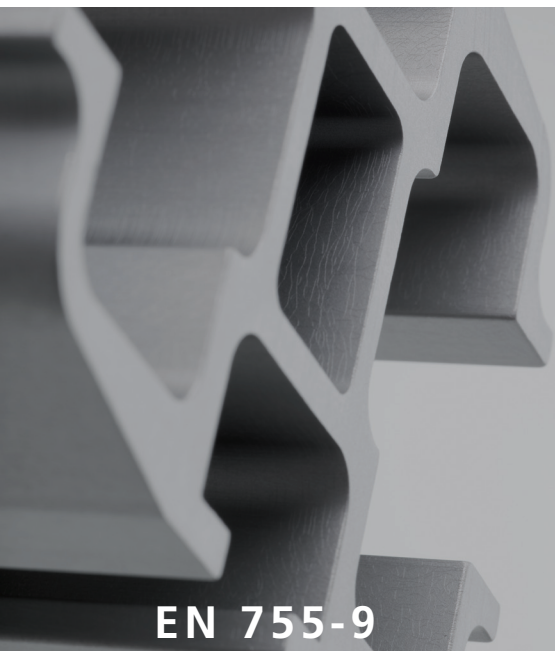


TOLERANCES FOR ALUMINIUM PROFILES



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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. This has to be taken into consideration when designing the profile.

Alumeco 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 Alumeco may need to be reached.

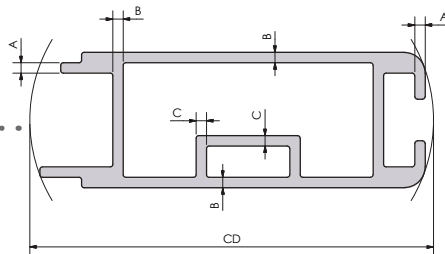
Wall Thickness		Tolerance on wall thickness - Circumscribing diameter up to and including 300 mm											
over	up to and including	Wall thickness A				Wall thickness B				Wall thickness C			
		Group 1		Group 2		Group 1		Group 2		Group 1		Group 2	
		0<CD ≤100	100<CD ≤300	0<CD ≤100	100<CD ≤300	0<CD ≤100	100<CD ≤300	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	± 0.25	± 0.20	± 0.30	± 0.30	± 0.40	± 0.25	± 0.35	± 0.35	± 0.50
1.5	3	± 0.15	± 0.25	± 0.25	± 0.30	± 0.25	± 0.40	± 0.35	± 0.50	± 0.30	± 0.50	± 0.45	± 0.65
3	6	± 0.20	± 0.30	± 0.30	± 0.35	± 0.40	± 0.60	± 0.55	± 0.70	± 0.50	± 0.75	± 0.60	± 0.90
6	10	± 0.25	± 0.35	± 0.35	± 0.45	± 0.60	± 0.80	± 0.75	± 1.0	± 0.75	± 1.0	± 1.0	± 1.3
10	15	± 0.30	± 0.40	± 0.40	± 0.50	± 0.80	± 1.0	± 1.0	± 1.3	± 1.0	± 1.2	± 1.3	± 1.7
15	20	± 0.35	± 0.45	± 0.45	± 0.55	± 1.2	± 1.5	± 1.5	± 1.8	± 1.5	± 1.9	± 1.9	± 2.2
20	30	± 0.40	± 0.50	± 0.50	± 0.60	± 1.5	± 1.8	± 1.8	± 2.2	± 1.9	± 2.2	± 2.2	± 2.7
30	40	± 0.45	± 0.60	± 0.60	± 0.70	-	± 2.0	-	± 2.5	-	± 2.5	-	-
40	50	-	± 0.70	-	± 0.80	-	-	-	-	-	-	-	-

