

Australian Standard™

**Founding—Patterns, pattern equipment
and coreboxes for the production of
sand moulds and sand cores**



This Australian Standard was prepared by Committee MT-001, Iron and Steel. It was approved on behalf of the Council of Standards Australia on 30 May 2005. This Standard was published on 15 June 2005.

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- Australian Railway Associations
- Australian Building Codes Board
- Australian Foundry Institute
- Australian Industry Group
- Australian Steel Institute
- Bureau of Steel Manufacturers of Australia
- Institute of Material Engineering Australia

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**Founding—Patterns, pattern equipment
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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee MT-001, Iron and Steel. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard.

The objective of this Standard is to specify the general technical delivery requirements for patterns to be used for iron, steel and non-ferrous castings.

This Standard is intended for purchasers, manufacturers (patternmakers) and founders. It is also intended to ensure the correct interpretation of casting and tooling drawings/numerical data and to ensure that pattern equipment will produce sand moulds and/or sand cores, suitable for use, and to assist in determining the usually undefined limits of good workmanship. This Standard stresses the need for consultation between the purchaser, manufacturer (patternmaker) and founder before work commences.

This Standard not only specifies the usual features of design, construction, materials, tolerances, contractions and required machining allowances but also specifies other features such as usage, classification, quality control, marking, packaging and storage.

During the preparation of this Standard, cognizance was taken of the following European Standard:

EN

12890 Founding—Patterns, pattern equipment and coreboxes for the production of sand moulds and sand cores

This Standard is one of a series of Standards covering the range of cast irons and steels. The series comprises the following:

AS

1830 Grey cast iron

1831 Ductile cast iron

1832 Malleable cast iron

1833 Austenitic cast iron

2027 Wear-resistant white cast iron

2074 Cast steels

4314 Founding—Patterns, pattern equipment and coreboxes for the production of sand moulds and sand cores (this Standard)

4738 Metal castings

4738.1 Part 1: Ferrous sand moulded

5049 Cast iron—Designation of microstructure of graphite

The terms ‘normative’ and ‘informative’ have been used in this standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a standard, where an ‘informative’ appendix is only information and guidance

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STANDARDS AUSTRALIA

Australian Standard

Founding—Patterns, pattern equipment and coreboxes for the production of sand moulds and sand cores**1 SCOPE**

This Standard specifies the requirements for patterns, pattern equipment and coreboxes for the production of sand moulds and/or sand cores.

This Standard does not specify equipment for the production of lost wax patterns, permanent moulds and die casting dies or ancillary items used in the manufacture of pattern equipment (such as screws and dowels).

2 REFERENCE DOCUMENTS

The following documents are referred to in this Standard:

AS

1100 Technical drawing

1100.201 Part 201: Mechanical engineering drawing

1199 Sampling procedures for inspection by attributes.

1199.0 Part 0: Introduction to the ISO 2859 attribute sampling system

1199.1 Part 1: Sampling schemes indexed by acceptable quality limit (AQL) for lot-by-lot inspection

1654 ISO system of limits and fits

1654.1 Part 1: Bases of tolerance, deviations and fits

4738 Metal castings

4738.1 Part 1: Ferrous sand moulded

AS/NZS

1604 Specifications for preservative treatment

1604.3 Part 3: Plywood

ISO 9001 Quality management systems—Requirements

ISO 9004 Quality management systems—Guidelines for performance improvements

HB 18 Guidelines for third-party certification and accreditation

HB 18.28 Guide 28 General rules for a model third-party certification scheme for products

3 DEFINITIONS

For the purposes of this Standard, the definitions below apply:

3.1 Purchaser

Person or body responsible for the ordering of the patterns, pattern equipment and coreboxes.

3.2 Manufacturer (patternmaker)

Person or body responsible for the production of the patterns, pattern equipment and coreboxes.

3.3 Founder

Person or body responsible for the manufacture of castings from the moulds made from patterns, pattern equipment and coreboxes supplied to it by the manufacturer (pattern maker) or the purchaser.

3.4 Sand mould

Part or assembly of parts, made of heat resistant sand (such as silica sand and zircon sand), which usually forms the external surfaces of a casting and is not re-usable after pouring.

3.5 Sand core

Part or assembly of parts, made of heat resistant sand (such as silica sand and zircon sand), which usually forms the inner surfaces of a casting and is not re-usable after pouring.

3.6 Pattern

Model which forms part or all of a subsequent mould or core assembly.

3.7 Corebox

Model which forms all of a core or part or all of a subsequent core assembly.

3.8 Pattern equipment

All the components which make up all the necessary pieces to ensure the correct manufacture of a mould.

3.9 Quality class

Classification system which enables the parties concerned with the manufacture and use of patterns, pattern equipment and core boxes to be aware of their properties (such as fitness for purpose, quality and expected usage).

3.10 Contract review

Analysis and/or check of the order details carried out by the parties concerned, both before and during the processing of the order.

3.11 Core print

Projection either attached to a pattern to form recesses in the mould or attached to a core at points where cores are to be supported.

3.12 Required machining allowance (RMA)

Material deliberately added to certain surfaces of patterns, pattern equipment and coreboxes which is removed, partially or wholly, from the casting during subsequent machining.

3.13 Contraction allowance

The dimensional variation or allowance added to the pattern in order to compensate for shrinkage of the casting during cooling from the pouring temperature.

3.14 Taper

Slope or angle deliberately given to certain pattern or corebox surfaces to aid the stripping of the pattern from the mould or the core from the corebox.

NOTE: Taper is sometimes referred to as draft or draft angle.

