



ASCENT™

Aluminium Products: Life Cycle Assessment & Durability Statement

Background to the preparation of this document

Safety Fabrications manufacture a range of Access & Safety products under the Ascent banner. The Products are all manufactured following CE approved and certified Factory Production Control Procedures in line with BS EN 1090 & BS EN 3834.

The Ascent products include The Ascent Rooftop walkway system, The Ascent Fixed Access Ladder,

The Ascent Companionway ladder and the Ascent step / stair unit. All are manufactured from 6082-T6 Aluminium.

Document purpose

To assist clients, designers, contractors and specialists in understanding the durability of the Ascent products and to give guidance on the way agents can affect the service life of the product. All in accordance with criteria set out in BS 7543:2003

Document Scope

This document gives guidance on durability, predicted service life and design life of the Ascent Range.

This document should be read in conjunction with BS 7543:2003 which sets out common factors which can affect the service life of a product. Each of these are site specific.



SafetyFabrications
MAKE STEEL WORK



Why Aluminium?

Ascent products are manufactured from 6082-T6 Structural Grade aluminium following CE approved, BS EN 1090 & BS EN 3834 Manufacturing Standards.

As part of the companies CE manufacturing accreditation it is a prerequisite that all the Aluminium used comes from traceable & certified sources.

Aluminium is chosen for use in the Ascent products, as it is a relatively lightweight structural section which is both weldable & bendable. Aluminium has the added benefit in that it can be endlessly melted down and recast with no loss of its inherent properties or downgrade in material integrity. This means that an aluminium product made with scrap cannot be distinguished from a product made from virgin aluminium.
(Constellium_life_cycle_of_aluminium)

At 8% of the earths crust, aluminium is the third most abundant element in nature
(<https://www.azom.com/article.aspx?ArticleID=3529>)

Aluminium in use

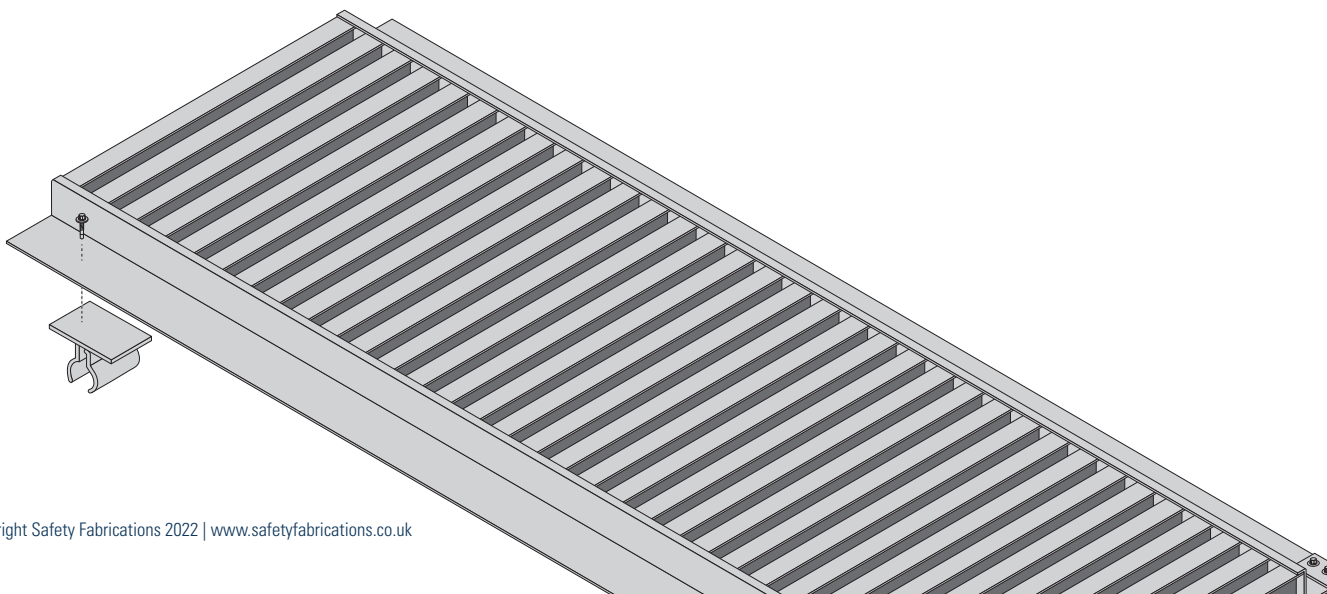
Whilst creating new metal from recycled aluminium only requires 5% of the energy needed to produce primary aluminium from Bauxite Ore – it is still important to consider the application of the product and its intended service life.

