

# SVENSK STANDARD

## SS-EN 485-2:2016+A1:2018

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### **Aluminium och aluminiumlegeringar – Plåt och band – Del 2: Mekaniska egenskaper**

### **Aluminium and aluminium alloys – Sheet, strip and plate – Part 2: Mechanical properties**

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EUROPEAN STANDARD

**EN 485-2:2016+A1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2018

ICS 77.150.10

Supersedes EN 485-2:2016

English Version

## Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties

Aluminium et alliages d'aluminium - Tôles, bandes et tôles épaisses - Partie 2: Caractéristiques mécaniques

Aluminium und Aluminiumlegierungen - Bänder, Bleche und Platten - Teil 2: Mechanische Eigenschaften

This European Standard was approved by CEN on 12 June 2016 and includes Amendment 1 approved by CEN on 25 July 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**SS-EN 485-2:2016+A1:2018 (E)**

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## European foreword

This document (EN 485-2:2016+A1:2018) has been prepared by Technical Committee CEN/TC 132 “Aluminium and aluminium alloys”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document includes Amendment 1 approved by CEN on 2018-07-25.

This document supersedes A1 EN 485-2:2016 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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A1 *deleted text* A1

EN 485 comprises the following parts under the general title, “*Aluminium and aluminium alloys — Sheet, strip and plate*”:

- *Part 1: Technical conditions for inspection and delivery*
- *Part 2: Mechanical properties*
- *Part 3: Tolerances on dimensions and form for hot-rolled products*
- *Part 4: Tolerances on shape and dimensions for cold-rolled products*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## SS-EN 485-2:2016+A1:2018 (E)

### 1 Scope

This European Standard specifies the mechanical properties of wrought aluminium and wrought aluminium alloy sheet, strip and plate for general engineering applications.

It does not apply to semi-finished rolled products in coiled form to be subjected to further rolling (reroll stock) or to special products such as corrugated, embossed, painted, sheets and strips or to special applications such as aerospace, can stock, finstock, for which mechanical properties are specified in separate European Standards.

The chemical composition limits of the alloys are specified in EN 573-3. Temper designations are defined in EN 515.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13195, *Aluminium and aluminium alloys — Specifications for wrought and cast products for marine applications (shipbuilding, marine and offshore)*

ASTM G66, *Standard Test Method for Visual Assessment of Exfoliation Corrosion Susceptibility of 5xxx Series Aluminium Alloys (ASSET Test)*

ASTM G67, *Standard Test Method for Determining the Susceptibility to Intergranular Corrosion of 5xxx Series Aluminium Alloys by Mass Loss After Exposure to Nitric Acid (NAMLT Test)*

### 3 Requirements

The mechanical properties shall be in conformity with those specified in Clause 4 or those agreed upon between supplier and purchaser and stated on the order document.

### 4 List of alloys with mechanical property limits

#### 4.1 General

Table 1 to Table 54 contain mechanical property limits values obtained by tensile testing according to EN ISO 6892-1 after sampling and after sample preparation according to EN 485-1.

They also contain values of bend radius and hardness following sampling and test methods as described in EN 485-1. These values are for information only.

For some alloys they contain provisions related to inter-granular corrosion, exfoliation corrosion or stress corrosion testing, see also EN 485-1.

#### 4.2 Elongation

The  $A_{50\text{mm}}$  value is the elongation measured over a gauge length of 50 mm and expressed in percent.

The  $A$  value for elongation is the elongation measured over a gauge length of  $5,65 \sqrt{S_0}$  (where  $S_0$  is the initial cross-sectional area of the test-piece), and expressed in percent.



### 4.3 List of alloys and their mechanical properties

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Table 1 — Aluminium EN AW-1050A [Al 99,5]

Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup> HBW
	mm	mm	$R_m$ MPa	$R_m$ MPa	$R_{p0,2}$ MPa	$R_{p0,2}$ MPa	%	%	180°	90°	
	over	up to	min.	max.	min.	max.	$A_{50\text{ mm}}$	$A$			
Fa	≥ 2,5	150,0	60								
O	0,2	0,5	65	95	20		20		0 t	0 t	20
	0,5	1,5	65	95	20		22		0 t	0 t	20
	1,5	3,0	65	95	20		26		0 t	0 t	20
	3,0	6,0	65	95	20		29		0,5 t	0,5 t	20
	6,0	12,5	65	95	20		35		1,0 t	1,0 t	20
	12,5	80,0	65	95	20			32			20
H111	0,2	0,5	65	95	20		20		0 t	0 t	20
	0,5	1,5	65	95	20		22		0 t	0 t	20
	1,5	3,0	65	95	20		26		0 t	0 t	20
	3,0	6,0	65	95	20		29		0,5 t	0,5 t	20
	6,0	12,5	65	95	20		35		1,0 t	1,0 t	20
	12,5	80,0	65	95	20			32			20
H112	≥ 6,0	12,5	75		30		20				23
	12,5	80,0	70		25			20			22
H12	0,2	0,5	85	125	65		2		0,5 t	0 t	28
	0,5	1,5	85	125	65		4		0,5 t	0 t	28
	1,5	3,0	85	125	65		5		0,5 t	0,5 t	28
	3,0	6,0	85	125	65		7		1,0 t	1,0 t	28
	6,0	12,5	85	125	65		9			2,0 t	28
	12,5	40,0	85	125	65			9			28
H14	0,2	0,5	105	145	85		2		1,0 t	0 t	34
	0,5	1,5	105	145	85		2		1,0 t	0,5 t	34
	1,5	3,0	105	145	85		4		1,0 t	1,0 t	34
	3,0	6,0	105	145	85		5			1,5 t	34
	6,0	12,5	105	145	85		6			2,5 t	34
	12,5	25,0	105	145	85			6			34
H16	0,2	0,5	120	160	100		1			0,5 t	39
	0,5	1,5	120	160	100		2			1,0 t	39

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Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup> HBW
	over	up to	min.	max.	min.	max.	A <sub>50 mm</sub>	A	180°	90°	
	1,5	4,0	120	160	100		3			1,5 t	39
H18	0,2	0,5	135		120		1			1,0 t	42
	0,5	1,5	140		120		2			2,0 t	42
	1,5	3,0	140		120		2			3,0 t	42
H19	0,2	0,5	155		140		1				45
	0,5	1,5	150		130		1				45
	1,5	3,0	150		130		1				45
H22	0,2	0,5	85	125	55		4		0,5 t	0 t	27
	0,5	1,5	85	125	55		5		0,5 t	0 t	27
	1,5	3,0	85	125	55		6		0,5 t	0,5 t	27
	3,0	6,0	85	125	55		11		1,0 t	1,0 t	27
	6,0	12,5	85	125	55		12			2,0 t	27
H24	0,2	0,5	105	145	75		3		1,0 t	0 t	33
	0,5	1,5	105	145	75		4		1,0 t	0,5 t	33
	1,5	3,0	105	145	75		5		1,0 t	1,0 t	33
	3,0	6,0	105	145	75		8		1,5 t	1,5 t	33
	6,0	12,5	105	145	75		8			2,5 t	33
H26	0,2	0,5	120	160	90		2			0,5 t	38
	0,5	1,5	120	160	90		3			1,0 t	38
	1,5	4,0	120	160	90		4			1,5 t	38
H28	0,2	0,5	140		110		2			1,0 t	41
	0,5	1,5	140		110		2			2,0 t	41
	1,5	3,0	140		110		3			3,0 t	41

<sup>a</sup> For information only.

Table 2 — Aluminium EN AW-1070A [Al 99,7]

Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup> HBW
	mm		MPa		MPa		%				
	over	up to	min.	max.	min.	max.	A <sub>50</sub> mm	A	180°	90°	
pa	≥ 2,5	25,0	60								
O	0,2	0,5	60	90	15		23		0 t	0 t	18
	0,5	1,5	60	90	15		25		0 t	0 t	18
	1,5	3,0	60	90	15		29		0 t	0 t	18
	3,0	6,0	60	90	15		32		0,5 t	0,5 t	18
	6,0	12,5	60	90	15		35		0,5 t	0,5 t	18
	12,5	25,0	60	90	15			32			18
H111	0,2	0,5	60	90	15		23		0 t	0 t	18
	0,5	1,5	60	90	15		25		0 t	0 t	18
	1,5	3,0	60	90	15		29		0 t	0 t	18
	3,0	6,0	60	90	15		32		0,5 t	0,5 t	18
	6,0	12,5	60	90	15		35		0,5 t	0,5 t	18
	12,5	25,0	60	90	15			32			18
H112	≥ 6,0	12,5	70		20		20				
	12,5	25,0	70					20			
H12	0,2	0,5	80	120	55		5		0,5 t	0 t	26
	0,5	1,5	80	120	55		6		0,5 t	0 t	26
	1,5	3,0	80	120	55		7		0,5 t	0,5 t	26
	3,0	6,0	80	120	55		9			1,0 t	26
	6,0	12,5	80	120	55		12			2,0 t	26
H14	0,2	0,5	100	140	70		4		0,5 t	0 t	32
	0,5	1,5	100	140	70		4		0,5 t	0,5 t	32
	1,5	3,0	100	140	70		5		1,0 t	1,0 t	32
	3,0	6,0	100	140	70		6			1,5 t	32
	6,0	12,5	100	140	70		7			2,5 t	32
H16	0,2	0,5	110	150	90		2		1,0 t	0,5 t	36
	0,5	1,5	110	150	90		2		1,0 t	1,0 t	36
	1,5	4,0	110	150	90		3		1,0 t	1,0 t	36
H18	0,2	0,5	125		105		2			1,0 t	40

**SS-EN 485-2:2016+A1:2018 (E)**

Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup>
	mm		$R_m$ MPa		$R_{p0,2}$ MPa		%				HBW
	over	up to	min.	max.	min.	max.	$A_{50}$ mm	$A$	180°	90°	
	0,5	1,5	125		105		2			2,0 <i>t</i>	40
	1,5	3,0	125		105		2			2,5 <i>t</i>	40
H22	0,2	0,5	80	120	50		7		0,5 <i>t</i>	0 <i>t</i>	26
	0,5	1,5	80	120	50		8		0,5 <i>t</i>	0 <i>t</i>	26
	1,5	3,0	80	120	50		10		0,5 <i>t</i>	0,5 <i>t</i>	26
	3,0	6,0	80	120	50		12			1,0 <i>t</i>	26
	6,0	12,5	80	120	50		15			2,0 <i>t</i>	26
H24	0,2	0,5	100	140	60		5		0,5 <i>t</i>	0 <i>t</i>	31
	0,5	1,5	100	140	60		6		0,5 <i>t</i>	0,5 <i>t</i>	31
	1,5	3,0	100	140	60		7		1,0 <i>t</i>	1,0 <i>t</i>	31
	3,0	6,0	100	140	60		9			1,5 <i>t</i>	31
	6,0	12,5	100	140	60		11			2,5 <i>t</i>	31
H26	0,2	0,5	110	150	80		3			0,5 <i>t</i>	35
	0,5	1,5	110	150	80		3			1,0 <i>t</i>	35
	1,5	4,0	110	150	80		4			1,0 <i>t</i>	35

<sup>a</sup> For information only.

Table 3 — Aluminium EN AW-1080A [Al 99,8(A)]

Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup> HBW
	mm	mm	$R_m$ MPa	$R_m$ MPa	$R_{p0,2}$ MPa	$R_{p0,2}$ MPa	%	%	180°	90°	
	over	up to	min.	max.	min.	max.	A <sub>50</sub> mm	A			
Fa	≥ 2,5	25,0	60								
O	0,2	0,5	60	90	15		26		0 t	0 t	18
	0,5	1,5	60	90	15		28		0 t	0 t	18
	1,5	3,0	60	90	15		31		0 t	0 t	18
	3,0	6,0	60	90	15		35		0,5 t	0,5 t	18
	6,0	12,5	60	90	15		35		0,5 t	0,5 t	18
H111	0,2	0,5	60	90	15		26		0 t	0 t	18
	0,5	1,5	60	90	15		28		0 t	0 t	18
	1,5	3,0	60	90	15		31		0 t	0 t	18
	3,0	6,0	60	90	15		35		0,5 t	0,5 t	18
	6,0	12,5	60	90	15		35		0,5 t	0,5 t	18
H112	≥ 6,0	12,5	70				20				
	12,5	25,0	70					20			
H12	0,2	0,5	80	120	55		5		0,5 t	0 t	26
	0,5	1,5	80	120	55		6		0,5 t	0 t	26
	1,5	3,0	80	120	55		7		0,5 t	0,5 t	26
	3,0	6,0	80	120	55		9			1,0 t	26
	6,0	12,5	80	120	55		12			2,0 t	26
H14	0,2	0,5	100	140	70		4		0,5 t	0 t	32
	0,5	1,5	100	140	70		4		0,5 t	0,5 t	32
	1,5	3,0	100	140	70		5		1,0 t	1,0 t	32
	3,0	6,0	100	140	70		6			1,5 t	32
	6,0	12,5	100	140	70		7			2,5 t	32
H16	0,2	0,5	110	150	90		2		1,0 t	0,5 t	36
	0,5	1,5	110	150	90		2		1,0 t	1,0 t	36
	1,5	4,0	110	150	90		3		1,0 t	1,0 t	36
H18	0,2	0,5	125		105		2			1,0 t	40
	0,5	1,5	125		105		2			2,0 t	40
	1,5	3,0	125		105		2			2,5 t	40

