Extruded alloys and tempers:

Cosmos aluminium can extrude the majority of 6XXX alloy series in various tempers but most common alloys & tempers used are:
The more the content of Mg and Si, the harder the alloy to extrude and the harder the final product. See datasheets.

EN-AW 6060 (Al MgSi0,5) DIN 3.3206
EN-AW 6063 (Al Mg0,7Si) DIN 3.2315
EN-AW 6005 (Al MgSi0,7) DIN 3.3210
EN-AW 6082 (Al Si1MgMn) DIN 3.2315

According to EN 573-3 (EN- AW chemical composition %)

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other		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
6082	0,7-1,3	0,50	0,10	0,40-1,0	0,6-1,2	0,25	0,20	0,10	0,05	0,15	Rest

Alloys & Tempers			
6060	**6063**	**6005**	**6082**
O	O	O	O
T4	T4	T4	T4
T5	T5		T5
T6	T6	T6	T6
T64	T64		
T66	T66		

Temper designation (as per EN 515)	
O	Annealed wrought alloys
T4	Solution heat treated & naturally aged.
T5	Cooled from an elevated temperature forming operation & artificially aged (precipitation hardened)
T6	Solution heat treated & artificially aged (precipitation hardened). Press quenching required.
T64	Solution heat treated & artificially aged (precipitation hardened). Under aged to improve formability (bending temper)
T66	Cooled from an elevated temperature forming operation & artificially aged (precipitation hardened) to a higher level of mechanical properties through special control of manufacturing processes. Press quenching required.

Properties

Physical properties				
Alloys EN-AW	**6060**	**6063**	**6005**	**6082**
Melting range ^{0}C	585-650	585-650	585-650	585-650
Density g/cm^3	2,70	2,70	2,70	2,70
Electrical Conductivity MS/m	34-38		26-32	24-32
Thermal Conductivity W/(m K)	200-220		180-220	170-220
Specific Heat J /(Kg K)	898			896
Thermal Expansion Values				
-50 to 20 ^{0}C (10 $^{-6}$/K)	21,8	23,4	23,4	23,4
20 to 100 ^{0}C (10 $^{-6}$/K)	23,4			
20 to 200 ^{0}C (10 $^{-6}$/K)	24,5			
20 to 300 ^{0}C (10 $^{-6}$/K)	25,6			
Young's Modulus MPa	69500	69500	69500	70000
Shear Modulus MPa	26100	26100	26200	26400

Mechanical Proporties (as per EN 755-2)							
Alloy	Wall Thickness	Tensile strength	Proof stress	Elongation		Brinell Hardness	Temper
	e mm*	R_m MPa min	$R_{P0,2}$ MPa min	A_{50mm} % min	A % min	HB**	
EN-AW 6060	e≤ 25	120	60	14	16	45	T4
	e≤ 5	160	120	6	8	55	T5
	e≤ 3	190	150	6	8	65	T6
	3<e≤25	170	140	6	8	60	
	e≤ 3	215	160	6	8	70	T66
	3<e≤25	195	150	6	8	65	
EN-AW 6063	e≤ 25	130	65	12	14	45	T4
	e≤ 3	175	130	6	8	55	T5
	3<e≤25	160	110	5	7	50	
	e≤ 10	215	170	6	8	65	T6
	10<e≤25	195	160	6	8	60	
	e≤ 10	245	200	6	8	75	
EN-AW 6005	e≤ 25	180	90	15	13	50	T4
	10<e≤25	250	200	8	6	85	T6 FLAT
	e≤ 5	270	225	8	6	90	T6 FLAT
	5<e≤10	260	215	8	6	85	T6 FLAT
	5<e≤10	250	200	8	6	85	T6 HOLLOW
EN-AW 6082	e≤ 25	205	110	12	14	70	T4
	e≤ 5	270	230	6	8	80	T5
	e≤ 5	290	250	6	8	95	T6
	10<e≤25	310	260	8	10	95	

* For different wall thicknesses of a given profile, the lowest specified values of properties shall be considered as valid for the whole profile crosss section.