Wall Thickness		Tolerance on wall thickness - Circumscribing diameter over 300 mm											
over	up to and including	Wall thickness A				Wall thickness B				Wall thickness C			
		Group 1		Group 2		Group 1		Group 2		Group 1		Group 2	
		300<CD ≤500	500<CD ≤800	300<CD ≤500	500<CD ≤800	300<CD ≤500	500<CD ≤800	300<CD ≤500	500<CD ≤800	300<CD ≤500	500<CD ≤800	300<CD ≤500	500<CD ≤800
-	1.5	± 0.25	-	± 0.35	-	-	-	-	-	-	-	-	-
1.5	3	± 0.35	± 0.40	± 0.45	± 0.50	± 0.60	± 0.80	± 0.70	± 0.90	± 0.75	± 1.0	± 0.90	± 1.2
3	6	± 0.40	± 0.50	± 0.60	± 0.60	± 0.80	± 1.0	± 0.90	± 1.0	± 1.0	± 1.2	± 1.2	± 1.3
6	10	± 0.45	± 0.55	± 0.65	± 0.70	± 1.0	± 1.2	± 1.2	± 1.5	± 1.2	± 1.5	± 1.5	± 1.9
10	15	± 0.50	± 0.60	± 0.70	± 0.80	± 1.2	± 1.5	± 1.5	± 1.8	± 1.5	± 1.9	± 1.9	± 2.3
15	20	± 0.55	± 0.65	± 0.75	± 0.85	± 1.7	± 2.0	± 2.0	± 2.5	± 2.0	± 2.5	± 2.3	± 3.1
20	30	± 0.60	± 0.70	± 0.80	± 0.90	± 2.0	± 2.5	± 2.5	± 3.0	± 2.5	± 3.0	± 3.1	± 3.7
30	40	± 0.70	± 0.80	± 0.90	± 1.0	± 2.2	± 2.7	± 3.0	± 3.2	± 2.7	± 3.3	-	-
40	50	± 0.80	± 0.90	± 1.0	± 1.1	-	-	-	-	-	-	-	-

Group 1 = EN AW-6101A, EN AW-6005, EN AW-6005A, EN AW-6060, EN AW-6063, EN AW-6063A

Group 2 = EN AW-6012, EN AW-6061, EN AW-6262, EN AW-6262A, EN AW-6082, EN AW-7020

EN 755-9

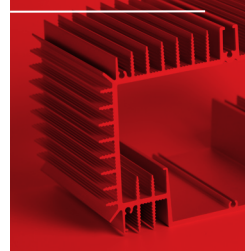


EN 12020-2

Wall Thickness		Tolerance on wall thickness			
		Wall thickness A		Wall thickness B + C	
over	up to and including	0 < CD ≤ 100	100 < CD ≤ 350	0 < CD ≤ 100	100 < CD ≤ 350
-	2	± 0.15	± 0.20	± 0.20	± 0.3
2	3	± 0.15	± 0.25	± 0.25	± 0.4
3	6	± 0.20	± 0.30	± 0.40	± 0.6
6	10	± 0.25	± 0.35	± 0.60	± 0.8
10	15	± 0.30	± 0.40	± 0.80	± 1.0
15	20	± 0.35	± 0.45	± 1.2	± 1.5
20	30	± 0.40	± 0.50	*	*
30	40	± 0.45	± 0.60	*	*

*: Shall be subject to agreement between the customer and Alumeco

*“ 100 % fokus
on aluminium ”*



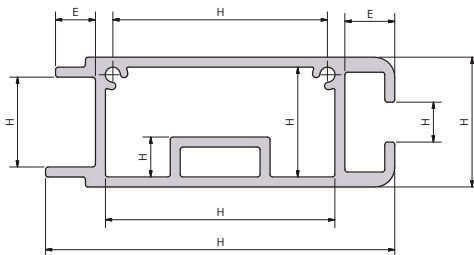
Dimensions		Tolerance on H for circumscribing diameter CD									
over	up to and including	Group 1					Group 2				
		0<CD ≤100	100<CD ≤200	200<CD ≤300	300<CD ≤500	500<CD ≤800	0<CD ≤100	100<CD ≤200	200<CD ≤300	300<CD ≤500	500<CD ≤800
-	10	± 0.25	± 0.30	± 0.35	± 0.40	± 0.50	± 0.40	± 0.50	± 0.55	± 0.60	± 0.70
10	25	± 0.30	± 0.40	± 0.50	± 0.60	± 0.70	± 0.50	± 0.70	± 0.80	± 0.90	± 1.1
25	50	± 0.50	± 0.60	± 0.80	± 0.90	± 1.0	± 0.80	± 0.90	± 1.0	± 1.2	± 1.3
50	100	± 0.70	± 0.90	± 1.1	± 1.3	± 1.5	± 1.0	± 1.2	± 1.3	± 1.6	± 1.8
100	150	-	± 1.1	± 1.3	± 1.5	± 1.7	-	± 1.5	± 1.7	± 1.8	± 2.0
150	200	-	± 1.3	± 1.5	± 1.8	± 2.0	-	± 1.9	± 2.2	± 2.4	± 2.7
200	300	-	-	± 1.7	± 2.1	± 2.4	-	-	± 2.5	± 2.8	± 3.1
300	450	-	-	-	± 2.8	± 3.0	-	-	-	± 3.5	± 3.8
450	600	-	-	-	± 3.8	± 4.2	-	-	-	± 4.5	± 5.0
600	800	-	-	-	-	± 5.0	-	-	-	-	± 6.0

