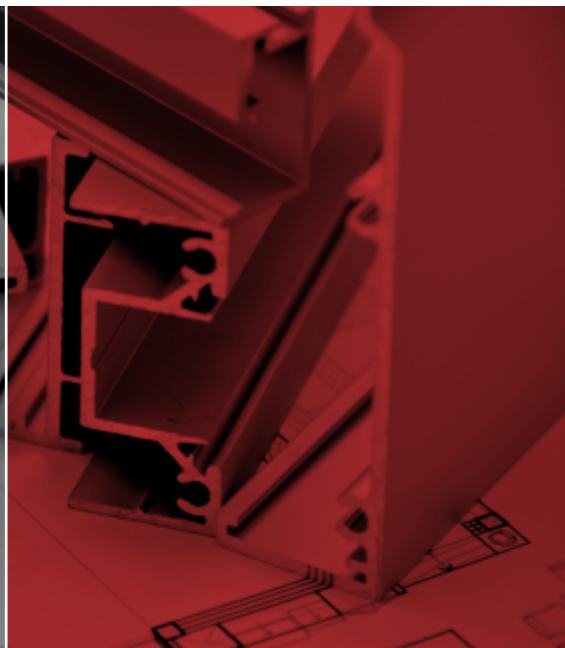
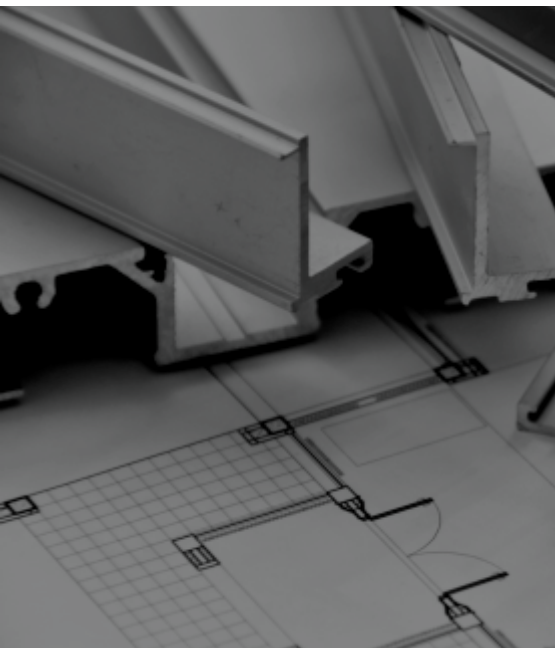


# ALUMINIUM ALLOYS FOR EXTRUDED PROFILES



• Introduction	Page 3
• CE Certified alloys extruded by EXALCO	Page 4
• Aluminium alloys - Technical data	Page 5
	Page 6
• Tolerances for cross-sectional dimensions - EN 755-9	Page 7
• Tolerances for cross-sectional dimensions - EN 12020-2	Page 8
• Tolerances for angularity - EN 755-9	Page 9
• Tolerances for angularity - EN 12020-2	Page 10
• Tolerances for straightness - EN 755-9	Page 11
• Tolerances for straightness - EN 12020-2	Page 12
• Tolerances for fixed length - EN 755-9	Page 13
• Tolerances for fixed length - EN 12020-2	Page 14
• Tolerances for wall thickness - EN 755-9	Page 15
• Tolerances for wall thickness - EN 12020-2	Page 16
• Surface quality	Page 17



Designing aluminium profiles gives immense possibilities. There are no general rules for what shapes and tolerances that can be applied in each case. Shape, wall thickness and alloy will have influence on the achieved tolerances.

Narrow tolerances can reduce the productivity of the profile and thus the cost can increase. This has to be taken into consideration when designing the profile.

Exalco is working according to the Standards of European Committee for Standardization, CEN, EN 755-9 and EN 12020-2. In this handbook, you will find an extract of these standards. Text and values are taken from there.

The standards have to be considered as guidance. In the case of profiles which, due to the complexity of their design, are difficult to manufacture and specify, then special agreements between customer and Exalco may need to be reached.

