	Т1	225(23.0)	1.0	80.0
		Д	Т2	176(18.0)	2.5	60.0
	АК7 (АК7)	З	-	127(13.0)	0.5	60.0
		К	-	157(16.0)	1.0	60.0
		З	Т5	176(18.0)	0.5	75.0
		К	Т5	196(20.0)	0.5	75.0
		Д	-	167(17.0)	1.0	50.0
		ПД	-	147(15.0)	0.5	65.0
	АК7ч (АЛ9)	З, В, К	-	157(16.0)	2.0	50.0
		Д	-	167(17.0)	1.0	50.0

Contd., Table 2

Alloy group	Grade of alloy	Casting process	Type of heat treatment	Ultimate tensile strength, MPa (kgf/mm^2)	Relative elongation in %	Hardness in Brinell HB
				Not less than		
1	АК7ч (АЛ9)	З, В, К, Д	Т2	137(14.0)	2.0	45.0
		КМ	Т4	186(19.0)	4.0	50.0
		З,В	Т4	176(18.0)	4.0	50.0
		К, КМ	Т5	206(21.0)	2.0	60.0
		З, В	Т5	196(20.0)	2.0	60.0
		ЗМ, ВМ	Т5	196(20.0)	2.0	60.0
		ЗМ, ВМ	Т6	225(23.0)	1.0	70.0
		ЗМ, ВМ	Т7	196(20.0)	2.0	60.0
		ЗМ, ВМ	Т8	157(16.0)	3.0	55.0
		К	Т6	235(24.0)	1.0	70.0
		К	Т7	196(20.0)	2.0	60.0
		К	Т8	157(16.0)	3.0	55.0
	АК7пч (АЛ9-1)	З, В	Т4	196(20.0)	5.0	50.0
		К, КМ	Т4	225(23.0)	5.0	50.0
		З, В	Т5	235(24.0)	4.0	60.0
		ЗМ, ВМ	Т5	235(24.0)	4.0	60.0
		К, КМ	Т5	265(27.0)	4.0	60.0
		ЗМ, ВМ	Т6	274(28.0)	2.0	70.0
		К, ВМ	Т6	294(30.0)	3.0	70.0
		Д	-	196(20.0)	1.0	50.0
		Д	Т2	167(17.0)	2.0	45.0
		ЗМ, ВМ	Т7	206(21.0)	2.5	60.0
		ЗМ, ВМ	Т8	167(17.0)	3.5	55.0
	АК10Су (АК10Су)	К	-	167(17.0)	1.0	70.0
	АК5М2 (АК5М2)	З	-	118(12.0)	-	65.0
		К	-	157(16.0)	0.5	65.0
		З	Т5	196(20.0)	-	75.0
		К	Т5	206(21.0)	0.5	75.0
		З	Т8	147(15.0)	1.0	65.0
		К	Т8	176(18.0)	2.0	65.0
		Д	-	147(15.0)	0.5	65.0
II	АК5М (АЛ5)	З, В, К	Т1	157(16.0)	0.5	65.0
		З, В	Т5	196(20.0)	0.5	70.0
		К	Т5	216(22.0)	0.5	70.0
		З, В	Т6	225(23.0)	0.5	70.0
		З, В, К	Т7	176(18.0)	1.0	65.0
		К	Т6	235(24.0)	1.0	70.0
	АК5Мч (АЛ5-1)	З, В, К	Т1	176(18.0)	1.0	65.0
		З, В	Т5	274(28.0)	1.0	70.0
		К, КМ	Т5	294(30.0)	1.5	70.0
		З, В, К	Т7	206(21.0)	1.5	65.0