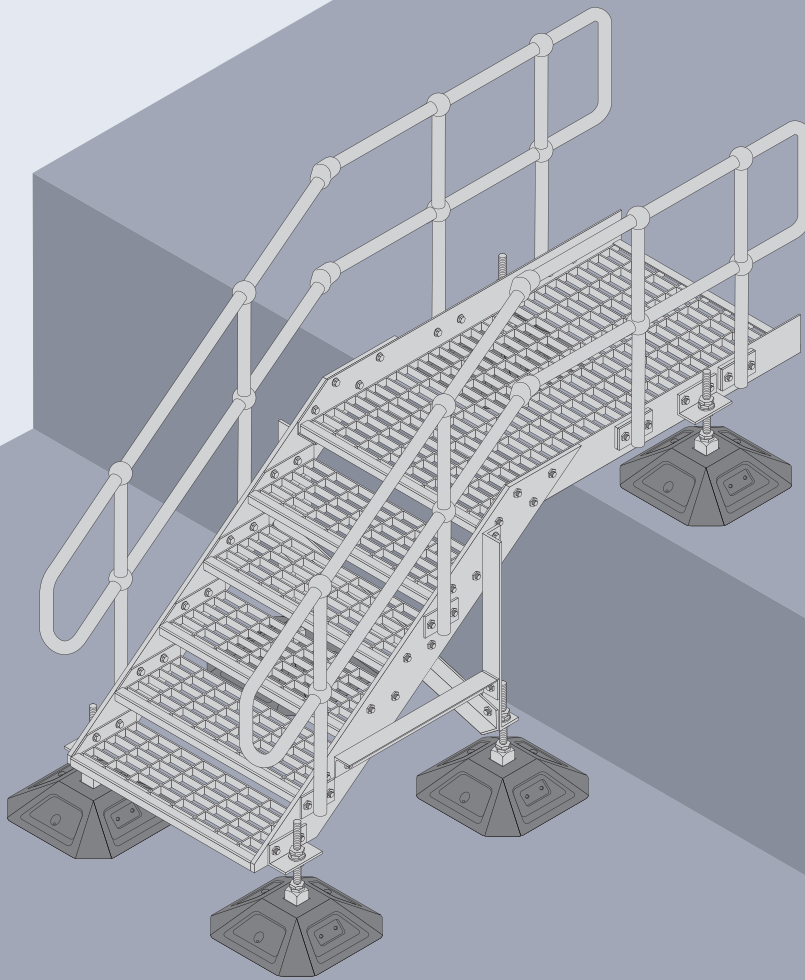
Ascent products are designed to create Safe Access for maintenance personnel in and about buildings. As such they are designed for regular light duty pedestrian traffic.

The Ascent products are all designed in accordance with the British Standards which are relevant to their specific application eg. BS 4211:2005 (+A1:2008) Specification for permanently fixed ladders - for the Ascent fixed ladders.

The structural members that form the safety critical / performance critical elements of all Ascent products are formed from 6082-T6 aluminium – which is identified under EN 1999-1-1(2007) Eurocode 9 -Design of aluminium structures as having a Durability rating B. (see Safety Fabrications Durability Document 2021 - Annex A – table 3.1a). The basic requirements for Durability are given in EN 1990 which state (2) under normal atmospheric conditions, aluminium structures made of the materials listed in tables 3.1a & b can be used without the need for surface protection to avoid the loss of load-bearing capacity.

Data from the International Aluminium Institute tells us that more than 75% of aluminium ever produced is still in use. (www.international-aluminium.org/work-areas/lifecycle/)





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Design/Service Life

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EN 1999-1 Cl C.2.1.1 describes 6082-6 “ is one of the most widely used heat-treatable alloys and often the principal structural alloy for welded and non-welded applications. It is a high strength alloy available in most forms; solid and hollow extrusions, tube, plate ,sheet and forging and finds increasing use in components exposed to a marine environment”

We would anticipate a service life of 30 years + when subject to normal use & normal environmental / atmospheric conditions as defined under BS 7543:2003.

All Ascent products are classified as Accessible for future maintenance & inspection.

Annex A – extracts from EN 1999-1:1

3.2 Structural aluminium

3.2.1 Range of materials

(1) This European standard covers the design of structures fabricated from aluminium alloy material listed in Table 3. 1a for wrought alloys conforming to the ENs listed in 1.2.3.1. for the design of structures of cast aluminium alloys given in Table 3. 1b, see 3.2.3.1.

NOTE: Annex C gives further information for the design of structures of cast aluminium alloys.