Dimension E		Additions to the tolerances on H for dimensions across the ends of open ended profiles	
over	up to and including	Group 1	Group 2
-	20	-	-
20	30	± 0.15	± 0.15
30	40	± 0.25	± 0.25
40	60	± 0.40	± 0.40
60	80	± 0.50	± 0.50
80	100	± 0.60	± 0.60
100	125	± 0.80	± 0.80
125	150	± 1.0	± 1.0
150	180	± 1.2	± 1.2
180	210	± 1.4	± 1.4
210	250	± 1.6	± 1.6
250		± 1.8	± 1.8

Group 1 = EN AW-6101A, EN AW-6005, EN AW-6005A, EN AW-6060, EN AW-6063, EN AW-6063A

Group 2 = EN AW-6012, EN AW-6061, EN AW-6262, EN AW-6262A, EN AW-6082, EN AW-7020

EN 755-9



EN 12020-2

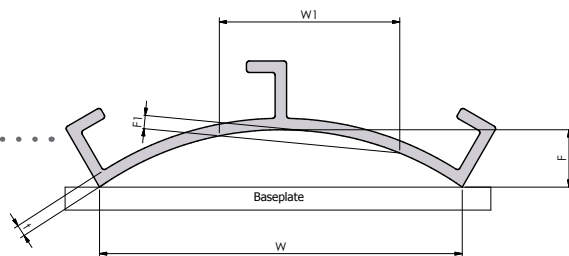
Dimension H		Tolerance on dimension H (except open ends)	Tolerance on dimension H (open ends)	
over	up to and including		$E \leq 60$	$E < 60 \leq 120$
-	10	± 0.15	± 0.15	
10	15	± 0.20	± 0.20	
15	30	± 0.25	± 0.25	
30	45	± 0.30	± 0.30	± 0.45
45	60	± 0.40	± 0.40	± 0.55
60	90	± 0.45	± 0.45	± 0.65
90	120	± 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
300	350	± 1.8	± 1.8	± 2.1

“ Technical
advice “

Width W		Deviation F		
over	up to and including	Hollow profiles		Solid profiles
		Wall thickness $t \leq 5$	Wall thickness $t > 5$	
-	30	0.30	0.20	0.20
30	60	0.40	0.30	0.30
60	100	0.60	0.40	0.40
100	150	0.90	0.60	0.60
150	200	1.2	0.80	0.80
200	300	1.8	1.2	1.2
300	400	2.4	1.6	1.6
400	500	3.0	2.0	2.0
500	600	3.6	2.4	2.4
600	800	4.0	3.0	3.0



EN 755-9

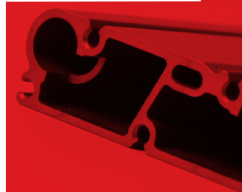


EN 12020-2

Width W		Deviation F
over	up to and including	
-	30	0.20
30	60	0.30
60	100	0.40
100	150	0.50
150	200	0.70
200	250	0.85
250	300	1.0
300	350	1.2

