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Zinc and zinc alloys — Castings — Specifications

Zinc et alliages de zinc — Pièces moulées — Spécifications



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15201 was prepared by Technical Committee ISO/TC 18, *Zinc and zinc alloys*, Subcommittee SC 2, *Zinc alloys for casting*.

Zinc and zinc alloys — Castings — Specifications

1 Scope

This International Standard specifies the designation, chemical composition, marking and other requirements for zinc alloy castings, produced by pressure die, permanent mould or sand casting, or another casting process.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 301, *Zinc alloy ingots intended for casting*

ISO 7000:2004, *Graphical symbols for use on equipment — Index and synopsis*

EN 10204, *Metallic products — Types of inspection documents*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

pressure die casting

metal object produced by injecting molten metal under high pressure and high velocity into a metal die

3.2

permanent mould casting

metal object produced by introducing molten metal by gravity or low pressure into a mould or die constructed of durable material, usually iron or steel, and allowing it to solidify

NOTE When a graphite mould is used, the process is known as "graphite permanent mould casting".

3.3

sand casting

metal object produced by introducing molten metal by gravity into a sand mould and allowing it to solidify

4 Casting designation

4.1 General

Zinc alloy castings conforming to this International Standard shall be designated by a number or short designation in accordance with the system given in ISO 301, but having a letter P in the second character position. P indicates that the product is a casting.

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NOTE Informative Annex B gives the relationship between the national alloy designations and the designations used in this International Standard.

4.2 Designation by a number

The alloy number shall be in accordance with the system given in ISO 301.

EXAMPLE A zinc alloy casting made from an alloy consisting nominally of 4 % aluminium, 1 % copper, and the remainder zinc, shall be designated: ZP0410.

4.3 Short designation

The short designation shall be in accordance with the system given in ISO 301.

EXAMPLE A zinc alloy casting made from an alloy consisting nominally of 4 % aluminium, 1 % copper, and the remainder zinc, shall be designated: ZP5.

5 Manufacture

The castings according to this International Standard shall be manufactured from:

- a) zinc alloy ingot or liquid conforming to one of the alloys given in ISO 301; and/or
- b) the die caster's own process returns, e.g. sprues, runners and overflows; and/or
- c) the die caster's own castings rejected from foundry secondary operations, excluding metallic-coated castings.

Materials that could cause contamination shall not be used.

6 Ordering information

To facilitate commercial relations with the supplier, the purchaser shall state, in the enquiry and order, the following information:

- a) the number of this International Standard (ISO 15201);
- b) the designation of the casting required (see Clause 4);
- c) any special requirements which shall be agreed by the time of acceptance of the order.

7 Requirements

7.1 Chemical composition

Zinc alloy castings shall conform to the relevant chemical composition given in Table 1.

7.2 Additional requirements

Any additional requirements shall be agreed between the purchaser and the supplier at the time of acceptance of the order.

8 Sampling

For routine sampling of a batch of castings for chemical analysis, the sampling techniques and frequency shall be at the discretion of the supplier.

In case of dispute, the procedures and frequency of sampling for chemical analysis shall be agreed between the purchaser and the supplier.

9 Chemical analysis methods

9.1 Analysis methods

9.1.1 For the routine testing of castings, the methods of analysis to be used on the samples obtained in accordance with Clause 8 shall be at the discretion of the supplier.

9.1.2 In the case of dispute concerning the conformity of castings to the chemical composition limits, the chemical composition shall be determined on the samples obtained by appropriate ISO wet chemical analysis methods.

The samples for wet chemical analysis shall be obtained from non-coated castings.

For coated castings, expert knowledge should be sought for coating removal.

A test report shall give full details of the sample analysis.

9.2 Rounding procedure

The following rounding procedure shall be used.

- a) If the figure immediately after the last figure to be retained is less than five, the last figure to be retained shall be kept unchanged.
- b) If the figure immediately after the last figure to be retained is greater than five, the last figure to be retained shall be increased by one.
- c) If the figure immediately after the last figure to be retained is equal to five, the last figure to be retained shall be the nearest even number.

