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Aluminium and aluminium alloys — Wrought products — Temper designations

*Aluminium et alliages d'aluminium — Produits corroyés — Désignation
des états métallurgiques*

Preview

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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.

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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 2107 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 9, *Symbolization*.

This third edition cancels and replaces the second edition (ISO 2107:2004), which has been technically revised by the addition of a terms and definitions clause and the designation of solution heat-treatment. This edition deals with wrought aluminum products and no longer applies to magnesium alloys.

Aluminium and aluminium alloys — Wrought products — Temper designations

1 Scope

This International Standard establishes temper designations as required for identification for all product forms of wrought aluminium and aluminium alloys.

2 Terms and definitions

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

2.1

temper

condition produced by either mechanical or thermal treatment, or both, and characterized by a certain structure and mechanical properties

2.2

working

deformation of metal, either hot or cold, by shaping processes including rolling, extruding, forging, drawing

2.3

hot working

plastic deformation, i.e., permanent deformation of metal at such temperatures that no strain-hardening occurs

2.4

cold working

plastic deformation, i.e., permanent deformation of metal at such temperatures that strain-hardening occurs

2.5

strain-hardening

modification of a metal structure, by cold working, resulting in an increase in strength and hardness but with loss of ductility

2.6

solution heat-treating

heating an alloy at a suitable temperature for a sufficient time to allow soluble constituents to enter into solid solution where they are retained in a supersaturated state after quenching (rapid cooling)

2.7

ageing

precipitation from supersaturated solid solution resulting in a change in properties of an alloy, usually occurring slowly at room temperature (natural ageing) and more rapidly at elevated temperatures (artificial ageing)

2.8

annealing

thermal treatment to soften metal by removal of stress resulting from cold working or by coalescing precipitates from solid solution

3 Basis of codification

The temper designations are based on the sequences of basic treatments used to produce the various tempers. Property limits (mechanical or physical) apply to individual alloy-temper-product combinations.

The temper designation follows the alloy designation; these are separated by a hyphen.

Basic temper designations consist of letters. If subdivisions of the basic tempers are required, these are indicated by one or more digits following the letter of the basic temper. These digits relate to a specific sequence of basic treatments, but only those treatments or operations recognized as significantly influencing the product characteristics are indicated.

Should some other variation of the same sequence of basic operations be applied to the same alloy, resulting in different characteristics, then additional digits are added to the designation.

Throughout this International Standard, generalized examples of tempers are shown, as follows:

- “X” denotes an unspecified digit (e.g., H2X is generalized to indicate appropriate temper designations in the series H21 to H29);
- “XX” denotes two unspecified digits (e.g., HXX4 is generalized to indicate appropriate temper designations in the H114 to H194 series, the H224 to H294 series, and the H324 to H394 series);
- “_” denotes one or multiple unspecified digits (e.g., T_51 is generalized to indicate appropriate temper designations such as T351, T651, T6151, T7351, T7651, etc.).

4 Basic temper designations

4.1 F — as fabricated

This designation applies to the products of shaping processes in which no special control over thermal conditions or strain-hardening is applied. For this temper, there are no mechanical property limits specified.

4.2 O — annealed

This designation applies to wrought products that are annealed to obtain the lowest strength temper, and to cast products that are annealed to improve ductility and dimensional stability. The O may be followed by a digit other than zero¹⁾ to indicate a product in the annealed condition having special characteristics.

4.3 H — strain-hardened

This designation applies to products subjected to the application of cold work after annealing (or after hot forming), or to a combination of cold work and partial annealing or stabilizing, in order to achieve the specified mechanical properties. The letter H is always followed by at least two digits, the first indicating the specific combination of basic operations and the second indicating the degree of strain hardening. A third digit indicates a variation of a two digit temper and is used when the mechanical properties, or other characteristics, differ from those of the two-digit H temper to which it is added.

4.4 W — solution heat-treated

This designation describes an unstable temper. It applies only to alloys which spontaneously age at room temperature after solution heat-treatment. This designation is specific only when the period of natural ageing is indicated, e.g., W 1/2 h.

1) Products achieving the required annealed properties after hot forming processes may be designated as O temper.

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