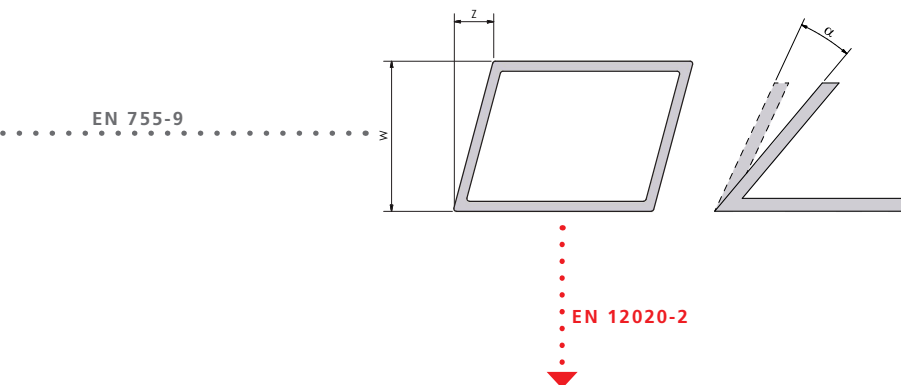
In the case of profiles with a width W of over 150 mm, the local deviation F1 shall not exceed 0.50 mm for any width W1 of 100 mm.

*“ Tailored
solutions “*



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
240	300	3.1
300	400	3.5

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



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

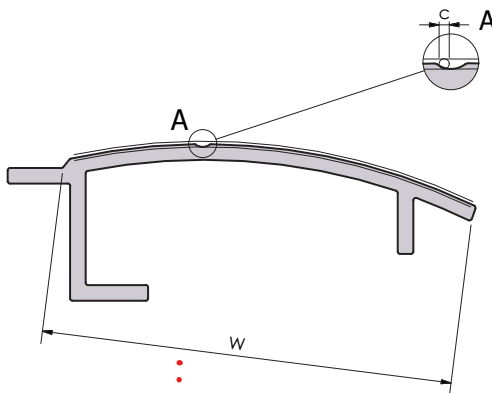
Width W		Deviation F
over	up to and including	Maximum allowable deviation
-	30	0.30
30	50	0.40
50	80	0.50
80	100	0.60
100	120	0.70
120	140	0.80
140	160	0.90
160	180	1.0
180	200	1.2
200	250	1.5

“Worldwide network”

Width W of the contour		Contour tolerance = diameter C of the tolerance circle
over	up to and including	
-	30	0.30
30	60	0.50
60	90	0.70
90	120	1.0
120	150	1.2
150	200	1.5
200	250	2.0
250	300	2.5
300	400	3.0
400	500	3.5
500	800	4.0



EN 755-9



EN 12020-2

Width W of the contour		Contour tolerance = diameter C of the tolerance circle
over	up to and including	
-	30	0.30
30	60	0.50
60	90	0.70
90	120	1.00
120	150	1.20
150	200	1.50
200	250	2.00
250	300	2.50
300	350	3.00

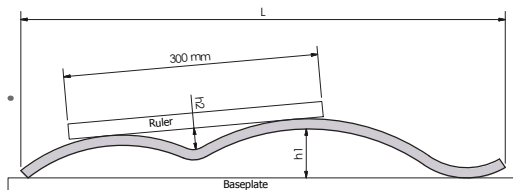
“ Logistics
solutions “



- 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



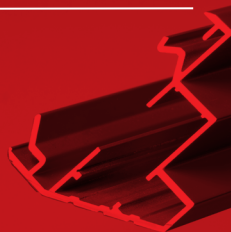
EN 12020-2

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

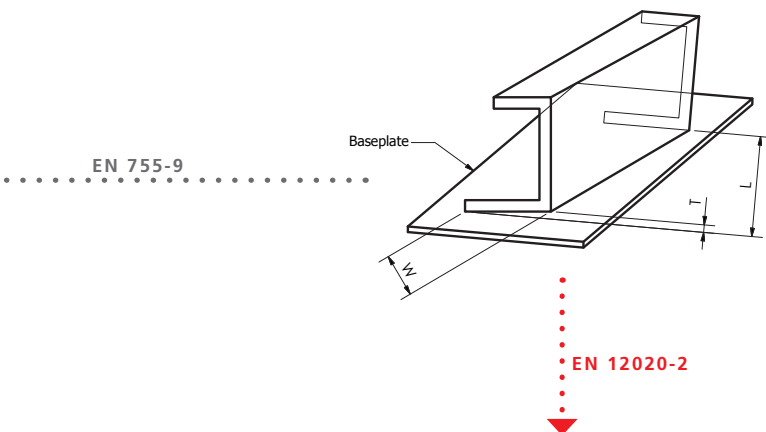
The local deviation from straightness h_2 shall not exceed 0.3 mm per 300 mm length