CERTIFICATE / CERTIFICAT / CERTIFICAZIONE / CERTIFICADO / CERTIFICAT / CERTIFICAT

# EC-CERTIFICATE

## Factory Production Control

No 0906 – CPR – 02410006

In accordance with the Regulation R 305/2011/EU and also in accordance with TÜV AUSTRIA procedures, it is hereby certified that the construction products as referred on the next table.

**Extruded Profiles:**

No	Product	EN 15088
1	EN AW-6005 T5	✓
2	EN AW-6060 T5	✓
3	EN AW-6063 T5	✓
4	EN AW-6101 T5	✓
5	EN AW-6060 T66	✓
6	EN AW-6063 T66	✓
7	EN AW-6050 T5	✓
8	EN AW-6063 T5	✓

produced by the manufacturer

**EXALCO S.A.**

5<sup>th</sup> km National Road Larissa – Athens, GR-411 00 LARISSA, GREECE

In the factories located at

**EXALCO S.A.**

5<sup>th</sup> km National Road Larissa – Athens, GR-411 00 LARISSA, GREECE

8<sup>th</sup> km National Road Larissa – Thessaloniki, GR-411 00 LARISSA, GREECE

are submitted by the manufacturer to Type Testing of the products and factory production control and that the notified body TÜV AUSTRIA has performed the initial inspection of the factory production control on 2016-10-25 and performs the continuous surveillance, assessment and approval of the factory production control.

This certificate attests that all provisions concerning the attestation factory production control described in Annex ZA of the standard:

**EN 15088:2005**

This certificate was first issued on 2016-11-03 and remains valid as long as the conditions laid down in the harmonized technical specifications in reference or the manufacturing conditions in the factory or the factory production control itself are not modified significantly or at the latest until 2019-11-02.

Certificate Registration No.: **No 0906 – CPR – 02410006**

Valid until: 2019-11-02  
Initial certification: 2010-11-03



Hristina Agreus  
Head of Management Systems & Product Certification Division  
Certification Body  
at TÜV AUSTRIA

Athens, 2016-11-03

This certification was conducted in accordance with TÜV AUSTRIA auditing and certification procedures and is subject to regular surveillance audits.

TÜV AUSTRIA HELLAS  
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TÜV AUSTRIA  
GROUP



04/2016, 01

04/2016, 01

**Extruded Profile Dimension:** MAX<sub>diagonal</sub> 250mm (Always be advised by EXALCO)

**Weight per meter:** MAX 10Kg/m (Always be advised by EXALCO)

**Standard length:** 6,000mm (Special lengths after agreement)

**Mechanical Properties - Extruded Profiles (According to EN 755-2)**

Description		Temper	Wall Thickness t (mm)	Rm min (Mpa)	Rp0.2 min (Mpa)	A min %	A50 mm min %	HBW Typical Value*
EN-AW 6060	AlMgSi0.5	T5	≤5	160	120	8	6	50
			5<t≤25	140	100	8	6	50
		T6	≤3	190	150	8	6	60
			3<t≤25	170	140	8	6	
		T66	≤3	215	160	8	6	67
			3<t≤25	195	150	8	6	
EN-AW 6063	AlMg0.7Si	T5	≤3	175	130	8	6	55
			2<t≤25	160	110	7	5	50
		T6	≤10	215	170	8	6	65
			10<t≤25	195	160	8	6	60
		T66	≤10	245	200	8	6	75
			10<t≤25	225	180	8	6	70
EN-AW 6005	AlSiMg	T6 open	≤5	270	225	8	6	80
			5<t≤10	260	215	8	6	80
			10<t≤25	250	200	8	6	75
		T6 hollow	≤5	255	215	8	6	75
			5<t≤10	250	200	8	6	75
			≤5	200	170	10	8	70
EN-AW 6101A	EAlMgSi(A)	T6	≤5	200	170	10	8	70
EN-AW 6101B	EAlMgSi(B)	T6	≤15	215	160	12	10	60