** The values for the HB hardness are indicative only.

Product forms & Applications

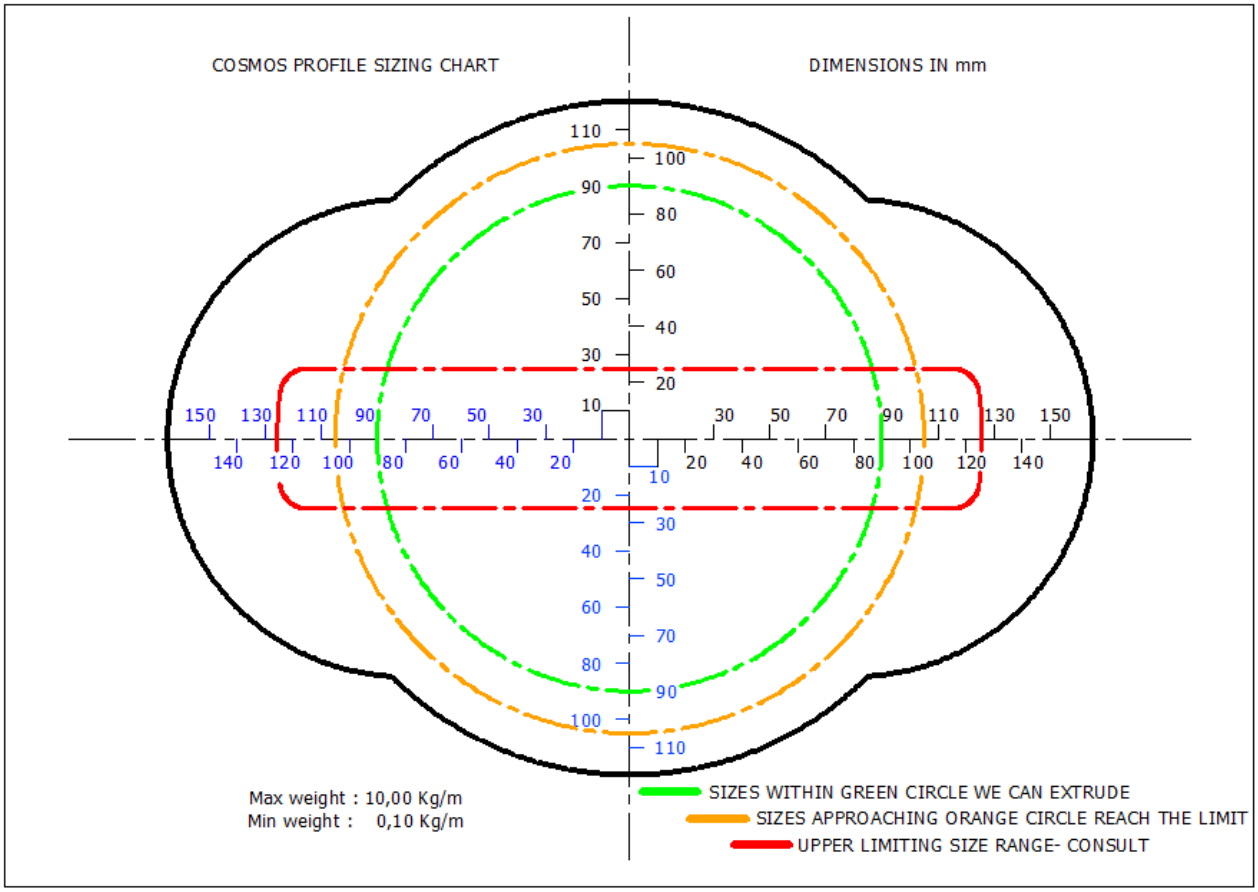
Alloys	Forms	Characteristic properties	Applications
EN-AW 6060	Extruded round rod/bar Extruded square, hexagonal, rectangular rod/bar Extruded tube Extruded profiles	V.good corrosion resistance Medium strength Complex sections Anodising quality	Architectural sections frames, lightings, railing, ladders, furniture, fences, flooring
EN-AW 6063		V.good corrosion resistance Medium strength Complex sections Anodising quality	Architectural sections frames, lightings, railing, ladders, furniture, fences, heat sink
EN-AW 6005 EN-AW 6082		V.good corrosion resistance Medium-High strength Not complex sections	Heavy duty structures, truck frames, bicycles, flanges, pylons, towers, scaffolding tubes