“Stock
management”



Width W		Twist tolerance T for a length L		
over	up to and including	Pr. 1000 ¹⁾	On total profile length L	
			1000 < L ≤ 6000	over 6000
-	30	1.2	2.5	3.0
30	50	1.5	3.0	4.0
50	100	2.0	3.5	5.0
100	200	2.5	5.0	7.0
200	300	2.5	6.0	8.0
300	450	3.0	8.0	1.5 x L (L in metres)
450	600	3.5	9.5	1.5 x L (L in metres)
600	800	4.5	10.0	1.5 x L (L in metres)

¹⁾ Twist tolerances for lengths less than 1,000 mm shall be subject to agreement between the customer and Alumeco



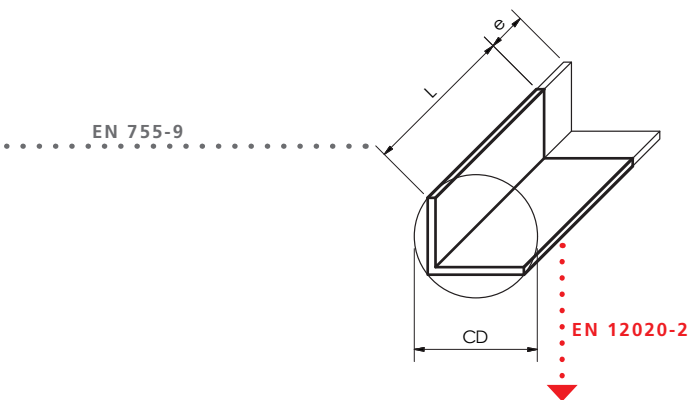
Width W		Twist tolerance T for a length L						
over	up to and including	$0 < L \leq 1000$	$1000 < L \leq 2000$	$2000 < L \leq 3000$	$3000 < L \leq 4000$	$4000 < L \leq 5000$	$5000 < L \leq 6000$	$L > 6000$
-	75	1.0	1.2	1.5	1.8	2.0	2.0	*
75	100	1.0	1.2	1.5	2.0	2.2	2.5	*
100	125	1.0	1.5	1.8	2.2	2.5	3.0	*
125	150	1.2	1.5	1.8	2.2	2.5	3.0	*
150	200	1.5	1.8	2.2	2.6	3.0	3.5	*
200	350	1.8	2.5	3.0	3.5	4.0	4.5	*

*) Subject to agreement between Alumeco and customer



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	450	+8	+11	+14	+20	+28
450	800	+9	+14	+16	+22	+30





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	350	+8	+11	+14	*

*) Subject to agreement between Alumeco and customer

“Worldwide
partnership”

