Aluminium

Chemical Composition

Designation of the alloy		Chemical Composition											Others		Aluminium
Numerical	Symbolic	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Ga	V	Notes	Each (max.)	Total (max.)	min.
EN AW-1050A	EN AW-Al 99.5	0.25 max.	0.40 max.	0.05 max.	0.05 max.	0.05 max.	-	0.07 max.	0.05 max.	-	-	-	0.03	-	99.5
EN AW-1070A	EN AW-Al 99.7	0.20 max.	0.25 max.	0.03 max.	0.03 max.	0.03 max.	-	0.07 max.	0.03 max.	-	-	-	0.03	-	99.7
EN AW-1200	EN AW-Al 99.0	1.00 Si+ Fe		0.05 max.	0.05 max.	-	-	0.1 max.	0.05 max.	-	-	-	0.05	0.15	99
EN AW-2017A	EN AW-AlCuMgSi(A)	0.20 - 0.8	0.70 max.	3.5 - 4.5	0.40 - 1.0	0.40 - 1.0	0.1 max.	0.25 max.	-	-	-	0.25 Zr + Ti	0.05	0.15	Rest
EN AW-2024	EN AW-AlCuMg1	0.50 max.	0.5 max.	3.8 - 4.9	0.30 - 0.9	1.2 - 1.8	0.1 max.	0.25 max.	0.15 max.	-	-	-	0.05	0.15	Rest
EN AW-3003	EN AW-AlMn1Cu	0.60 max.	0.7 max.	0.05 - 0.20	1.0 - 1.5	-	-	0.1 max.	-	-	-	-	0.05	0.15	Rest
EN AW-3005	EN AW-AlMn1Mg0.5	0.60 max.	0.7 max.	0.3 max.	1.0 - 1.5	0.20 - 0.6	0.1 max.	0.25 max.	0.1 max.	-	-	-	0.05	0.15	Rest
EN AW-3105	EN AW-AlMn0.5Mg0.5	0.60 max.	0.7 max.	0.3 max.	0.30 - 0.8	0.20 - 0.8	0.2 max.	0.40 max.	0.1 max.	-	-	-	0.05	0.15	Rest
EN AW-5005	EN AW-AlMg1(B)	0.30 max.	0.7 max.	0.2 max.	0.2 max.	0.50-1.1	0.1 max.	-	0.25 max.	-	-	-	0.05	0.15	Rest
EN AW-5052	EN AW-AlMg2.5	0.25	0.40 max.	0.1 max.	0.1 max.	2.2 - 2.8	0.15 - 0.35	0.1 max.	-	-	-	-	0.05	0.15	Rest
EN AW-5083	EN AW-AlMg4.5Mn0.7	0.40 max.	0.40 max.	0.1 max.	0.40 - 1.0	4.0 - 4.9	0.05 - 0.2	0.25 max.	0.15 max.	-	-	-	0.05	0.15	Rest

Designation of the alloy		Chemical Composition											Others		Aluminium
Numerical	Symbolic	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Ga	V	Notes	Each (max.)	Total (max.)	min.
EN AW-5086	EN AW-Al Mg4	0.40 max.	0.50 max.	0.1 max.	0.20 - 0.7	3.5 - 4.5	0.05 - 0.2	0.25 max.	0.15 max.	-	-	-	0.05	0.15	Rest
EN AW-5182	EN AW-Al Mg4.5Mn0.4	0.20 max.	0.35 max.	0.15 max.	0.20 - 0.50	4.0 - 5.0	0.1 max.	0.25 max.	0.1 max.	-	-	-	0.05	0.15	Rest
EN AW-5657	EN AW-Al 99.85Mgl(A)	0.08 max.	0.10 max.	0.1 max.	0.03 max.	0.6-1.0	-	-	0.05 max.	0.03	0.05	-	0.02	0.05	Rest
EN AW-5754	EN AW-Al Mg3	0.40 max.	0.40 max.	0.1 max.	0.50 max.	2.6 - 3.6	0.30	0.2 max.	0.15 max.	-	-	0.10 - 0.6 Mn + Cr	0.05	0.15	Rest
EN AW-6016	EN AW(Al Si1.2Mg0.4)	1.0 - 1.5	0.50 max.	0.2 max.	0.2 max.	0.25 - 0.6	0.1 max.	0.2 max.	0.15 max.	-	-	-	0.05	0.15	Rest
EN AW-6082	EN AW-Al Si1MgMn	0.7 - 1.3	0.50 max.	0.1 max.	0.40 - 1.0	0.6 - 1.2	0.2 max.5	0.2 max.	0.1 max.	-	-	-	0.05	0.15	Rest
EN AW-7075	EN AW-Al Zn5.5MgCu	0.40 max.	0.50 max.	1.2 - 2.0	0.30 max.	2.1 - 2.9	0.18 - 0.28	5.1 - 6.1	0.2 max.	-	-	-	0.05	0.15	Rest
EN AW-8011A	EN AW-Al FeSi(A)	0.40 - 0.8	0.50 - 1.0	0.1 max.	0.1 max. max.	0.1 max.	0.1 max.	0.1 max.	0.05 max.	-	-	-	0.05	0.15	Rest