Tolerances & Certifications

The quality control department at Cosmos Aluminium abides with the following standards for the production quality control and delivery of aluminium profiles.

EN Standard	Description
Aluminium & aluminium alloys- Extruded rod/bar, tubes and profiles	
EN 755-1	Technical conditions for inspection & delivery
EN 755-2	Mechanical properties
EN 755-3	Round bars, tolerances on dimension & form
EN 755-4	Square bars, tolerances on dimension & form
EN 755-5	Rectangular bars, tolerances on dimension & form
EN 755-6	Hexagonal bars, tolerances on dimension & form
EN 755-8	Portthole tubes, tolerances on dimension & form
EN 755-9	Profiles, tolerances on dimension & form
Aluminium & aluminium alloys- Extruded precision profiles in alloys EN- AW 6060 & EN- AW 6063	
EN- 12020-1	Technical conditions for inspection & delivery (precision profiles)
EN- 12020-2	Tolerances on dimension & form (precision profiles)
Metallic products- Types of inspection documents	
Inspection	2.3, 3.1, 3.2

Profile size production range



Profile weight production range

Minimum profile weight: 100 gr/m	**Maximum** profile weight: 8000 gr/m

COSMOS ALUMINIUM	**ALLOY DATA SHEET EN AW 6060 [AlMgSi0.5]**	**ALLOY TYPE: GENERAL EXTRUSION**

EN AW 6060 is a medium strength and most commonly used alloy, suitable for applications where no special strength properties are required. Simple to very complex shapes can be produced with very good surface quality characteristics, and suitable for many coating operations such as anodizing and powder coating. Typical areas of application for this alloy is architectural doors and windows, facades, furniture parts, lighting columns and flagpoles, heat sink sections, office equipment, trailer flooring, irrigation, heating and cooling pipes, ladders, railings.

Chemical composition according to EN 573-3

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other		Al
								Each	Total	
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

Physical Properties (approx. 20^{0}C)

Density [g/cm^3]	Melting range [^{0}C]	Electrical conductivity [MS/m]	Thermal conductivity [W/(m K]	Thermal expansion [10 $^{-6}$/K]	Modulus of elasticity [MPa]	Shear modulus [MPa]
2,7	585-650	34-38	200-220	23,4	69500	26100

Mechanical Properties (extruded profiles) EN 755-2

	e* mm	R_m min MPa	$R_{P0,2}$ min MPa	A_{50mm} %	A %	HB**
T4	e≤ 25	120	60	14	16	45
T5	e≤ 5	160	120	6	8	55
T6	e≤ 3	190	150	6	8	65
	3< e≤ 25	170	140	6	8	60
T66	e≤ 3	215	160	6	8	70
	3< e≤ 25	195	150	6	8	65

* For different wall thicknesses of a given profile, the lowest specified values of properties shall be considered as valid for the whole profile cross section

** The values for the HB hardness are indicative only

Temper Designation according to EN 515

T4	Solution heat treated & naturally aged
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

Weldability*-** Gas: **3** TIG: 2 MIG: **2** (Filler materials (EN ISO 18273): AlMg5Cr (A) or AlSi5, and AlMg3 if product has to be anodized. Due to the welding heat input consider 50% off properties (ref: EN 1999-1).