EXAMPLES 3,62 becomes 3,6

 3,65 becomes 3,6

 3,67 becomes 3,7

 3,72 becomes 3,7

 3,75 becomes 3,8

 3,77 becomes 3,8

10 Marking and labelling

10.1 Castings

Where possible, the castings shall be marked or labelled with the following information unless the supplier and purchaser agree to omit some of the following markings:

- a) producer's mark;
- b) short designation (see Table 1);
- c) recycling mark (see Annex A);
- d) production period.

10.2 Packaging

Containers of castings in process shall be identified, e.g. alloy number, designation, colour code (see Table 1).

11 Inspection document

If requested by the purchaser at the time of ordering, the supplier shall furnish inspection documents with each consignment of castings. The documentation shall be as requested by the purchaser and shall be in accordance with either a) or b) as follows:

- a) a certificate in accordance with EN 10204, based either on
 - tests carried out on the delivered batch of castings, or
 - the producer's quality-control systems;
- b) a declaration of conformity of the consignment with the order requirements, signed by the supplier's authorized representative.

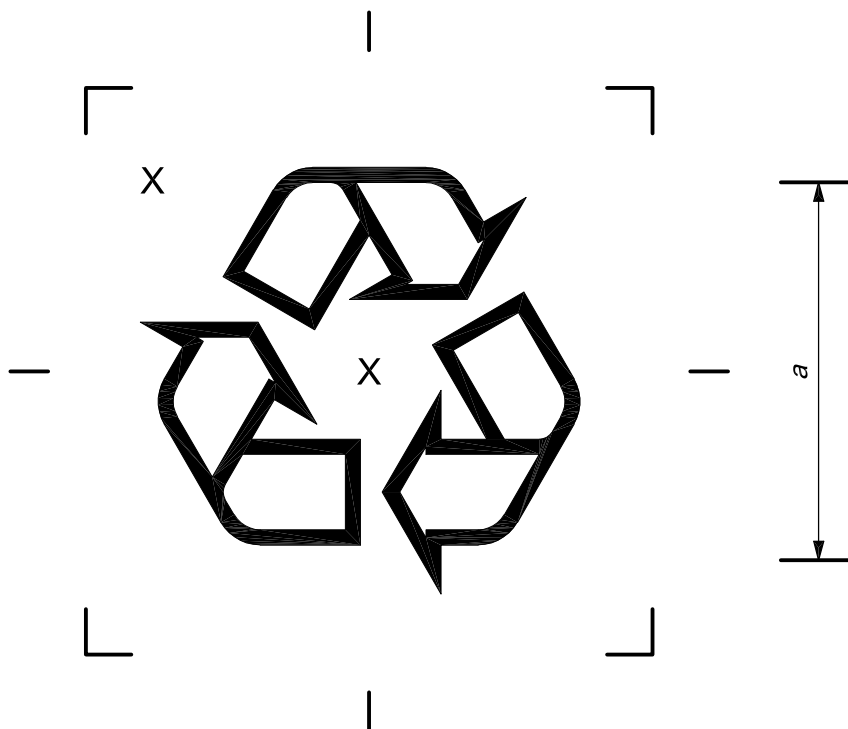
Table 1 — Chemical composition of zinc alloy castings

Alloy number	Short designation	Colour code	Element	Al	Cu	Mg	Pb	Cd	Sn	Fe	Zn	Chemical composition in % (mass fraction)	
												min.	max.
ZP0400	ZP3	white/yellow	min. max.	3,7	—	0,02	—	—	—	—	Remainder	—	—
				4,3	0,1	0,06	0,005	0,004	0,002	0,05	—		
ZP0410	ZP5	white/black	min. max.	3,7	0,7	0,02	—	—	—	—	Remainder	—	—
				4,3	1,2	0,06	0,005	0,004	0,002	0,05	—		
ZP0430	ZP2	white/green	min. max.	3,7	2,6	0,02	—	—	—	—	Remainder	—	—
				4,3	3,3	0,06	0,005	0,004	0,002	0,05	—		
ZP0810	ZP8	white/blue	min. max.	8,0	0,8	0,01	—	—	—	—	Remainder	—	—
				8,8	1,3	0,03	0,006	0,006	0,003	0,075	—		
ZP1110	ZP12	white/orange	min. max.	10,5	0,5	0,01	—	—	—	—	Remainder	—	—
				11,5	1,2	0,03	0,006	0,006	0,003	0,075	—		
ZP2720	ZP27	white/violet	min. max.	25,0	2,0	0,01	—	—	—	—	Remainder	—	—
				28,0	2,5	0,02	0,006	0,006	0,003	0,075	—		

Annex A
(normative)

Recycling mark

The recycling mark (Figure A.1) shall be in accordance with ISO 7000:2004, symbol number 1135 (Application).