Table 3.1a – Wrought aluminium alloys for structures

Alloy designation		Form of product	Durability Rating ³⁾
Numerical	Chemical symbols		
EN AW-3004	EN AW-AlMn1Mg1	SH, ST, PL	A
EN AW-3005	EN AW-AlMn1Mg0.5	SH, ST, PL	A
EN AW-3103	EN AW-Al Mn1	SH, ST, PL, ET, EP, ER/B	A
EN AW-5005 / 5005A	EN AW-AlMg1(B) / (C)	SH, ST, PL	A
EN AW-5049	EN AW-AlMg2Mn0,8	SH, ST, PL	A
EN AW-5052	EN AW-Al Mg2.5	SH, ST, PL, ET ²⁾ , EP ²⁾ ER/B, DT	A
EN AW-5083	EN AW-Al Mg4,5Mn0,7	SH, ST, PL, ET ²⁾ , EP ²⁾ ER/B, DT, FO	A ¹⁾
EN AW-5454	EN AW-Al Mg3Mn	SH, ST, PL, ET ²⁾ , EP ²⁾ ER/B	A
EN AW-5754	EN AW-Al Mg3	SH, ST, PL, ET ²⁾ , EP ²⁾ ER/B, DT, FO	A
EN AW-6060	EN AW-Al MgSi	ET,EP,ER/B,DT	B
EN AW-6061	EN AW-Al Mg1SiCu	SH,ST,PL,ET,EP,ER/B,DT	B
EN AW-6063	EN AW-Al Mg0,7Si	ET,EP,ER/B,DT	B
EN AW-6005A	EN AW-Al SiMg(A)	ET,EP,ER/B	B
EN AW-6082	EN AW-Al Si1MgMn	SH, ST, PL, ET, EP, ER/B, DT, FO	B
EN AW-6106	EN AW-AlMgSiMn	EP	B
EN AW-7020	EN AW-Al Zn4.5Mg1	SH, ST, PL, ET, EP, ER/B, DT	C
EN AW-8011A	EN AW-AlFeSi	SH, ST, PL	B
Key: SH - Sheet (EN 485) ST - Strip (EN 485) PL -Plate (EN 485) ET -Extruded Tube (EN 755) EP -Extruded Profiles (EN 755)		ER/B -Extruded Rod and Bar (EN 755) DT -Drawn Tube (EN 754) FO -Forgings (EN 586) 1) See Annex C: C2.2.2(2) 2) Only simple, solid (open) extruded sections or thick-walled tubes over a mandrel (seamless) 3) See 4, Annex C and Annex D	

4 Durability

(1) The basic requirements for durability are given in EN 1990.

NOTE: For aluminium in contact with other material, recommendations are given in Annex D.

(2) Under normal atmospheric conditions, aluminium structures made of alloys listed in Tables 3.1a and 3.1.b can be used without the need for surface protection to avoid loss of load-bearing capacity.

NOTE: Annex D gives information on corrosion resistance of aluminium and guidelines for surface protection of aluminium, as well as information on conditions for which a corrosion protection is recommended.

C.2 Wrought products

C.2.1 Wrought heat treatable alloys

(1) Within the 6xxx series alloys, the alloys EN AW-6082, EN AW-6061, EN AW-6005A, EN AW-6106, EN AW-6063 and EN AW-6060 are suitable for structural applications. These alloys have durability rating B. Within the 7xxx series alloys, the alloy EN AW-7020 is suitable for general structural applications and has durability rating C.

C.2.1.1 Alloys EN AW -6082 and EN AW-6061

(1) EN AW -6082 is one of the most widely used heat treatable alloy and often the principle structural alloy for welded and non-welded applications. It is a high strength alloy available in most forms; solid and hollow extrusions.

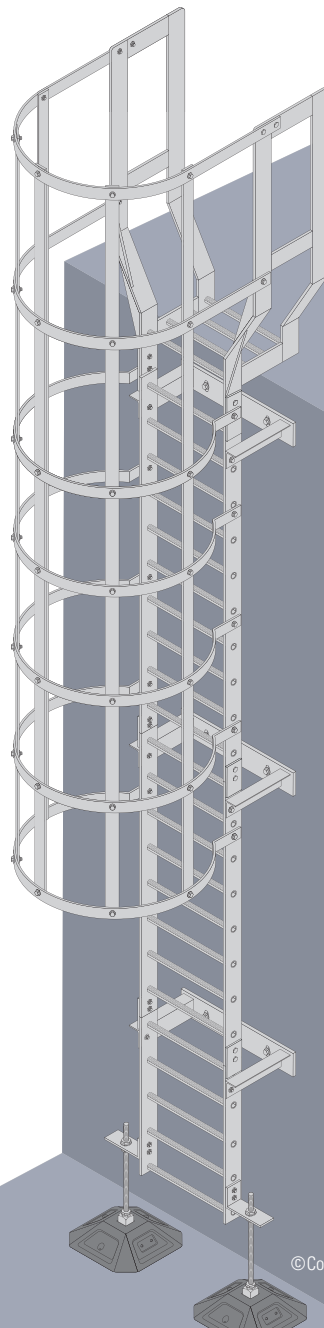


Table C.1 – Comparison of general characteristics and other properties for structural alloys