Machining*-** T4 temper: **3** T5 & T6: **2**

Corrosion resistance*-** Atmosphere: **2** Seawater: **2**

Coating Properties*-** Protection anodizing: **1** Decorative anodizing: **1** Coating: **1**

***Qualification ranking: 1-very good to 6-unsuitable

COSMOS ALUMINIUM	**ALLOY DATA SHEET EN AW 6063 [AlMg0.7Si]**	**ALLOY TYPE: GENERAL EXTRUSION**

EN AW 6063 is a medium strength alloy, suitable for applications where no special strength properties are required. Simple to complex shapes can be produced with very good surface quality characteristics, and suitable for many coating operations such as anodizing and powder coating. Typical areas of application for this alloy is architectural doors and windows, facades, furniture parts, lighting columns and flagpoles, heat sink sections, office equipment, trailer flooring, irrigation, heating and cooling pipes, ladders, railings.

Chemical composition according to EN 573-3

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other		Al
								Each	Total	
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

Physical Properties (approx. 20^{0}C)

Density [g/cm^3]	Melting range [^{0}C]	Electrical conductivity [MS/m]	Thermal conductivity [W/(m K]	Thermal expansion [10 $^{-6}$/K]	Modulus of elasticity [MPa]	Shear modulus [MPa]
2,7	585-650	34-38	200-220	23,4	69500	26100

Mechanical Properties (extruded profiles) EN 755-2

TEMPER	Wall Thickness	Tensile strength	Proof stress	Elongation min		Brinell Hardness
	e* mm	R_m min MPa	$R_{P0,2}$ min MPa	A_{50mm} %	A %	HB**
T4	e≤ 25	130	65	12	14	45
T5	e≤ 3	175	130	6	8	55
	3< e≤ 25	160	110	5	7	50
T6	e≤ 10	215	170	6	8	65
	10< e≤ 25	195	160	6	8	60
T66	e≤ 10	245	200	6	8	75
	10< e≤ 25	225	180	6	8	70

* For different wall thicknesses of a given profile, the lowest specified values of properties shall be considered as valid for the whole profile cross section

** The values for the HB hardness are indicative only

Temper Designation according to EN 515

T4	Solution heat treated & naturally aged
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

Weldability*-** Gas: **3** TIG: **2** MIG: **1** (Filler materials (EN ISO 18273): AlMg5Cr (A) or AlSi5, and AlMg3 if product has to be anodized. Due to the welding heat input consider 50% off properties (ref: EN 1999-1).

Machining*-** T4 temper: **3** T5 & T6: **2**

Corrosion resistance*-** Atmosphere: **2** Seawater: **2-3**

Coating Properties*-** Protection anodizing: **1** Decorative anodizing: **3** Coating: **2**

***Qualification ranking: 1-very good to 6-unsuitable

cosmos ALUMINIUM	**ALLOY DATA SHEET EN AW 6005A [AlSiMgA]**	**ALLOY TYPE: MEDIUM STRENGTH**

EN AW 6005A is a heat treated medium strength alloy, suitable for moderate load applications and exhibits excellent corrosion resistance. Within the 6XXX family, the strength of 6005A is between that of 6063 and 6082, with its properties approaching more on the 6082 side. This is why 6005A can be used interchangeably with 6082, while retaining much better surface and allowing better extrusion speeds. Complex and thin walled shapes are not possible to produce. Typical areas of application for this alloy is railway, coaches, truck profiles, pylon & towers, tubes for scaffolding, masts and beams for ship building.

