BRITISH STANDARD

BS EN
12844:1999

Zinc and zinc alloys — Castings — Specifications

The European Standard EN 12844:1998 has the status of a British Standard

ICS 77.150.60

National foreword

This British Standard is the English language version of EN 12844:1998. It supersedes BS 1004:1972 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NFE/8, Zinc and zinc alloys, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 8, an inside back cover and a back cover.

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 12844

November 1998

ICS 77.150.60

Descriptors: founding, castings, zinc, zinc alloys, specifications, definitions, designation, chemical composition, sampling, chemical analysis, marking, labelling, mechanical properties

English version

Zinc and zinc alloys — Castings — Specifications

Zinc et alliages de zinc — Pièces moulées — Spécifications

Zink und Zinklegierungen — Gußstücke — Spezifikationen

This European Standard was approved by CEN on 22 October 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 12844:1998 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 209, Zinc and zinc alloys, the Secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.

This European Standard is one of a series concerning zinc and zinc alloys for foundry purposes.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

1 Scope

This European Standard specifies the designation, chemical composition, marking and other requirements for zinc alloy castings.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1559-1, *Founding — Technical conditions of delivery — Part 1 : General.*

EN 1559-6, *Founding — Technical conditions of delivery — Part 6 : Additional requirements for zinc alloy castings.*

EN 1774, *Zinc and zinc alloys — Alloys for foundry purposes — Ingot and liquid.*

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

EN 12019, *Zinc and zinc alloys — Optical emission spectrometric analysis.*

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

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

pressure die casting

metal object produced by injecting molten metal under high pressure 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 standard shall be designated by number or short designation in accordance with the system given in EN 1774, but having a letter P in the second character position. P indicates that the product is a casting.

4.2 Designation by number

The alloy number shall be in accordance with the system given in EN 1774.

EXAMPLE

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

4.3 Short designation

The short designation shall be in accordance with the system given in EN 1774.

EXAMPLE

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

5 Manufacture

The castings according to this standard shall be manufactured from:

a) zinc alloy ingot or liquid conforming to one of the alloys given in EN 1774; 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.

Used recycled materials and all other materials which could cause contamination such as shredder scrap shall not be used.

6 Ordering information

In order to facilitate the enquiry, order and confirmation of order procedures between the purchaser and the supplier, the purchaser shall state on the enquiry and order the following information:

a) the number of this European Standard (EN 12844);

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 (see EN 1559-1 and EN 1559-6).

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 by the time of acceptance of the order.

Table 1 — Chemical composition of zinc alloy castings

Chemical composition in % (*m/m*)

Alloy number	Short designation	Colour code	Element	Al	Cu	Mg	Cr	Ti	Pb	Cd	Sn	Fe	Ni	Si	Zn
ZP0400	ZP3	white/yellow	min.	3,7	—	0,025	—	—	—	—	—	—	—	—	Remainder
			max.	4,3	0,1	0,06	—	—	0,005	0,005	0,002	0,05	0,02	0,03	—
ZP0410	ZP5	white/black	min.	3,7	0,7	0,025	—	—	—	—	—	—	—	—	Remainder
			max.	4,3	1,2	0,06	—	—	0,005	0,005	0,002	0,05	0,02	0,03	—
ZP0430	ZP2	white/green	min.	3,7	2,7	0,025	—	—	—	—	—	—	—	—	Remainder
			max.	4,3	3,3	0,06	—	—	0,005	0,005	0,002	0,05	0,02	0,03	—
ZP0610	ZP6	white/white	min.	5,4	1,1	—	—	—	—	—	—	—	—	—	Remainder
			max.	6,0	1,7	0,005	—	—	0,005	0,005	0,002	0,05	0,02	0,03	—
ZP0810	ZP8	white/blue	min.	8,0	0,8	0,015	—	—	—	—	—	—	—	—	Remainder
			max.	8,8	1,3	0,03	—	—	0,006	0,006	0,003	0,06	0,02	0,045	—
ZP1110	ZP12	white/orange	min.	10,5	0,5	0,015	—	—	—	—	—	—	—	—	Remainder
			max.	11,5	1,2	0,03	—	—	0,006	0,006	0,003	0,07	0,02	0,06	—
ZP2720	ZP27	white/violet	min.	25,0	2,0	0,01	—	—	—	—	—	—	—	—	Remainder
			max.	28,0	2,5	0,02	—	—	0,006	0,006	0,003	0,1	0,02	0,08	—
ZP0010	ZP16	white/brown	min.	0,01	1,0	—	0,1	0,15	—	—	—	—	—	—	Remainder
			max.	0,04	1,5	0,02	0,2	0,25	0,005	0,005	0,004	0,05	—	0,05	—