Alloy EN- Designation	Form and temper standardised for						Strength	Durability rating a)	Weldability	Decorative anodising
	Sheet, strip and plate	Extruded products			Cold drawn Products	Forgings				
		Bar/rod	Tube	Profile	Tube					
EN AW-3004	O	-	-	-	-		III/IV	A	I	I
EN AW-3005	O	-	-	-	-		III/IV	A	I	I
EN AW-3103	O	O	O	O	O		III/IV	A	I	II
EN AW-5005	O	O	O	O	O		III/IV	A	I	I
EN AW-5049	O	-	-	-	-		II/III	A	I	I/II
EN AW-5052	O	O	O X)	O X)	O		II/III	A	I	I/II
EN AW-5083	O	O	O X)	O X)	O	O	I/II	A	I	I/II
EN AW-5454	O	O	O X)	O X)	-		II/III	A	I	I/II
EN AW-5754	O	O	O X)	O X)	O	O	II/III	A	I	I/II
EN AW-6060	-	O	O	O	O		II/III	B	I	I
EN AW-6061	-	O	O	O	O		II/III	B	I	II/III
EN AW-6063	-	O	O	O	O		II/III	B	I	I/II
EN AW-6005A	-	O	O	O	-		II	B	I	II/III
EN AW-6106	-	-		O	-		II/III	B	I	I/II
EN AW-6082	O	O	O	O	O	O	I/II	B	I	II/III
EN AW-7020	O	O	O	O	O		I	C	I	II/III
EN AW-8011A	O	-					III/IV	B	II	III/IV

Key:

- O Standardised in a range of tempers: Availability of semi products from stock to be checked for each product and dimension
- Not standardised
- X) Simple, solid sections only (seamless products over mandrel)
- I Excellent
- II Good
- III Fair
- IV Poor

NOTE: These indications are for guidance only and each ranking is only applicable in the column concerned and may vary with temper

a) See Table 3.1.a

Table D.1 – Recommendations for corrosion protection for various exposure conditions and durability ratings

Alloy durability rating	Material thickness mm	Protection according to the exposure							
		Atmospheric						Immersed	
		Rural	Industrial/urban		Marine			Fresh-water	Sea water
			Mode-rate	Severe	Non-industrial	Mode-rate	Severe		
A	All	0	0	(Pr)	0	0	(Pr)	0	(Pr)
B	< 3	0	0	(Pr)	(Pr)	(Pr)	(Pr)	Pr	Pr
	≥ 3	0	0	0	0	0	(Pr)	(Pr)	Pr
C	All	0	0 2)	(Pr) 2)	0 2)	0 2)	(Pr)	(Pr) 1)	NR

0 Normally no protection necessary

Pr Protection normally required except in special cases, see D.3.2

(Pr) The need for protection depends on if there are special conditions for the structure, see D.3.2.
In case there is a need it should be stated in the specification for the structure

NR Immersion in sea water is not recommended

1) For 7020, protection only required in Heat Affected Zone (HAZ) if heat treatment not applied after welding

2) If heat treatment of 7020 after welding is not applied, the need to protect HAZ should be checked with respect to conditions, see D.3.2

NOTE: For the protection of sheet used in roofing and siding see EN-508-2.



End of Life Plan

The Ascent products have a design Life of 30+ years and Safety Fabrications actively encourage its customers to consider an end of life scrappage plan. This is crucially important in reducing the environmental impact of the Aluminium product. As previously stated creating new metal from recycled aluminium only requires 5% of the energy needed to produce primary aluminium from Bauxite Ore. Without this end of life plan the Aluminium recycling wheel would grid to a halt, forcing the use of alternative more CO2 intensive materials or the extraction of more Bauxite to manufacture aluminium.

As there is limited data available as to the recycling rates for Access / Safety products we are unable to provide accurate data on CO2eq/component. At present the global average emission for both virgin and recycled aluminium is 11.5 t of CO2 per ton of aluminium. As the world wakes up to the effect of climate change and alternative power sources are sought to run the smelters a figure of between 2-4 t of Co2 per ton of aluminium is becoming achievable where hydropower & other sustainable energy sources are used.

(<https://aluminiuminsider.com/leaders-emerge-in-the-aluminium-industrys>)

Sources

1. Constellium – *Going Full Circle: The Life Cycle of Aluminium.*
2. www.international-aluminium.org/work_areas/lifecycle/
3. www.aluminiuminsider.com Monday 6th December 2021



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