Equivalents

EUROPEAN STANDARD (EN)		Approximate international equivalents					
Numerical classification	Classification of symbols	US (AISI)		JAPAN (JIS)		CHINA (GB)	
EN AW-1050A	EN AW-Al 99.5						
EN AW-1070A	EN AW-Al 99.7						
EN AW-1200	EN AW-Al 99.0						
EN AW-2017A	EN AW-Al CuMgSi(A)						
EN AW-2024	EN AW-Al CuMg1						
EN AW-3003	EN AW-Al Mn1Cu						
EN AW-3005	EN AW-Al Mn1Mg0.5						
EN AW-3105	EN AW Al Mn0.5Mg0.5						
EN AW-5005	EN AW-Al Mg1(B)						
EN AW-5052	EN AW-Al Mg2.5						
EN AW-5083	EN AW-Al Mg4.5Mn0.7						
EN AW-5086	EN AW-Al Mg4						
EN AW-5182	EN AW-Al Mg4.5Mn0.4						
EN AW-5657	EN AW-Al 99.85Mgl(A)						
EN AW-5754	EN AW-Al Mg3						
EN AW-6016	EN AW(Al Si1.2Mg0.4)						
EN AW-6082	EN AW-Al Si1MgMn						
EN AW-7075	EN AW-Al Zn5.5MgCu						
EN AW-8011A	EN AW-Al FeSi(A)						

Mechanical properties

The mechanical properties shown on the following tables contain the intermediate thickness ranges. For very large and/or small thicknesses, there may be deviations from the data presented.

MECHANICAL PROPERTIES EN 485-2

QUALITY OF THE ALUMINIUM		Treatment condition	Tensile strength Rm		Yield strength Rp_{02}		Minimum elongation % (based on increased thickness)
			N/mm^2				
Designation	Standard		Min.	Max.	Min.	Max.	A50mm
EN AW-1050A (Al 99.5)	EN 485	0/H111	65	95	20	-	20-29
		H14	105	145	85	-	2-5
		H16	120	160	100	-	1-3
		H18	140	-	120	-	1-2
		H22	85	125	55	-	4-11
		H24	105	145	75	-	3-8
		H26	120	160	90	-	2-4
EN AW-1070 (Al 99.7)	EN 485	0/H111	60	90	15	-	23-32
		H18	125	-	105	-	2
		H22	80	120	50	-	7-12
		H24	100	140	60	-	5-9
EN AW-1200 (Al 99.0)	EN 485	0/H111	75	105	25	-	19-28
		H14	115	155	95	-	2-6
		H18	150	-	130	-	1-2
		H19	160	-	140	-	1
		H24	115	155	90	-	3-7
AW-2017A (Al Cu4MgSi(A))	EN 485	O	-	225	-	145	12-14
		T4	390	-	245	-	14-15
AW-2024 (Al Cu4Mg1)	EN 485	O	-	220	-	140	12-13