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Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup>
	mm		$R_m$ MPa		$R_{p0,2}$ MPa		%				HBW
	over	up to	min.	max.	min.	max.	$A_{50}$ mm	$A$	180°	90°	
H22	0,2	0,5	80	120	50		8		0,5 <i>t</i>	0 <i>t</i>	26
	0,5	1,5	80	120	50		9		0,5 <i>t</i>	0 <i>t</i>	26
	1,5	3,0	80	120	50		11		0,5 <i>t</i>	0,5 <i>t</i>	26
	3,0	6,0	80	120	50		13			1,0 <i>t</i>	26
	6,0	12,5	80	120	50		15			2,0 <i>t</i>	26
H24	0,2	0,5	100	140	60		5		0,5 <i>t</i>	0 <i>t</i>	31
	0,5	1,5	100	140	60		6		0,5 <i>t</i>	0,5 <i>t</i>	31
	1,5	3,0	100	140	60		7		1,0 <i>t</i>	1,0 <i>t</i>	31
	3,0	6,0	100	140	60		9			1,5 <i>t</i>	31
	6,0	12,5	100	140	60		11			2,5 <i>t</i>	31
H26	0,2	0,5	110	150	80		3			0,5 <i>t</i>	35
	0,5	1,5	110	150	80		3			1,0 <i>t</i>	35
	1,5	4,0	110	150	80		4			1,0 <i>t</i>	35

<sup>a</sup> For information only.



Table 4 — Aluminium EN AW-1200 [Al 99,0]

Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup> HBW
	mm		MPa		MPa		%				
	over	up to	min.	max.	min.	max.	A <sub>50</sub> mm	A	180°	90°	
Fa	≥ 2,5	150,0	75								
O	0,2	0,5	75	105	25		19		0 t	0 t	23
	0,5	1,5	75	105	25		21		0 t	0 t	23
	1,5	3,0	75	105	25		24		0 t	0 t	23
	3,0	6,0	75	105	25		28		0,5 t	0,5 t	23
	6,0	12,5	75	105	25		33		1,0 t	1,0 t	23
	12,5	80,0	75	105	25			30			23
H111	0,2	0,5	75	105	25		19		0 t	0 t	23
	0,5	1,5	75	105	25		21		0 t	0 t	23
	1,5	3,0	75	105	25		24		0 t	0 t	23
	3,0	6,0	75	105	25		28		0,5 t	0,5 t	23
	6,0	12,5	75	105	25		33		1,0 t	1,0 t	23
	12,5	80,0	75	105	25			30			23
H112	≥ 6,0	12,5	85		35		16				26
	12,5	80,0	80		30			16			24
H12	0,2	0,5	95	135	75		2		0,5 t	0 t	31
	0,5	1,5	95	135	75		4		0,5 t	0 t	31
	1,5	3,0	95	135	75		5		0,5 t	0,5 t	31
	3,0	6,0	95	135	75		6		1,0 t	1,0 t	31
	6,0	12,5	95	135	75		8			2,0 t	31
	12,5	40,0	95	135	75			8			31
H14	0,2	0,5	105	155	95		1		1,0 t	0 t	37
	0,5	1,5	115	155	95		3		1,0 t	0,5 t	37
	1,5	3,0	115	155	95		4		1,0 t	1,0 t	37
	3,0	6,0	115	155	95		5		1,5 t	1,5 t	37
	6,0	12,5	115	155	90		6			2,5 t	37
	12,5	25,0	115	155	90			6			37
H16	0,2	0,5	120	170	110		1			0,5 t	42
	0,5	1,5	130	170	115		2			1,0 t	42
	1,5	4,0	130	170	115		3			1,5 t	42

