European Aluminium
ANYTHING BUT BASIC

GUIDANCE DOCUMENT

SELECTION OF ALUMINIUM ALLOYS FOR STRUCTURAL AND NON-STRUCTURAL USES

November 2023

Aluminium alloys are materials of choice for structural application, i.e. for parts contributing to the mechanical resistance and stability of buildings, constructions, engineering works and transport applications. Industrial halls, decks, retaining walls, bridges are just a few examples of where aluminium structures can be found in constructions.

STRUCTURE: organised combination of connected parts designed to carry loads and provide adequate rigidity

STRUCTURAL ELEMENT: *physically distinguishable part of a structure which constitute a load-bearing component of the building that is essential to the stability of the building or any part of it.*

When it comes to non-structural building applications, aluminium is also used extensively. Lightweight but durable, aluminium alloys are the material of choice for curtain walling and other framed products such as doors and windows. The metal is widely used for exterior cladding and roofing, suspended ceilings, wall panels and partitions, heating and ventilation equipment, solar shading devices and light reflectors. Whilst products like cladding and curtain walling are attached to the structure of the building, they typically do not contribute to its stability. Wind loads, impact loads, snow loads, and own self-weight of cladding and curtain walling are transferred to the structural framework.

Selection of aluminium wrought alloys for structural building applications

The standard EN 1999-1-1 on “Eurocode 9: Design of aluminium structures - General structural rules” sets the requirements in terms of the design of aluminium structures and structural elements fabricated from aluminium alloys. For wrought alloys, dedicated tables in the standard list the material, tempers and forms that can be used for structural purposes. Additional aluminium alloys and tempers than those listed in those tables can be found in National Annexes. Changes to the list of suitable aluminium alloys can be done through the revision of the EN 1999-1-1 standard.

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List of aluminium alloys, tempers and forms for structural uses

Aluminium Alloy EN AW	Temper	Form
3004	H14|H24/H34 H16|H26/H36	Sheet, strip, plate
3005	H14|H24 H16|H26	Sheet, strip, plate
3103	H14|H24 H16|H26	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar
5005/5005A	0/H111 H12|H22/H32 H14|H24/H34	Sheet, strip, plate
5049	0/H111 H14|H24/H34	Sheet, strip, plate
5052	H12|H22/H32 H14|H24/H34	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar, drawn tube
5083	0/H111 H12|H22/H32 H14|H24/H34 F/H112	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar, drawn tube, forgings
5383	0/H111 H116/H321	Sheet, strip, plate
5454	0/H111 H14|H24/H34 F/H112	Sheet, strip, plate, extruded tube, extruded profile, extruded rod and bar
5754	0/H111 H12|H22/H32 H14|H24/H34 F/H112	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar, drawn tube, forgings
6005A	T6	Extruded tube, extruded profile, extruded rod and bar
6060	T5, T6, T64, T66	Extruded tube, extruded profile, extruded rod and bar, drawn tube
6061	T4/T451 T6/T651	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar, drawn tube
6063	T5, T6, T66	Extruded tube, extruded profile, extruded rod and bar, drawn tube
6082	T4/T451 T61/T6151 T6/T651	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar, drawn tube, forgings
6106	T6	Extruded profile
7020	T6/T651	Sheet, tread plate, strip, plate, extruded tube, extruded profile, extruded rod and bar, drawn tube
8011A	H14|H24 H16|H26	Sheet, strip, plate

Selection of aluminium wrought alloys for non-structural building applications

In general, for non-structural construction products made of aluminium, harmonised product standards in support of Regulation (EU) 305/2011 (i.e. the Construction Products Regulation - CPR) do not define a list of aluminium alloys to be used for fabrication, so there is no constraint imposed by the regulation.

Nevertheless, for aluminium fenestration products EN AW 6060 and 6063 alloys are the most commonly used thanks to properties such as ductility that allows shaping complex cross sections, very good surface finish and good anodising response.

For aluminium roofing, external cladding and internal lining, the relevant product standards are EN 14782:2006 and EN 14783:2013. These are harmonised standards in support of the CPR and they make direct reference respectively to EN 508-2:2019 and EN 507:2019 for the selection of suitable aluminium alloys. While changes to the list of suitable aluminium alloys can be done through the revision of EN 507 and EN 508-2, it is mandatory to look at the latest version of these standards for the correct manufacturing of the products, subsequent declaration of performance and CE marking[1].

EN 507:2019	EN 508-2:2019
EN AW-1050 A	EN AW-3003
EN AW-1200	EN AW-3004
EN AW-3003	EN AW-3005
EN AW-3004	EN AW-3103
EN AW-3005	EN AW-3105
EN AW-3103	EN AW-4015
EN AW-3105	EN AW-4016
EN AW-4015	EN AW-4017
EN AW-4016	EN AW-5005
EN AW-4017	EN AW-5005A
EN AW-5005	EN AW-5006
EN AW-5005A	EN AW-5052
EN AW-5006	EN AW-5083
EN AW-5052	EN AW-5251
EN AW-5083	EN AW-5754
EN AW-5251	EN AW-8011 A

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[1] When a supporting standard (i.e. EN 507 and EN 508-2) is referenced with its date of publication (EN 507:2019 and EN 508-2:2019) in a harmonised products standard, this means that only valid supporting standard for the declaration of performance and subsequent CE marking is that very same version of the standard. On the other hand, when a supporting standard is reference without its date of publication, this means that the latest available version of the supporting standard is the one to be considered.