\*HBW (Brinell) values are indicative only

**Corellation of Hardness Units**

Brinell	30	35	40	45	52.5	55	60	65	68	75	80	85	90	95
Webster	4	5	6	7	8	9	10	11	12	13	14	15	16	17

### Heat Treatment

Temper Designation T (according to EN 515)	
T5	Cooled from an elevated temperature forming operation & artificially aged (precipitation hardened)
T6	Solution heat treated & artificially aged (precipitation hardened) Press quenching required
T66	Cooled from an elevated temperature forming operation & artificially aged (precipitation hardened) to a higher level of mechanical properties through special control of manufacturing process. Press quenching required

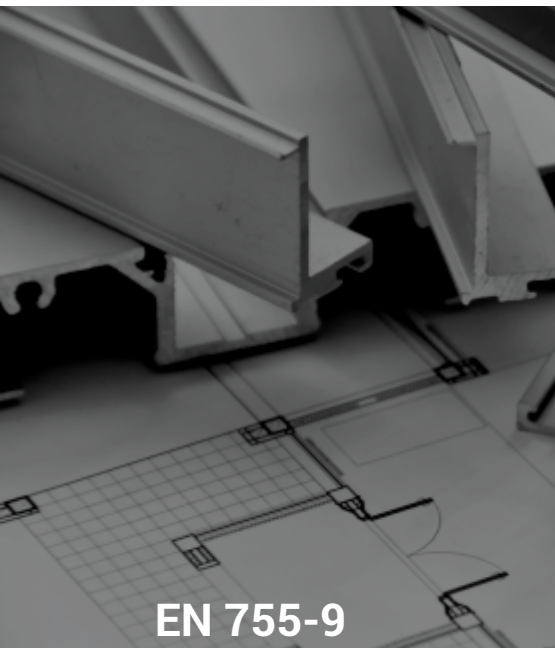
### Chemical Composition % of Aluminium Alloys EN-AW (According to EN 573-3)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Others		Al
									Each	Total	
6060	0.30-0.60	0.10-0.30	0.10	0.10	0.35-0.60	0.05	0.15	0.10	0.05	0.15	Rest
6063	0.20-0.60	0.35	0.10	0.10	0.45-0.90	0.10	0.10	0.10	0.05	0.15	Rest
6005	0.50-0.90	0.35	0.30	0.50	0.40-0.70	0.30	0.20	0.10	0.05	0.15	Rest
6101A	0.30-0.70	0.40	0.05	-	0.40-0.90	-	-	-	0.03	0.10	Rest
6101B	0.30-0.60	0.10-0.30	0.05	0.05	0.35-0.60	-	0.10	-	0.03	0.10	Rest

### Tolerances & Certifications

EN Standard	Description
EN 755-9	Profiles, tolerances on dimension & form
<b>Aluminium and aluminium alloys - Extruded precision profiles in alloys EN-AW 6060 &amp; EN-AW 6063</b>	
EN 12020-2	Tolerances on dimension & form (precision profiles)

# TOLERANCES FOR ALUMINIUM PROFILES



**EN 755-9**



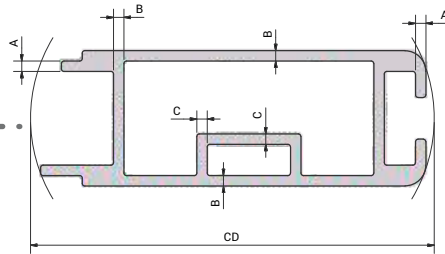
**EN 12020-2**





Wall Thickness		Tolerance on wall thickness - Circumscribing diameter up to and including 300 mm					
over	up to and including	Wall thickness A		Wall thickness B		Wall thickness C	
		0<CD≤100	100<CD≤300	0<CD≤100	100<CD≤300	0<CD≤100	100<CD≤300
-	1.5	± 0.15	± 0.20	± 0.20	± 0.30	± 0.25	± 0.35
1.5	3	± 0.15	± 0.25	± 0.25	± 0.40	± 0.30	± 0.50
3	6	± 0.20	± 0.30	± 0.40	± 0.60	± 0.50	± 0.75
6	10	± 0.25	± 0.35	± 0.60	± 0.80	± 0.75	± 1.0
10	15	± 0.30	± 0.40	± 0.80	± 1.0	± 1.0	± 1.2
15	20	± 0.35	± 0.45	± 1.2	± 1.5	± 1.5	± 1.9
20	30	± 0.40	± 0.50	± 1.5	± 1.8	± 1.9	± 2.2
30	40	± 0.45	± 0.60	-	± 2.0	-	± 2.5
40	50	-	± 0.70	-	-	-	-