QUALITY OF THE ALUMINIUM		Treatment condition	Tensile strength Rm		Yield strength Rp_{02}		Minimum elongation % (based on increased thickness)
			N/mm^2				
Designation	Standard		Min.	Max.	Min.	Max.	A50mm
		T4	425	-	275	-	12-14
EN AW-3003 (Al Mn1Cu)	EN 485	0/H111	95	135	35	-	15-23
		H14	145	185	125	-	2-4
		H16	170	210	150	-	1-2
		H18	190	-	170	-	1-2
		H24	145	185	115	-	4-6
		H26	170	210	140	-	2-3
EN AW-3005 (Al Mn1Mg0.5)	EN 485	H111	115	165	45	-	12-19
		H14	170	215	150	-	1-3
		H22	145	195	110	-	5-7
		H24	220	-	190	-	2-3
EN AW-3105 (Al Mn0.5Mg0.5)	EN 485	H111	100	155	40	-	14-17
		H18	195	-	180	-	1
		H24	150	200	120	-	4-5
EN AW-5005 (Al Mg1(B))	EN 485	H111	100	145	35	-	15-22
		H18	185	-	165	-	1-2
		H34	145	185	110	-	3-6
		H36	165	205	135	-	2-4
EN AW-5052 (Al Mg2.5)	EN 485	0/H111	170	215	65	-	12-18
		H14	230	280	180	-	3-4
		H18	270	-	240	-	1-2
		H34	230	280	150	-	4-7
EN AW-5083 (Al Mg4.5Mn0.7)	EN 485	H111	275	350	125	-	11-15

QUALITY OF THE ALUMINIUM		Treatment condition	Tensile strength Rm		Yield strength Rp_{02}		Minimum elongation % (based on increased thickness)
			N/mm^2				
Designation	Standard		Min.	Max.	Min.	Max.	A50mm
		H321	305	-	215	-	8-10
		H32	305	380	215	-	5-8
		H34	340	400	250	-	4-7
EN AW-5086 (Al Mg4)	EN 485	H111	240	310	100	-	11-17
EN AW-5182 (Al Mg4.5Mn0.4)	EN 485	H111	255	315	110	-	11-13
EN AW-5657 (Al 99.85 Mg1(A))	ASTM	H241	125	180	-	-	13
		H25	140	195	-	-	8
		H26	150	205	-	-	7
EN AW-5754 (Al Mg3)	EN 485	0/H111	190	240	80	-	12-18
		H14	240	280	190	-	3-4
		H18	290	-	250	-	1-2
		H22	220	270	130	-	7-10
		H32	220	270	130	-	7-10
		H34	240	280	160	-	6-8
		H36	265	305	190	-	4-6
EN AW-6016 (Al Si1.2Mg0.4)	EN 485	T4	170	250	80	140	24
		T6	260	300	180	260	10
EN AW-6082 (Al Si1MgMn)	EN 485	O	-	150	-	85	14-18
		T4	205	-	110	-	12-15
		T6	310	-	260	-	6-10
EN AW-7075 (Al Zn5.5MgCu)	EN 485	O	-	275	-	145	10
		T6	545	-	475	-	6-8
		T76	500	-	425	-	7-8

QUALITY OF THE ALUMINIUM		Treatment condition	Tensile strength Rm		Yield strength Rp_{02}		Minimum elongation % (based on increased thickness)
			N/mm^2				
Designation	Standard		Min.	Max.	Min.	Max.	A50mm
		T73	460	-	385	-	7-8
EN AW-8011A (Al FeSi(A)	EN 485	O/H111	85	130	30	-	19-25
		H18	165	-	145	-	1-2
		H24	125	165	100	-	3-6

EXPLANATION OF THE DESIGNATIONS OF THE TREATMENT CONDITIONS USED IN THE EN 485-2 TABLES

Designation of the treatment condition	Explanation
O	Annealed - products which, after hot forming, have the properties required for the annealed state can be designated with the O condition
H14	Work hardening - 1/2 hard
H16	Work hardening - 3/4 hard
H18	Work hardening - 4/4 hard
H19	Work hardening - extra hard
H111	Annealing with light work hardening (less than H11) during the final processes such as drawing or flattening
H22 / H32	Work hardening - 1/4 hard
H24 / H34	Work hardening - 1/2 hard
H26 / H36	Work hardening - 3/4 hard
H321	Work hardening and stabilisation- 1/4 hard, applied to aluminium-magnesium alloys for which resistance to exfoliation corrosion and intergranular corrosion is requested
T4	Solution and natural ageing
T6	Solution and artificial ageing
T73	Solution and artificial over-ageing to achieve the best resistance to stress corrosion
T76	Solution and artificial over-ageing to achieve the best resistance to exfoliation corrosion

CONDITION EQUIVALENTS
H2 ~ H12 ~ H22 ~ H32
H4 ~ H14 ~ H24 ~ H34
H8 ~ H18 ~ H28 ~ H38

Finishes

- Under a commercial agreement
- We are able to supply aluminium that can be anodised or is anodised
- We also offer the following material cleaning options (depending on the alloy):
    - Wash
    - Chemical degreasing