Chemical composition according to EN 573-3

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other		Al
								Each	Total	
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

Physical Properties (approx. 20^{0}C)

Density [g/cm^3]	Melting range [^{0}C]	Electrical conductivity [MS/m]	Thermal conductivity [W/(m K]	Thermal expansion [10 $^{-6}$/K]	Modulus of elasticity [MPa]	Shear modulus [MPa]
2,7	585-650	26-32	180-220	23,4	69500	26200

Mechanical Properties (extruded profiles) EN 755-2

TEMPER	Wall Thickness	Tensile strength	Proof stress	Elongation min		Brinell Hardness
	e* mm	R_m min MPa	$R_{P0,2}$ min MPa	A %	A_{50mm} %	HB**
T4	e≤ 25	180	90	15	13	50
T6 Open profile	e≤ 5	270	225	8	6	90
	5< e≤ 10	260	215	8	6	85
	10< e≤ 25	250	200	8	6	85
T6 Hollow profile	e≤ 5	255	215	8	6	85
	5< e≤ 10	250	200	8	6	85

* For different wall thicknesses of a given profile, the lowest specified values of properties shall be considered as valid for the whole profile cross section

** The values for the HB hardness are indicative only

Temper Designation according to EN 515

T4	Solution heat treated & naturally aged
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

Weldability*-** Gas: **3** TIG: **2** MIG: **1** [Filler materials (EN ISO 18273): AlMg4.5Mn07 (A), or AlSi5. Due to the welding heat input consider 50% off properties (ref: EN 1999-1).

Machining*-** T4 temper: **4** T6 temper: **2**

Corrosion resistance*-** Atmosphere: **1** Seawater: **2**

Coating Properties*-** Protection anodizing: **1** Decorative anodizing: **2** Coating: **1**

*** Qualification ranking: 1-very good to 6-unsuitable

cosmos ALUMINIUM	**ALLOY DATA SHEET** **EN AW 6082 [AlSi1MgMn]**	**ALLOY TYPE:** **HIGH STRENGTH**

EN AW 6082 is a medium to high strength alloy, suitable for high load applications and exhibits excellent corrosion resistance. It has the highest strength of the 6XXX alloys. The addition of large amounts of Mn controls the grain size thus resulting to a stronger alloy. Complex and thin walled shapes are not possible to produce and the surface finish smoothness is inferior to that of 6060. Typical areas of application for this alloy is heavy duty structures in rail coaches, truck frames, bicycles, pylon & towers, tubes for scaffolding, masts and beams for ship building..

Chemical composition according to EN 573-3

Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other		Al
								Each	Total	
0,70-1,30	0,50	0,10	0,40-1,0	0,60-1,20	0,25	0,20	0,10	0,05	0,15	Rest

Physical Properties (approx. 20^{0}C)

Density [g/cm^3]	Melting range [^{0}C]	Electrical conductivity [MS/m]	Thermal conductivity [W/(m K]	Thermal expansion [10 $^{-6}$/K]	Modulus of elasticity [MPa]	Shear modulus [MPa]
2,7	585-650	24-32	170-220	23,4	70000	26400

Mechanical Properties (extruded profiles) EN 755-2

TEMPER	Wall Thickness	Tensile strength	Proof stress	Elongation min	Elongation min	Brinell Hardness
	e* mm	R_m min MPa	$R_{P0,2}$ min MPa	A_{50mm} %	A %	HB**
T4	e≤ 25	205	110	12	14	65
T5	e≤ 5	270	230	6	8	80
T6	e≤ 5	290	250	6	8	95
	5< e≤ 25	310	260	8	10	95

* For different wall thicknesses of a given profile, the lowest specified values of properties shall be considered as valid for the whole profile cross section

** The values for the HB hardness are indicative only

Temper Designation according to EN 515

T4	Solution heat treated & naturally aged
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

Weldability*-** Gas: **3** TIG: **2** MIG: 1 [Filler materials (EN ISO 18273): AlMg5Cr (A), AlMg4.5Mn07 (A), or AlSi5. Due to the welding heat input consider 50% off properties (ref: EN 1999-1).

Machining*-** T4 temper: **4** T5 & T6: **2**

Corrosion resistance*-** Atmosphere: **1** Seawater: **2**

Coating Properties*-** Protection anodizing: **1** Decorative anodizing: **3** Coating: **2**

*** Qualification ranking: 1-very good to 6-unsuitable