8 Sampling and analysis

8.1 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.

8.2 Analysis

8.2.1 For the routine testing of castings, the methods of analysis to be used on the samples obtained in accordance with **8.1** shall be at the discretion of the supplier.

8.2.2 In the case of dispute concerning the conformity of the castings to the chemical composition limits, when the sample quantity is sufficient, the chemical composition shall be determined on the samples obtained by optical emission spectrometric analysis, using the methods given in EN 12019.

The analysis sample shall then be:

— a purpose made sample, prepared by remelting, to give a test piece having a minimum mass of 100 g. In this case, the selection of the samples shall be such that it is representative of the tested lot;

— if the casting to be tested is too small and it is not possible to collect sufficient into a 100 g specimen, the sampling and test methods shall be agreed between the parties, and expert knowledge should be sought.

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

9 Marking and labelling

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 C);

d) production period.

10 Inspection documents

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 process control systems;

b) a declaration of conformity of the consignment with the order requirements, signed by the supplier's authorized representative.

11 Rounding of numbers

In expressing the results for the analysis, the values obtained shall be rounded in one step to the same number of figures used to express the specified limit in Table 1. The following rules shall be used for rounding:

a) if the figure immediately after the last figure to be retained is less than 5, the last figure to be retained shall be kept unchanged;

b) if the figure immediately after the last figure to be retained is equal to or greater than 5, the last figure to be retained shall be increased by 1.

Annex A (informative)
Relationship between the zinc alloy designation for castings used in this standard and the corresponding designations previously used in a number of countries

Table A.1 — Former national zinc alloy designations and corresponding designations in this standard

Alloy number	Short designation	U.K. BS 1004	France NF A 55-010	Germany DIN 1743-2	Spain UNE 37302-88	Italy UNI 3717 UNI 9408	Norway NS 16930	Sweden SIS 147020	Portugal NP 1632/31	U.S.A. ASTM B 240 ASTM B 669
ZP0400	ZP3	Alloy A	Z-A4	Z400	ZnAl4	G-ZnAl4[1)]	ZnAl4	ZnAl4	FZnAl4Mg	AG40A
ZP0410	ZP5	Alloy B	Z-A4U1	Z410	ZnAl4Cu1	G-ZnAl4Cu1[1)]	ZnAl4Cu1	ZnAl4Cu1	FZnAl4Cu1Mg	AG41A
ZP0430	ZP2	—	Z-A4U3	Z430	ZnAl4Cu3	G-ZnAlC3[1)]	—	—	—	AG43A
ZP0610	ZP6	—	—	Z610	ZnAl6Cu1	—	—	—	—	—
ZP0810	ZP8	—	Z-A8U1	—	—	G-ZnAl8Cu1[2)]	—	—	—	ZA8
ZP1110	ZP12	—	—	—	ZnAl11Cu1	G-ZnAl11Cu1[2)]	—	—	—	ZA12
ZP2720	ZP27	—	—	—	—	G-ZnAl27Cu2[2)]	—	—	—	ZA27
ZP0010	ZP16	—	—	—	—	—	—	—	—	—

[1)] According to UNI 3717.

[2)] According to UNI 9408.