3.15 Clearance

Space deliberately built into certain pattern or corebox surfaces to aid the assembly of the mould and/or core.

4 ORDER INFORMATION AND DELIVERY CONDITIONS

4.1 General

Clause 4 details the technical order information and delivery condition requirements to be agreed between the purchaser and the manufacturer (patternmaker). These requirements shall be in accordance with AS 4738.1.

The patterns, pattern equipment and coreboxes may be ordered either by the purchaser or by the founder. If the founder does not order directly, then consultation between the purchaser and founder is required.

As applicable, an agreement and an exchange of information carried out between the purchaser, the manufacturer (patternmaker), and the founder by the time of the acceptance of the order, is required to ensure a full understanding of the respective requirements of the parties concerned.

NOTE: The production of castings requires the use of patterns and/or coreboxes. The starting point in their manufacture is the drawing/numerical data of the as-cast casting and/or the machined part as agreed with the purchaser who can either—

- (a) order the castings and pattern equipment together from the founder who can sub-contract the pattern equipment manufacture to a patternmaker; or
- (b) order the castings from the founder and the patterns, pattern equipment and coreboxes from the manufacturer (patternmaker) separately.

4.2 Pre-production requirements

The following items shall be the subjects of agreement at the time of enquiry and before placing the order:

- (a) Cast material(s) and its (their) identification.
- (b) Moulding and/or coremaking techniques.
- (c) Dimensional tolerances.
- (d) Mould and core joint lines.
- (e) Pattern equipment identification.
- (f) Pattern surface coating.
- (g) Contractions.
- (h) Clearances.
- (i) Tapers.
- (j) Required machining allowances.
- (k) Pattern material(s).
- (l) Pattern material quality class(es).
- (m) Extent and type of quality inspection.
- (n) Protection and packaging for transportation and storage.

4.3 Mandatory information

The order shall include information on:

- (a) Designation of material to be cast (symbol and/or number).
- (b) Number of castings to be produced.
- (c) Number of sets of pattern equipment to be supplied.
- (d) Delivery time.

- (e) Relevant drawing(s) or numerical data.
- (f) Quality class(es) required.
- (g) Inspection(s) and documentation required.
- (h) Specification of the pattern and/or corebox materials to be used.
- (i) Moulding joint(s) and core print configuration.
- (j) Sizes and positions of gates and risers if required.
- (k) Contractions allowance to be used.
- (l) Type of protection and packaging.
NOTE: Transport arrangements may be included.
- (m) Repair and refurbishment.
- (n) Storage arrangement.
- (o) Approval procedure.
- (p) Any other requirements.
- (q) Core print configuration.
NOTE: Example size and shape of core prints or checks to prevent reversal.

5 CONTRACTION ALLOWANCE

The contraction allowance (see Appendix C) for patterns may vary as a result of material specification, various grades within a material specification the process of manufacture and the shape of the casting to be produced. Contraction rates may also vary within an individual pattern. For this reason the patternmaker shall discuss contraction rates with the casting supplier prior to manufacture of the pattern.

6 CLASSIFICATION

Patterns, pattern equipment and coreboxes shall be classified in accordance with the quality classes given in Table 1. In Table 1, reference is made to Tables 2 to 5 in which the applicability of the material is specified (see also Appendix A).

TABLE 1
QUALITY CLASSES FOR PATTERNS, PATTERN EQUIPMENT
AND COREBOXES

Material type	Quality classes	For further details
Wood	H1, H2, H3	See Tables 2 and 5
Metal	M1, M2	See Tables 3 and 5
Plastics	K1, K2	See Tables 4 and 5

7 SPECIFICATIONS

7.1 General

Drawings/numerical data, design and specifications shall be in accordance with the requirements of AS 4738.1, as applicable.

The quality class of patterns, pattern equipment and coreboxes shall be stated on the order (see Tables 2 to 5).

7.2 Designation

The designation of the quality class on relevant documents shall contain the following:

- (a) The number of this Australian Standard (AS 4314).
- (b) The quality class.

EXAMPLE: AS 4314-H3

TABLE 2A
QUALITY CLASSES—PATTERNS, PATTERN EQUIPMENT AND
COREBOXES MADE OF WOOD

Feature	Quality class		
	H1	H2	H3
Use	For large quantities in hand and machine moulding shops when very high standards are required	For small quantities and recurring single castings in hand and machine moulding shops.	For single castings in hand moulding shops.
Number of moulds*: Large pattern sizes† Intermediate patterns sizes‡ Small pattern sizes‡	Up to 200 200 up to 5000 1000 up to 10 000	5 up to 20 20 up to 100 100 up to 200	Up to 10 10 up to 20 20 up to 50
Material type‡	Plywood panels, composite boards, hardwood or softwood shall be used	Veneered panels or soft sawn timber	Soft sawn timber or particleboards
Joints	Framing shall be box-jointed, connections e.g. segments, shall be glued and additionally bolted or screwed according to stress conditions	Framing shall be box-jointed $\frac{1}{2}$ or $\frac{2}{3}$ rebate-jointed as required. Bolting and/or screwed and/or nailing shall be used.	Framing shall be rebate-jointed. Bolting and/or screwed or otherwise nailing shall be used.
Pattern, pattern equipment and corebox distortion	Shall not distort either during compaction or stripping	As for H1	As for H1 NOTE: Additional strengthening can be necessary to prevent distortion when laminated or particle board is used in its construction.
Wood grain direction	Preferably in the lifting direction	Preferably in the lifting direction but can be crosswise when sides are steeply sloping' change between long timber and end-grain wood shall be avoided.	No special instructions.

(continued)