Tolerances

ALLOY GROUP

Group I	1080A	1070A	1050A	1220				
	3003	3103	3005	3105				
	4006	4007						
	5005	5050						
	8011A							
Group II	2014	2017A	2024					
	3004							
	5040	5049	5251	5052	5154A	5454	5754	5182
	5083	5086						
	6061	6082						
	7020	7021	7022	7075				

THICKNESS TOLERANCES

Nominal thickness		Thickness tolerances according to EN 485-4 for nominal widths of			
		≤ 1000		1000 < and ≤ 1250	
>	≤	Alloy Group		Alloy Group	
		I	II	I	II
0.2	0.4	± 0.02	± 0.03	± 0.04	± 0.05
0.4	0.5	± 0.03	± 0.03	± 0.04	± 0.05
0.5	0.6	± 0.03	± 0.04	± 0.05	± 0.06
0.6	0.8	± 0.03	± 0.04	± 0.06	± 0.07
0.8	1	± 0.04	± 0.05	± 0.06	± 0.08
1	1.2	± 0.04	± 0.05	± 0.07	± 0.09
1.2	1.5	± 0.05	± 0.07	± 0.09	± 0.11
1.5	1.8	± 0.06	± 0.08	± 0.10	± 0.12
1.8	2	± 0.06	± 0.09	± 0.11	± 0.13
2	2.5	± 0.07	± 0.10	± 0.12	± 0.14

Nominal thickness		Thickness tolerances according to EN 485-4 for nominal widths of			
		≤ 1000		1000 < and ≤ 1250	
>	≤	Alloy Group		Alloy Group	
		I	II	I	II
2.5	3	± 0.08	± 0.11	± 0.13	± 0.15
3	3.5	± 0.10	± 0.12	± 0.15	± 0.17
3.5	4	± 0.15	-	± 0.20	-
4	5	± 0.18	-	± 0.22	-

Measurements in mm.

WIDTH TOLERANCES

Nominal thickness t		Standard slitting tolerances for Metalle Schmidt[1)]				Width tolerances according to EN 485-4 for nominal widths of:			
>	≤	3-15	15-50	50-150	>150	≤ 100	100 < and ≤ 300	300< and ≤ 500	500 < and ≤ 1250
0,2	0,4	0;+0,15	0;+0,15	0;+0,15	0;+0,2	0;+0,3	0;+0,4	0;+0,6	0;+1,5
0,4	0,6	0;+0,17	0;+0,18	0;+0,2	0;+0,24	0;+0,3	0;+0,4	0;+0,6	0;+1,5
0,6	1	0;+0,17	0;+0,18	0;+0,2	0;+0,24	0;+0,3	0;+0,5	0;+1	0;+1,5
1	1,5	0;+0,2	0;+0,2	0;+0,2	0;+0,3	0;+0,4	0;+0,7	0;+1,2	0;+2
1,5	2	on request	0;+0,26	0;+0,3	0;+0,32	0;+0,4	0;+1	0;+1,2	0;+2
2	2,5	on request	0;+0,26	0;+0,3	0;+0,32	0;+1	0;+1	0;+1,5	0;+2
2,5	3	on request	on request	0;+0,32	0;+0,35	0;+1	0;+1	0;+1,5	0;+2
3	5	on request	on request	0;+0,32	0;+0,35	-	0;+1,5	0;+2	0;+3

-	0,2	0;+0,15	0;+0,15	0;+0,15	0;+0,2	-	-	-	-

Measurements in mm.

1) Other, closer dimensional tolerances are possible under a commercial agreement .

EDGE CAMBER TOLERANCES

Nominal width (W)	Closer edge curve tolerances possible **under commercial agreement**.		Tolerances according to Standard EN 485-4 for: edge curve
	Maximum deviation 2000 mm Thickness (t)		Maximum deviation 2000 mm Thickness (t)
	t ≤ 1.20 mm	t > 1.20 mm	Tolerance on the d_{max} curve
3 ≤ W < 6	10.00	15.00	-
6 < W ≤ 10	8.00	12.00	-
10 < W ≤ 20	4.00	6.00	-
20 < W < 25	2.00	4.00	-
25 ≤ W ≤ 100	2.00	4.00	8 [1)]
100	2.00	4.00	6.00
300 < W ≤ 350	2.00	4.00	5.00
350 < W ≤ 600	-	-	5.00
600 < W ≤ 1000	-	-	4.00

Measurements in mm.
1) For nominal widths below 25mm, the tolerances will be agreed when requesting the quote or placing the order.