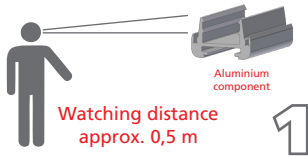
TECHNICAL DATA

Alloy	Temper	Proof stress $R_{p0.2}$ MPa, min.	Tensile strength R_m MPa, min.	Elongation A % min.	Hardness Webster B	Thermal conductivity at 20° W/m °C
EN AW-6005 AlSiMg	T6 - Solid profile	$t \leq 5$: 225 $5 < t \leq 10$: 215 10 < $t \leq 25$: 200	$t \leq 5$: 270 $5 < t \leq 10$: 260 10 < $t \leq 25$: 250	$t \leq 25$: 8	14	170
	T6 - Hollow profile	$t \leq 5$: 215 $5 < t \leq 15$: 200	$t \leq 5$: 255 $5 < t \leq 15$: 250	$t \leq 15$: 8	14	170
EN AW-6005A AlSiMg(A)	T6 - Solid profile	$t \leq 5$: 225 $5 < t \leq 10$: 215 10 < $t \leq 25$: 200	$t \leq 5$: 270 $5 < t \leq 10$: 260 10 < $t \leq 25$: 250	$t \leq 25$: 8	14	170
	T6 - Hollow profile	$t \leq 5$: 215 $5 < t \leq 15$: 200	$t \leq 5$: 255 $5 < t \leq 15$: 250	$t \leq 15$: 8	14	170
EN AW-6060 AlMgSi	T4	$t \leq 25$: 60	$t \leq 25$: 120	$t \leq 25$: 16	5	190
	T6	$t \leq 3$: 150 $3 < t \leq 25$: 140	$t \leq 3$: 190 $3 < t \leq 25$: 170	$t \leq 25$: 8	10	190
EN AW-6063 AlMg0.7Si	T4	$t \leq 25$: 65	$t \leq 25$: 130	$t \leq 25$: 14	5	190
	T6	$t \leq 10$: 170 10 < $t \leq 25$: 160	$t \leq 10$: 215 10 < $t \leq 25$: 195	$t \leq 25$: 8	12	190
	T66	$t \leq 10$: 200 10 < $t \leq 25$: 180	$t \leq 10$: 245 10 < $t \leq 25$: 225	$t \leq 25$: 8	13	190
EN AW-6063A AlMg0.7SiA	T4	$t \leq 25$: 90	$t \leq 25$: 150	$t \leq 25$: 12	7	190
	T6	$t \leq 10$: 190 10 < $t \leq 25$: 180	$t \leq 10$: 230 10 < $t \leq 25$: 220	$t \leq 25$: 7 10 < $t \leq 25$: 5	13	190
EN AW-6082 AlSi1MgMn	T4	$t \leq 25$: 110	$t \leq 25$: 205	$t \leq 25$: 14	11	170
	T6 - Solid profile	$t \leq 5$: 250 $5 < t \leq 25$: 260	$t \leq 5$: 290 $5 < t \leq 25$: 310	$t \leq 5$: 8 $5 < t \leq 25$: 10	15	170
	T6 - Hollow profile	$t \leq 5$: 250 $5 < t \leq 15$: 260	$t \leq 5$: 290 $5 < t \leq 15$: 310	$t \leq 15$: 8 $5 < t \leq 15$: 10	15	170

t = Wall thickness

Temper Designations:

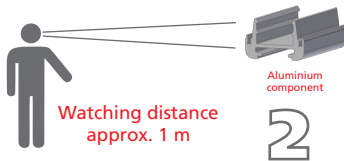
T4: Solution heat treated and naturally aged. **T6:** Solution heat treated and artificially aged. **T66:** Solution heat treated and artificially aged.



Requirements: No disturbing faults in the surface or material structure when observed at very close range (0.5m).

Usage: Decorations of all sorts.

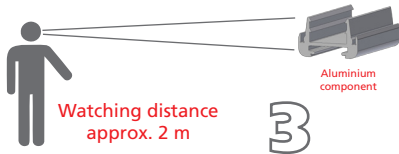
Manufacturing: Max. Delivery length 2,5 m. Can be produced only by polishing from class 2 profiles. All around visible surfaces not possible.



Requirements: No disturbing faults in the surface or material structure when observed at close range (1m).

Usage: Furniture, decorations, raw material for gloss anodized profiles.

Manufacturing: Max. Delivery length 2,5 m. Can be produced only by polishing from class 2 profiles. All around visible surfaces not possible.



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

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

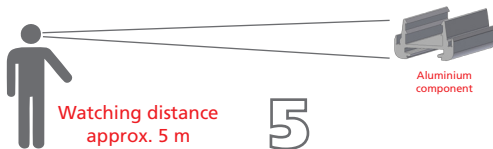
Manufacturing: Profiles are usually anodized. Small faults due to production process are acceptable on less visible surfaces.



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.