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Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup>
	mm		$R_m$ MPa		$R_{p0,2}$ MPa		%				HBW
	over	up to	min.	max.	min.	max.	$A_{50}$ mm	$A$	180°	90°	
H18	0,2	0,5	150		130		1			1,0 <i>t</i>	45
	0,5	1,5	150		130		2			2,0 <i>t</i>	45
	1,5	3,0	150		130		2			3,0 <i>t</i>	45
H19	0,2	0,5	160		140		1				48
	0,5	1,5	160		140		1				48
	1,5	3,0	160		140		1				48
H22	0,2	0,5	95	135	65		4		0,5 <i>t</i>	0 <i>t</i>	30
	0,5	1,5	95	135	65		5		0,5 <i>t</i>	0 <i>t</i>	30
	1,5	3,0	95	135	65		6		0,5 <i>t</i>	0,5 <i>t</i>	30
	3,0	6,0	95	135	65		10		1,0 <i>t</i>	1,0 <i>t</i>	30
	6,0	12,5	95	135	65		10			2,0 <i>t</i>	30
H24	0,2	0,5	115	155	90		3		1,0 <i>t</i>	0 <i>t</i>	37
	0,5	1,5	115	155	90		4		1,0 <i>t</i>	0,5 <i>t</i>	37
	1,5	3,0	115	155	90		5		1,0 <i>t</i>	1,0 <i>t</i>	37
	3,0	6,0	115	155	90		7			1,5 <i>t</i>	37
	6,0	12,5	115	155	85		9			2,5 <i>t</i>	36
H26	0,2	0,5	130	170	105		2			0,5 <i>t</i>	41
	0,5	1,5	130	170	105		3			1,0 <i>t</i>	41
	1,5	4,0	130	170	105		4			1,5 <i>t</i>	41

<sup>a</sup> For information only.

Table 5 — Aluminium EN AW-1350 [Al 99,5]

Temper	Specified thickness		Tensile strength		Yield strength		Elongation min.		Bend radius <sup>a</sup>		Hardness <sup>a</sup>
	over	up to	min.	max.	min.	max.	A <sub>50</sub> mm	A	180°	90°	HBW
F <sup>a</sup>	2,5	150,0	60								
O	0,2	0,5	65	95	20		20		0 t	0 t	20
	0,5	1,5	65	95	20		22		0 t	0 t	20
	1,5	3,0	65	95	20		26		0 t	0 t	20
	3,0	6,0	65	95	20		29		0,5 t	0,5 t	20
	6,0	12,5	65	95	20		35		1,0 t	1,0 t	20
	12,5	80,0	65	95	20			32			20
H111	0,2	0,5	65	95	20		20		0 t	0 t	20
	0,5	1,5	65	95	20		22		0 t	0 t	20
	1,5	3,0	65	95	20		26		0 t	0 t	20
	3,0	6,0	65	95	20		29		0,5 t	0,5 t	20
	6,0	12,5	65	95	20		35		1,0 t	1,0 t	20
	12,5	80,0	65	95	20			32			20
H112	0,2	0,5	75		30		20				23
	0,5	1,5	75		30		20				23
	1,5	3,0	75		30		20				23
	3,0	6,0	75		30		20				23
	6,0	12,5	75		30		20				23
	12,5	80,0	75		30			20			23
H12	0,2	0,5	85	125	65		2		0,5 t	0 t	28
	0,5	1,5	85	125	65		4		0,5 t	0 t	28
	1,5	3,0	85	125	65		5		0,5 t	0,5 t	28
	3,0	6,0	85	125	65		7		1,0 t	1,0 t	28
	6,0	12,5	85	125	65		9			2,0 t	28
	12,5	40,0	85	125	65			9			28
H14	0,2	0,5	105	145	85		2		1,0 t	0 t	34
	0,5	1,5	105	145	85		2		1,0 t	0,5 t	34
	1,5	3,0	105	145	85		4		1,0 t	1,0 t	34
	3,0	6,0	105	145	85		5			1,5 t	34
	6,0	12,5	105	145	85		6			2,5 t	34
	12,5	25,0	105	145	85			6			34