Key

X position of short designation (inside or outside of the recycling mark)

Figure A.1 — Recycling mark

Example An example for zinc alloy casting ZP0410 is shown in Figure A.2.



Figure A.2 — Example of recycling mark for zinc alloy casting ZP0410

Annex B (informative)

Relationship between the alloy designations used in this International Standard and the corresponding designations used in a number of countries

Table B.1 — National alloy designations and corresponding designations in this International Standard

Alloy symbol	Alloy number	Europe CEN EN 1774	Japan JIS H5301	Australia AS 1881	USA ASTM B 86	UNS
ZnAl4	ZP0400	ZnAl4	ZDC 2	ZnAl4	AG40A	Z33521
ZnAl4Cu1	ZP0410	ZnAl4Cu1	ZDC 1	ZnAl4Cu1	AC41A	Z35531
ZnAl4Cu3	ZP0430	ZnAl4Cu3	—	—	AC43A	Z35541
ZnAl8Cu1	ZP0810	ZnAl8Cu1	—	—	ZA8	Z35636
ZnAl11Cu1	ZP1110	ZnAl11Cu1	—	ZnAl11Cu1	ZA12	Z35631
ZnAl27Cu2	ZP2720	ZnAl27Cu2	—	ZnAl27Cu2	ZA27	Z35841

Annex C (informative)

Properties of zinc-alloy die castings at 20 °C

Table C.1 is given for information only.

Table C.1 — Properties of zinc-alloy die castings at 20 °C

Alloy number		ZP0400	ZP0410	ZP0430	ZP0810	ZP1110	ZP2720
Short designation		ZP3	ZP5	ZP2	ZP8	ZP12	ZP27
Colour code		white/yellow	white/black	white/green	white/blue	white/orange	white/violet
Tensile strength	MPa	280	330	355	370	400	425
Elongation <i>A</i> (50 mm)	%	10	5	5	8	5	2,5
Brinell hardness HBW 500-10-30		83	92	102	100	100	120
Impact energy [unnotched (6,3 × 6,3) mm bar]	J	57	65	47	40	30	10
Young's modulus	GPa	85	85	85	86	82	78
0,2 % Yield strength	MPa	200	250	270	220	300	370
Fatigue strength (10 ⁸ cycles)	MPa	48	56	60	100	—	145
Creep stress for 0,5 % elongation (3 000 h)	MPa	80	100	130	160	—	100
Density	kg/dm ³	6,7	6,7	6,8	6,3	6	5
Melting range	°C	382 to 387	379 to 388	379 to 389	375 to 404	377 to 432	377 to 484
Coefficient of thermal expansion	µm/(m·K)	27	27	27	23	24	26
Thermal conductivity	W/(m·K)	113	110	119	115	116	126
Electrical conductivity	% IACS ^a	26	26	26	28	28	30

NOTE 1 The values given in this table are mid-range values and they are given for guidance only.

NOTE 2 1 MPa is equivalent to 1 N/mm².

NOTE 3 1 GPa is equivalent to 1 kN/mm².

NOTE 4 100 % IACS is equivalent to 58 S·m/mm².

^a IACS means. International Annealed Copper Standard.

Bibliography

- [1] EN 1774, *Zinc and zinc alloys — Alloys for foundry purposes — Ingot and liquid*
- [2] JIS H 5301, *Zinc alloys die castings*
- [3] AS 1881, *Zinc alloys — Casting ingots and castings — Quality requirements*
- [4] ASTM B 86, *Standard specification for zinc and zinc-aluminium (ZA) alloy foundry and die castings*

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