RIPPLE - LONGITUDINAL FLATNESS

The flatness tolerance of the strips in cut lengths in the direction of rolling must be a maximum of 10 mm over 1000 mm. Any other flatness requirement must be agreed when placing the order.

States

DESIGNATION OF THE BASIC STATES OF THE PROCESS

F: As fabricated

Applied to the semi-product fabrication process in which there are no special controls associated with the heat treatments or cold working processes carried out. No values have been established for the mechanical properties.

O: Annealed

Applied to semi-products with the purpose of achieving the state with the lowest strength.

H: Work hardened (Generally drawn/rolled).

Applied to semi-products with a strength that has increased after being cold worked, with or without an intermediate heat treatment to achieve a reduction in their mechanical properties.

W: Solution heat treated and cold worked

This state is only applied to alloys that spontaneously age at the ambient temperature after being heat treated and cold worked. This state is only used when the natural ageing time is indicated. For example, W 1/2 hour.

T: Heat treated to achieve structural hardening

Applied to semi-products that are heat treated to increase their mechanical strength, with or without additional work hardening, with the purpose of achieving a stable state.

SUBDIVISIONS OF THE BASIC ALUMINIUM TREATMENT STATES

1. SUBDIVISION OF STATE H: WORK HARDENED

1.1. The first digit after the letter H indicates the specific variation of the basic operations of the process according to the following:

H1: Work hardened only

The mechanical properties are achieved with final cold working.

H2: Work hardened and partially annealed

The mechanical properties are achieved with a final heat treatment. In general, this state has a larger elongation than H1 with the same strength.

H3: Work hardened and stabilised

Applied to semi-products hardened with cold plastic working, with mechanical properties that have been subsequently stabilised by a low-temperature heat treatment. In general, stabilisation reduces mechanical strength and increases ductility. This subdivision is only applicable to alloys that are softened at the ambient temperature if not stabilised, such as AlMg alloys.

1.2 The digit after H1, H2 and H3 refers to the mechanical properties of the semi-product:

HX2: 1/4 hard. Its tensile strength is approximately halfway between the annealed and semi-hard state.

HX4: Semi-hard. Its tensile strength is approximately halfway between the annealed and hard state.

HX6: 3/4 hard. Its tensile strength is approximately halfway between the semi-hard and hard state.

HX8: Hard. Maximum degree of work hardening generally used.

HX9: Extra hard. Its tensile strength exceeds that of the hard state. Odd digits indicate states in which the tensile strength is the mean corresponding to the states of adjacent even digits.

1.3 Third digit (x) in the subdivision of state H

The next three digits after the letter H are used to designate forgeable alloys:

H (x)11: : Applied to semi-products that maintain their cold working hardness after final annealing, which prevents them from being classified as annealed (0), but which can be classified as H(x)1. Example: The degree of hardness achieved by controlled stress straightening is described as H111 (elongation of approximately 1%).

H 112: Applied to semi-products that can be work hardened at high temperatures, for which a series of mechanical property limits have been established.

H 113: : Applied to sheets that maintain their cold working hardness after final annealing, which prevents them from being classified as annealed (0), but which can be classified as H(x) (elongation of approximately 3%).

2. SUBDIVISION OF T STATES: HEAT TREATMENT

Digits 1 to 10 after the letter T indicate the specific sequences of basic treatments, as described next.

T1: Cooled from an elevated temperature-shaping process and naturally aged

Applied to semi-products that are cooled down from the extrusion temperature at the adequate speed (cold working), with the purpose of increasing their mechanical properties with a subsequent natural ageing process. This state includes the products that are subject to flattening or straightening with stress after cooling down, with no significant effects on the product's mechanical properties.

T3: Solution heat treated (1), cold worked (1), work hardened and naturally aged

Applied to semi-products that are cold worked and then work hardened after a solution heat treatment or cold working, with the purpose of improving their mechanical strength. This state includes the products that are subject to flattening or straightening with stress after cold working, which have an impact on the product's mechanical properties.