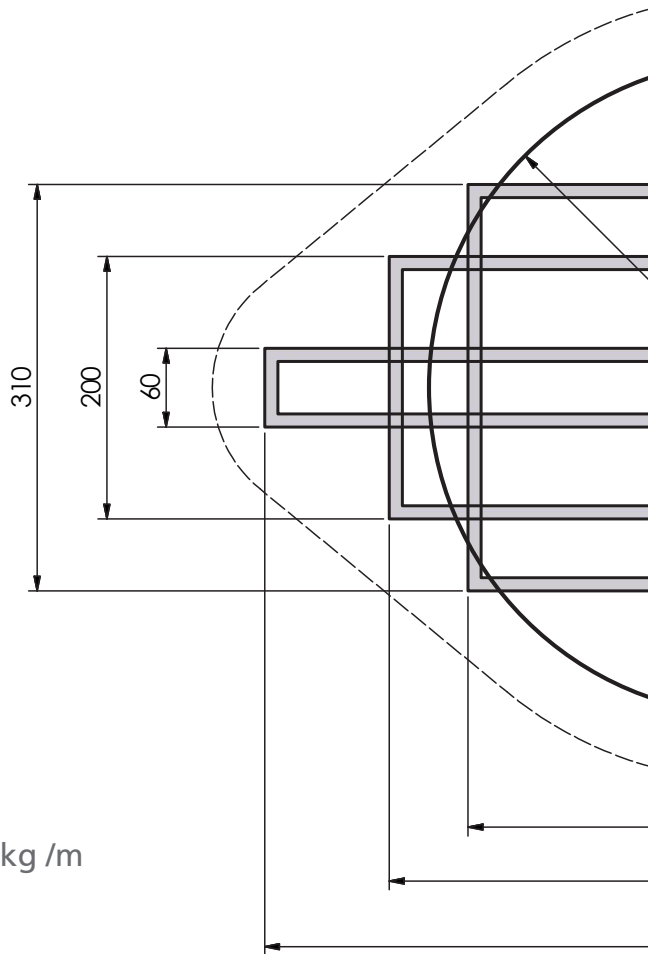
Requirements: No disturbing faults in the surface or material structure when observed at 5 m.

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

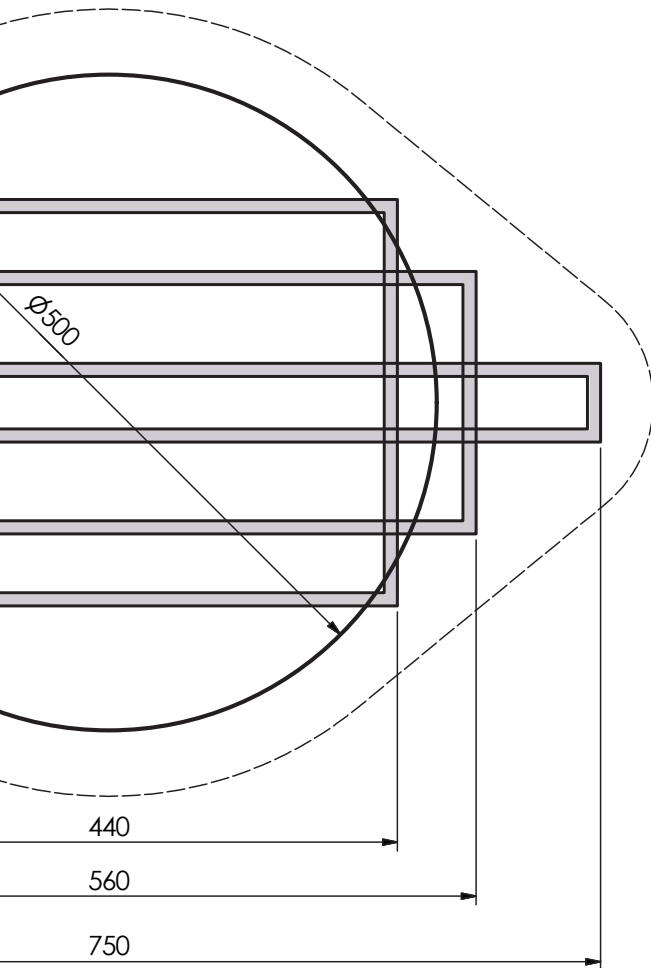
Manufacturing: In addition to class 4 some streaks, local roughness and mild orange peel may occur.

Practically all of our profiles are produced according to classes 3, 4 and 5. These classes are suitable for anodizing (3 & 4) and powder coating (4 & 5). Classes 1 – 2 require individual handling. Furthermore, class 1 always requires polishing.

PROFILE DIMENSIONS



Max. weight: 450 kg /m





Alumeco A/S
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