EN 755-9



EN 12020-2

Wall Thickness		Tolerance on wall thickness			
		Wall thickness A		Wall thickness B + C	
over	up to and including	$0 < CD \leq 100$	$100 < CD \leq 330$	$0 < CD \leq 100$	$100 < CD \leq 300$
-	2	$\pm 0.15$	$\pm 0.20$	$\pm 0.20$	$\pm 0.3$
2	3	$\pm 0.15$	$\pm 0.25$	$\pm 0.25$	$\pm 0.4$
3	6	$\pm 0.20$	$\pm 0.30$	$\pm 0.40$	$\pm 0.6$
6	10	$\pm 0.25$	$\pm 0.35$	$\pm 0.60$	$\pm 0.8$
10	15	$\pm 0.30$	$\pm 0.40$	$\pm 0.80$	$\pm 1.0$
15	20	$\pm 0.35$	$\pm 0.45$	$\pm 1.2$	$\pm 1.5$
20	30	$\pm 0.40$	$\pm 0.50$	*	*
30	40	$\pm 0.45$	$\pm 0.60$	*	*

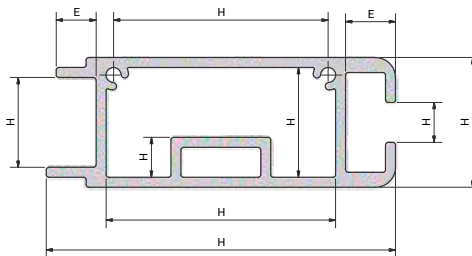
\*: Shall be subject to agreement between the customer and EXALCO

Dimensions		Tolerance on H for circumscribing diameter CD		
over	up to and including	0<CD	100<CD	200<CD
		≤100	≤200	≤300
-	10	± 0.25	± 0.30	± 0.35
10	25	± 0.30	± 0.40	± 0.50
25	50	± 0.50	± 0.60	± 0.80
50	100	± 0.70	± 0.90	± 1.1
100	150	-	± 1.1	± 1.3
150	200	-	± 1.3	± 1.5
200	300	-	-	± 1.7



Dimension E		Additions to the tolerances on H for dimensions across the ends of open ended profiles
over	up to and including	
-	20	-
20	30	± 0.15
30	40	± 0.25
40	60	± 0.40
60	80	± 0.50
80	100	± 0.60
100	125	± 0.80
125	150	± 1.0
150	180	± 1.2
180	210	± 1.4
210	250	± 1.6


EN 755-9



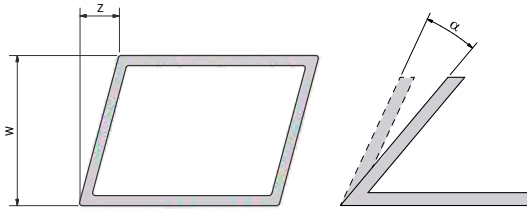
EN 12020-2

Dimension H		Tolerance on dimension H (except open ends)	Tolerance on dimension H (open ends)	
over	up to and including		E ≤ 60	E < 60 ≤ 120
-	10	± 0.15	± 0.15	
10	15	± 0.20	± 0.20	
15	30	± 0.25	± 0.25	
30	45	± 0.30	± 0.30	± 0.45
45	60	± 0.40	± 0.40	± 0.55
60	90	± 0.45	± 0.45	± 0.65
90	120	± 0.60	± 0.60	± 0.80
120	150	± 0.80	± 0.80	± 1.0
150	160	± 1.0	± 1.0	± 1.3
180	240	± 1.2	± 1.2	± 1.5
240	300	± 1.5	± 1.5	± 1.8