Annex B (informative)
Properties of zinc alloy die castings at 20 °C

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

Alloy number		ZP0400	ZP0410	ZP0430	ZP0610[1)]	ZP0810	ZP1110	ZP2720	ZP0010
Short designation		ZP3	ZP5	ZP2	ZP6	ZP8	ZP12	ZP27	ZP16
Colour code		white/yellow	white/black	white/green	white/white	white/blue	white/orange	white/violet	white/brown
Tensile strength	MPa	280	330	355	—	370	400	425	220
Elongation *A* (50 mm)	%	10	5	5	—	8	5	2,5	—
Brinell Hardness HBS 500-10-30		83	92	102	—	100	100	120	—
Impact energy (un-notched 6,3 mm × 6,3 mm bar)	J	57	58	59	—	40	30	10	—
Youngs 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	6,5	6,3	6	5	7,2
Melting range	°C	382 to 387	379 to 388	379 to 389	375 to 395	375 to 404	377 to 432	377 to 484	410 to 420
Coefficient of thermal expansion	µm/(m·K)	27	27	27	25	23	24	26	—
Thermal conductivity	W/(m·K)	113	110	119	115	115	116	126	109
Electrical conductivity	% IACS	26	26	26	27	28	28	30	24

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/mm^2.

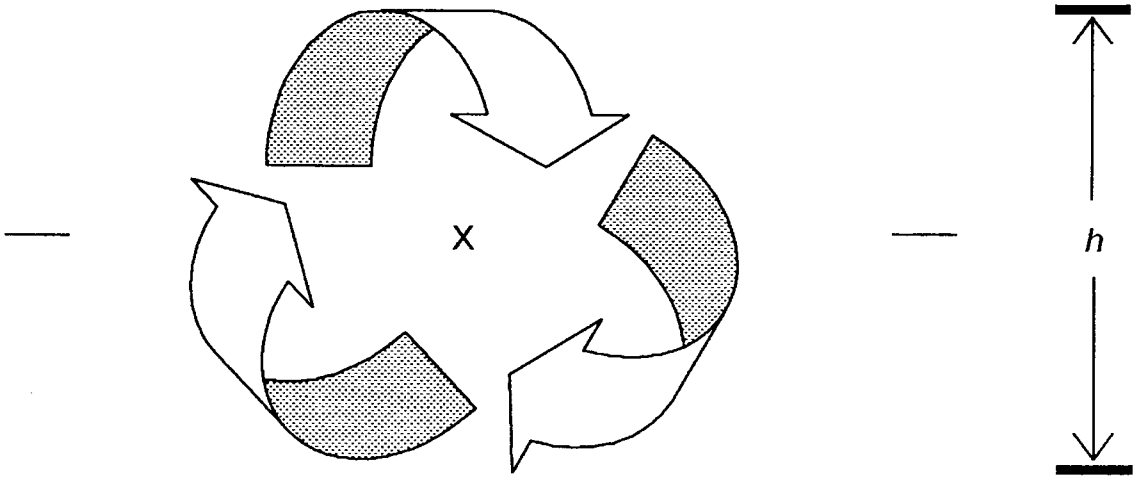
NOTE 3 1 GPa is equivalent to 1 kN/mm^2.

NOTE 4 100 % IACS is equivalent to 58 S·m/mm^2.

[1)] Normally not supplied in die-cast form.

Annex C (informative)
Recycling mark

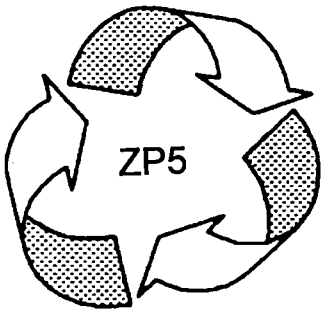
The recycling mark (Figure C.1) shall be in accordance with ISO 7000, symbol number 1135-BA.

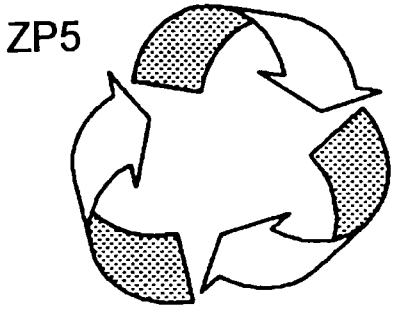


X short designation

Figure C.1 — Recycling mark

EXAMPLE
Zinc alloy casting ZP0410





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