T4: Solution heat treated (1), cold worked (1) and naturally aged

Applied to semi-products that improve their mechanical properties after being solution heat treated, cold worked and naturally aged. This state includes the products that are subject to flattening or straightening with stress, with no effect on the product's mechanical properties.

T5: Cooled from an elevated temperature-shaping process and artificially aged

Applied to semi-products that are cooled down with forced air at the adequate speed (cold working) from the extrusion temperature, with the purpose of increasing their mechanical properties with a subsequent artificial ageing process. This state includes the products that are subject to flattening or straightening with stress after cooling down, with no significant effects on the product's mechanical properties.

T6: Solution heat treated (1), cold worked (1) and artificially aged

Applied to semi-products that improve their mechanical properties after a sudden solution heat treatment and artificial ageing. This state includes the products that are subject to flattening or straightening with stress, with no effect on the product's mechanical properties.

T7: Solution heat treated (1), cold worked (1) and artificially overaged / stabilised

Applied to semi-products that are artificially aged after being solution heat treated and cold worked, exceeding the limit corresponding to the maximum strength, with the purpose of controlling some of the product's significant properties.

T8: Solution heat treated (1), cold worked (1), work hardened and artificially aged

Applied to semi-products that are work hardened to a certain level between being cold worked and artificially aged to improve their strength. This state includes the products that are subject to flattening or straightening with stress after cold working, which have

an impact on the product's mechanical properties.

T9: Solution heat treated (1), cold worked (1), artificially aged and work hardened

Applied to semi-products that are cold worked after being solution heat treated, cord worked and artificial aged, with the purpose of improving their mechanical strength.

T10: Cooled from an elevated temperature-shaping process, work hardened and artificially aged

Applied to semi-products that are subject to a specific work hardening process after cooling down (cold working) and before they are artificially aged.

2.1 Second digit in the subdivision of state T

A second digit is added (it must not be 0) to indicate variations in the treatment that significantly alter the properties of semi-products. The most significant variations are:

T31: 1% Solution heat treated, cold worked and work hardened.

T31: 1% Solution heat treated, cold worked and work hardened.

T41: Solution heat treated and cold worked, cooled down at a specific temperature.

T35: 1.5 to 3% Solution heat treated, cold worked and controlled stress applied.

T36: 7% Solution heat treated, cold worked and work hardened.

T42: Solution heat treated from 0 or F, cold worked and natural ageing.

T62: Solution treated from 0 or F, cold worked and natural ageing.

T51, T52, T53, T54: Cooling down (cold worked) from the extrusion temperature with different cooling levels, achieving different final mechanical properties with the same type of artificial ageing.

T53: Cooling (cold worked), from the extrusion and double artificial ageing temperature.

T61: Solution heat treated, cold worked and artificially aged under conditions other than T6.

T72: Stabilisation treated after T42.

T73: Solution heat treated, cold worked and aged with double treatment (stabilised to improve the resistance to corrosion under stress and ageing conditions).

T74: Solution heat treated, cold worked in water at a temperature above 50ºC and ageing with double treatment (Stabilisation + Ageing).

T76: Solution heat treated, cold worked and aged with double treatment (stabilised to improve the resistance to exfoliation corrosion + Ageing).

T81: Solution heat treated, cold worked, work hardened with forming and artificially aged. 1.5 to 3% Stress hardened.

T83: Similar to T8 for the Simagaltok 63/EN AW 6063 alloy.

T86: Solution heat treated, cold worked, work hardened and artificially aged. The degree of work hardening is usually the result of 6% stress straightening.

T87: Solution heat treated, cold worked, work hardened with forming and artificially aged. The degree of work hardening is usually the result of 7% stress straightening.

T89: Solution heat treated, cold worked and work hardened to achieve the mechanical properties and artificial ageing.

T93, T94: Solution heat treated, cold worked and work hardened to achieve the mechanical properties.

2.2 Third digit (x) in the subdivision of state T

The third digit indicates the elimination of stresses by means of straightening with controlled stress, where:

T(x)51: Applied to semi-products, indicating the work hardening effects after final straightening with controlled stress (1 to 3%) after solution heat treatment and cold working. These bars will not be subject to subsequent straightening processes.

T(x)50: As in the previous state, but applied to extruded and drawn bars, sections and pipes: Work hardening percentage, straightened with controlled stress (3%), except for pipes (0.5 to 3%).

T(x)511: As in the previous state, but allowing a lower degree of drawing after controlled stress.