Width W		Maximum allowable deviation Z
over	up to and including	
-	30	0.40
30	50	0.70
50	80	1.0
80	120	1.4
120	180	2.0
180	240	2.6



The maximum allowable deviation  $\alpha$  for angles other than right angle shall be  $\pm 1^\circ$



EN 755-9

EN 12020-2

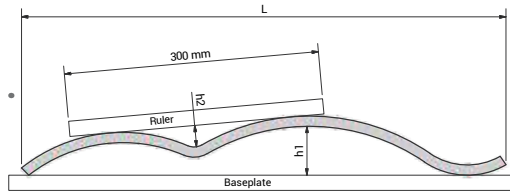
The maximum allowable deviation  $\alpha$  for angles other than right angle shall be  $\pm 1^\circ$

Width W		Deviation F
over	up to and including	Maximum allowable deviation
-	30	0.30
30	50	0.40
50	80	0.50
80	100	0.60
100	120	0.70
120	140	0.80
140	160	0.90
160	180	1.0
180	200	1.2
200	250	1.5

- Deviations from straightness **h1** and **h2** shall be measured as shown with the profile placed on a horizontal baseplate so that its mass decreases the deviation.
- The straightness tolerance **h1** shall not exceed 1.5 mm / m length.
- Local deviations **h2** from straightness shall not exceed 0.6 mm / 300 mm length.



EN 755-9



EN 12020-2

Straightness tolerance H1 for specified length L

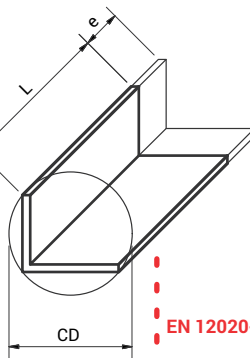
$0 < L \leq 1000$	$1000 < L \leq 2000$	$2000 < L \leq 3000$	$3000 < L \leq 4000$	$4000 < L \leq 5000$	$5000 < L \leq 6000$	$L > 6000$
0.7	1.3	1.8	2.2	2.6	3.0	3.5

The local deviation from straightness  $h_2$  shall not exceed 0.3 mm per 300 mm length



Circumscribing Circle $CD$		Tolerance $e$ on fixed length $L$				
over	up to and including	$< L \leq 2000$	$2000 < L \leq 5000$	$5000 < L \leq 10000$	$10000 < L \leq 15000$	$15000 < L \leq 25000$
-	100	+5	+7	+10	+16	+22
100	200	+7	+9	+12	+18	+24
200	300	+8	+11	+14	+20	+28

EN 755-9



EN 12020-2

Circumscribing Circle CD		Tolerance e on fixed length L			
over	up to and including	$< L \leq 2000$	$2000 < L \leq 5000$	$5000 < L \leq 10000$	$L > 10000$
-	100	+5	+7	+10	*
100	200	+7	+9	+12	*
200	300	+8	+11	+14	*

\*) Subject to agreement between Exalco and customer

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Watching distance  
approx. 2 m

1

**Requirements:** No disturbing faults in the surface or material structure when observed at 2 m.

**Usage:** Furniture, lighting, household equipments, decoration lists for households.

**Manufacturing:** Profiles are usually anodized. Small faults due to production process are acceptable on less visible surfaces.

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Watching distance  
approx. 3 m

2

**Requirements:** No disturbing faults in the surface or material structure when observed at 3 m.

**Usage:** Building systems, windows, doors, ladders, electrical equipments.

**Manufacturing:** Sufficient quality for powder coated and anodized profiles. Small faults due to production process are acceptable on all surfaces.

---

Watching distance  
approx. 5 m

3

**Requirements:** No disturbing faults in the surface or material structure when observed at 5 m.

**Usage:** Building systems, ladders, standard profiles and mechanical components.

**Manufacturing:** In addition to class 4 some streaks, local roughness and mild orange peel may occur.