Contd., Table 2

Alloy group	Grade of alloy	Casting process	Type of heat treatment	Ultimate tensile strength, MPa (kgf/mm^2)	Relative elongation in %	Hardness in Brinell HB
				Not less than		
II	АК6М2 (АК6М2)	К	Т1	196(20.0)	1.0	70.0
		К	-	230(23.5)	2.0	78.4
		К	Т5	294(30.0)	1.0	75.0
	АК8М (АЛ32)	З	Т6	245(25.0)	1.5	60.0
		К	Т1	196(20.0)	1.5	70.0
		К	Т6	265(27.0)	2.0	70.0
		Д	-	255(26.0)	2.0	70.0
		Д	Т2-1	255(26.0)	1.7	70.0
		З	Т5	235(24.0)	2.0	60.0
		К	Т5	255(26.0)	2.0	70.0
		З	Т7	225(23.0)	2.0	60.0
		К	Т7	245(25.0)	2.0	60.0
		З	Т1	176(18.0)	0.5	60.0
		Д	Т1	284(29.0)	1.0	90.0
		Д	Т2	235(24.0)	2.0	60.0
	АК5М4 (АК5М4)	З	-	118(12.0)	-	60.0
		К	-	157(16.0)	1.0	70.0
		К	Т6	196(20.0)	0.5	90.0
	АК5М7 (АК5М7)	З	-	127(13.0)	-	70.0
		К	-	157(16.0)	-	70.0
		К	Т1	167(17.0)	-	90.0
		З	Т1	147(15.0)	-	80.0
		Д	-	118(12.0)	-	80.0
	АК8М3 (АК8М3)	К	-	147(15.0)	1.0	70.0
		К	Т6	216(22.0)	0.5	90.0
	АК8М3ч (ВАЛ8)	К, ПД	Т4	343(35.0)	5.0	90.0
		К, ПД	Т5	392(40.0)	4.0	110
		Д	-	294(30.0)	2.0	75.0
		Д	Т5	343(35.0)	2.0	90.0
		Д	Т2	215(22.0)	1.5	60.0
		З	Т5	345(35.0)	1.0	90.0
		В	Т5	345(35.0)	2.0	90.0
		З	Т7	270(27.0)	1.0	80.0
		К	Т7	295(30.0)	2.5	85.0
	АК9М2 (АК9М2)	К	-	186(19.0)	1.5	70.0
		Д	-	196(20.0)	1.5	75.0
		К	Т6	274(28.0)	1.5	85.0
		К	Т1	206(21.0)	1.4	80.0
	АК12М2 (АК12М2)	К	-	186(19.0)	1.0	70.0
		Д	Т1	260(26.5)	1.5	83.4

Contd., Table 2

Alloy group	Grade of alloy	Casting process	Type of heat treatment	Ultimate tensile strength, MPa (kgf/mm^2)	Relative elongation in %	Hardness in Brinell HB
				Not less than		
II	АК12ММгН (АЛ30)	К	Т1	196(20.0)	0.5	90.0
		К	Т6	216(22.0)	0.7	100.0
	АК12М2МгН (АЛ25)	К	Т1	186(19.0)	-	90.0
	АК12М2.5Н2.5	К	Т2	157(16.0)	-	90.0
	(ВКЖЛС-2)	К	Т1	186(19.0)	-	100.0
III	АМ5 (АЛ19)	З, В, К	Т4	294(30.0)	8.0	70.0
		З, В, К	Т5	333(34.0)	4.0	90.0
		З	Т7	314(32.0)	2.0	80.0
	АМ4.5Кд (ВАЛ10)	З, В	Т4	294(30.0)	10.0	70.0
		К	Т4	314(32.0)	12.0	80.0
		З, В	Т5	392(40.0)	7.0	90.0
		К	Т5	431(44.0)	8.0	100.0
		З, В	Т6	421(43.0)	4.0	110.0
		К	Т6	490(50.0)	4.0	120.0
		З	Т7	323(33.0)	5.0	90.0
IV	АМгК1.5	К	Т2	211(21.5)	2.0	81.0
	(АМгК1.5М1)	К	Т6	265(27.0)	2.3	104.0
	АМг5К (АЛ13)	З, В, К	-	147(15.0)	1.0	55.0
		Д	-	167(17.0)	0.5	55.0
	АМг5Мц (АЛ28)	З, В	-	196(20.0)	4.0	55.0
		К	-	206(21.0)	5.0	55.0
		Д	-	206(21.0)	3.5	55.0
	АМг6л (АЛ23)	З, В	-	186(19.0)	4.0	60.0
		К, Д	-	216(22.0)	6.0	60.0
		З, К, В	Т4	225(23.0)	6.0	60.0
	АМг6лч (АЛ23-1)	З, В	-	196(20.0)	5.0	60.0
		К, Д	-	235(24.0)	10.0	60.0
		З, К, В	Т4	245(25.0)	10.0	60.0
	АМг10 (АЛ27)	З, К, Д	Т4	314(32.0)	12.0	75.0
	АМг10ч (АЛ27-1)	З, О, К, Д	Т4	343(35.0)	15.0	75.0
	АМг11 (АЛ22)	З, В, К	-	176(18.0)	1.0	90.0
		З, В, К	Т4	225(23.0)	1.5	90.0
		Д	-	196(20.0)	1.0	90.0
	АМг7 (АЛ29)	Д	-	206(21.0)	3.0	60.0
V	АК7Ц9 (АЛ11)	З, В	-	196(20.0)	2.0	80.0
		К	-	206(21.0)	1.0	80.0
		Д	-	176(18.0)	1.0	60.0
		З, В, К	Т2	216(22.0)	2.0	80.0
	АК9Ц6 (АК9Ц6р)	З	-	147(15.0)	0.8	70.0
		К, Д	-	167(17.0)	0.8	80.0

Contd., Table 2

Alloy group	Grade of alloy	Casting process	Type of heat treatment	Ultimate tensile strength	Relative elongation in %	Hardness in Brinell HB
				Not less than		
	АЦМг (АЛ24)	З, В З, В	- Т5	216(22.0) 265(27.0)	2.0 2.0	60.0 70.0

Note:

1. Conventional designation for casting process:
   - З - casting in sand moldings;
   - В - investment pattern molding;
   - К - die/chill casting;
   - D - Pressure die-casting/ injection molding;
   - Пd - Pressure die-casting/ injection molding with crystallization (molten stamping);
   - О - casting in shell molds;
   - М - alloys subjected to modification.
2. Conventional designation of Heat-treatment:
   - Т1 - artificial ageing without preliminary hardening;
   - Т2 - annealing;
   - Т4 - hardening;
   - Т5 - hardening and short duration (partial) artificial ageing;
   - Т6 - hardening and total artificial ageing;
   - Т7 - hardening and stabilizing tempering;
   - Т8 - hardening and moderate tempering.
3. Mechanical properties of alloys АК7Ц9 and АК9Ц6 are determined after minimum one day of natural ageing.
4. Mechanical properties, shown for casting process В, also covers for casting in shell molds.

5.1.2. Recommended modes for heat treatment of alloys in castings are given in Appendix B.

5.1.3. Mechanical properties of alloys, which are not given in table 2, should correspond to standard documentation for castings.

5.2. Test procedure

5.2.1. Chemical composition is determined as per GOST 25086, GOST 11739.1 – GOST 11739.24, GOST 7727. It is permitted to determine the chemical composition

by other methods, which maintains the accuracy standards/quality.

In case of difference of opinion about evaluation of the chemical composition, carry out analysis as per GOST 25086, GOST 11739.1 – GOST 11739.24.

5.2.2. Mechanical properties of alloys are determined on separate casting samples or samples, turned from special casting billet or poured in the casting billet, casted in die/chill casting or in sand mold.

5.2.3. Shape and dimensions of separate casted samples during sand molding and die/chill casting should correspond to those given in Fig. 2 and table 3, and for pressure die casting – those given in Fig. 3.

Table 3 Dimensions, mm

Sample Number	d_0	l_0	l	D	h_1	h_2	r	L
2	12	60	72	18	52	12	25	200
1	10	50	60	15	40	10	25	160

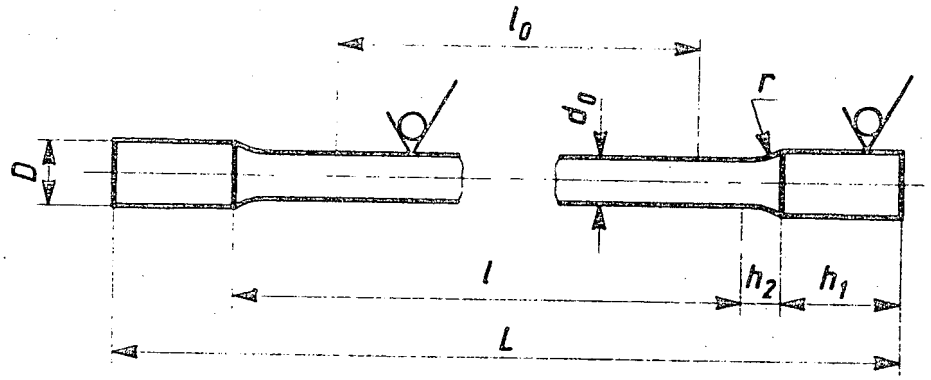

Fig. 2 - Shape and dimensions of sample of die/chill casting & sand molds

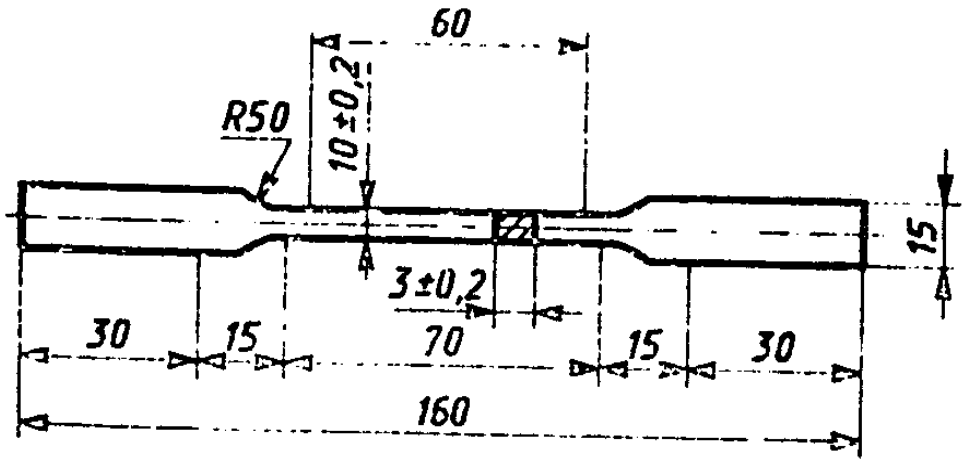

Fig. 3 – Shape and dimensions of sample of pressure die-casting

Permissible difference of maximum and minimum diameter along the length of the active part of sample should not be more than 0.3 mm.

It is permitted to reduce the length of sample head, during this head length is determined by the design of the clamp of testing machine.

For large samples (sand molds and die/chill castings) calculated/design length of the sample should be $l_0 = 5d_0$.

Horizontally arrangement of casting samples in molds is recommended.

5.2.4. Blanks, from which the sample is turned, should have diameter 20 mm and should be in accordance with Fig. 4. Dimensions shown in Fig. 4, are for reference and are given for the design of molds. Shape and dimensions of turned samples should be in accordance with GOST 1497. Diameter of calculated/design length of samples should not be less than 5 mm, design length $l_0 = 5\ d_0$.

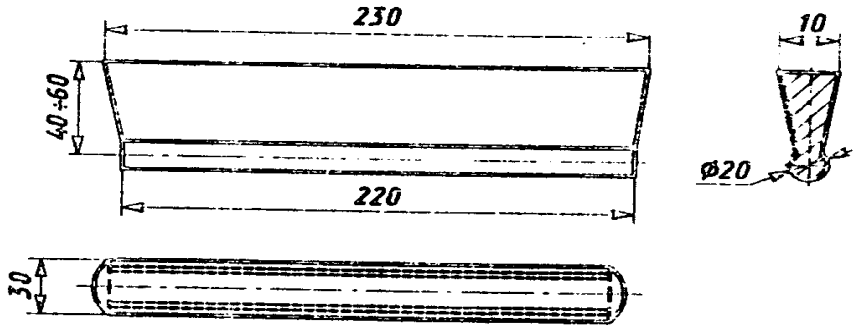

Fig 4. - Billet for sample turning

Shapes and dimensions of the casting billets during chill/die casting or sand molds are specified in the standard documents or by the manufacturer

5.2.5 Shape and dimensions of separately casted samples of investment pattern should be determined by the standard documents. Calculated/design length should be $l_0 = 5d_0$.

Shape and dimension of the molded or separately molded billets are specified by the manufacturer or specified in standard documents for casting.

5.2.6 Separate molded samples for all types of castings are tested with casting skin. Non-uniformity of the casting skin at places of dressing of the sample surface is permitted.

5.2.7 While determining the mechanical properties for samples with calculated

length below 60 mm for alloys, for which the minimum value of relative elongation is below 1 %, relative elongation is not determined.

5.2.8 Casting process and type of heat treatment of samples for testing should be in accordance with the casting process and heat treatment mode, as established/specified for casts from these alloys. For all types of castings, inspection of mechanical properties for samples of die/chill casting or sand molds is permitted

5.2.9 Parameters of mechanical properties of samples, cut from castings, should be specified in the standard document for casting.

5.2.10 Mechanical properties are determined as per GOST 1497, hardness in Brinell – as per GOST 9012 at ball diameter 10 mm and load 9806 N (1000 kgf) or at ball diameter 5 mm and load 2450 N (250 kgf) withhold time for both cases - from 10 to 30 sec.

5.2.11 Gaseous porosity of casting is determined, immediately on the casting or on the samples cut from the castings, in accordance with 4.3.8.