

Information about the content

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This specification covers cold-rolled molybdenum ribbon.

1 Dimensions and tolerances

Thickness [mm]	Tolerance ± mm	Width [mm]	Tolerance ≤ 5 mm [± mm]	Tolerance > 5 - < 100 mm [± mm]	Tolerance ≥ 100 mm [± mm]
0,015 – < 0,025	0,0020	1 – 140	0,020	0,050	0,100
≥ 0,025 – ≤ 0,050	0,0030	1 – 215,9	0,020	0,050	0,100
> 0,050 – ≤ 0,080	0,0050	1 – 215,9	0,020	0,050	0,100
> 0,080 – ≤ 0,120	0,0075	1,5 – 215,9	0,020	0,050	0,100
> 0,120 – ≤ 0,200	0,0100	6,35 – 254		0,100	0,200
> 0,200 – ≤ 0,500	0,0150	10 – 254		0,100	0,200
> 0,500 – 0,762	0,0200	50 – 254		0,200	0,400

2 Physical and mechanical product properties

2.1 Surface condition

Appearance: The material will be of uniform quality, free from foreign matter, splits and fractures. Surface defects and geometric variations are assessed in the frame of visual inspection.

Surface Roughness: Cold rolled, bright (thickness $\leq 0,30$ mm): $R_a \leq 0,35 \mu\text{m}^*$
Cold rolled, pickled (thickness $> 0,30$ mm): $R_a \leq 1,00 \mu\text{m}^*$

^{*)} across rolling direction

2.2 Physical and mechanical product properties

Density: ^{a)} $\geq 10,2 \text{ g/cm}^3$

Hardness Vickers: ^{b)} Thickness $\geq 0,10$ mm: 240 – 280 HV

Tensile Test: ^{c)}	Thickness	Tensile strength	0,2%-Yield strength	Elongation
	[mm]	min. [MPa]	min. [MPa]	min. [%]
	0,015 – $\leq 0,025$	750	550	1,0
	$> 0,025$ – $\leq 0,050$	750	550	2,0
	$> 0,050$ – $< 0,100$	750	550	3,0
	$\geq 0,100$ – 0,762	750	550	10,0

a) The density cannot be determined with sufficient accuracy because of small material thickness. Due to the high degree of deformation during production, it is assumed that the theoretical density (above given value) is achieved.

b) The actual value quoted in certificates corresponds to the mean-value of a representative control sample.

c) Samples are taken parallel to the rolling direction.

Remarks: Mo-Ribbons $\geq 0,050$ mm are delivered stress-relieved annealed.
Mo-Ribbons $< 0,050$ mm: annealing upon request.

3 Chemical composition

Main and Minor Components	Plansee		Standard	EU-Directive
	Content		ASTM B386/361	RoHS ^{a)}
Mo	Min. 99.97 % ^{b)}		Rest	-
Impurities	Max. Values [µg/g]		Max. Values [µg/g]	Max. Values [µg/g]
	Typical	Guaranteed		
Al	1	10	-	-
Cr	3	20	-	-
Cu	2	20	-	-
Fe	5	20	100	-
K	6	20	50	-
Ni	1	10	100	-
Si	2	20	-	-
W	169	300	-	-
C	13	30	100	-
H	-	10	-	-
N	5	10	20	-
O	6	40	70	-
Cd	1	5	-	100
Hg	-	1	-	1000
Pb	-	5	-	1000
Cr (VI)			-	1000
Organic Impurities (e.g. PBB, PBDE, PFOS, PFOA)	- ^{**)}	- ^{**)}	-	1000

a) EU-directives 2015/863/EU, 2011/65/EU and 2000/53/EC.

b) Metallic purity without W

^{**)} The presence of Cr (VI) and organic impurities can definitely be excluded because of the production process (multiple heat treatments at temperatures above 1000 °C in H₂-atmosphere).

The chemical composition is checked by means of random sampling. The sampling inspection plan, analysis and evaluation methods are determined in the internal instruction PSE-020-WI-003. The application of the measured values for the chemical analysis is defined in PSE-680-WI-001.

Remarks: The specified physical and chemical characteristics are disclosed not regarding measurement accuracy.

4 Packaging, labelling, storage and certification

4.1 Packaging, labelling and storage

Standard individual packing:

The ribbons are wound on appropriate spools, depending on their dimensions and are sealed in a plastic bag together with a dehydrating agent. The packaging ensures avoidance of mechanical damage, moisture, oxidation and other sources of contamination during transport and handling.

Special packing:

The ribbons with thickness 0,08-0,12 mm and width 2,00-5,00 mm will be wound clockwise on polystyrene spools. Each spool will then be sealed in a plastic bag together with a dehydrating agent.

Each package will be provided with a label with the following information:

Producer's name:	Plansee
Plansee order number:	
Lot number:	
Material number:	
Material:	Mo
Dimension:	thickness, width
Quantity:	Total quantity in kg
Date:	

The material must be kept in a dry place and protected from mechanical damage. It is best to keep the material in the original packing until used.

Special packing: (extra costs will be invoiced)

Special packing should be used if the sheets are stored under unusual conditions (aggressive atmosphere sea air, ...).

4.2 Inspection documents

Following inspection documents will be supplied upon customer request according to EN 10 204:

Test report 2.2

Plansee confirms with this test report that the delivered product meets the specification and gives details of the material properties according to ongoing production surveillance, not directly related to the particular production batch.

Inspection certificate 3.1 (extra costs will be invoiced)

An inspection officer from Plansee confirms with this inspection certificate that the delivered product meets the specification and gives test results related to the particular production batch.

5 Order instructions

Please quote following information when ordering:

- Product description
- Quality (the number of this specification must be mentioned)
- Thickness, width
- Quantity in kg
- Required certificate and content in case of a 3.1 inspection certificate
- For special packing: Specification of packaging

For further information on our delivery possibilities, please look into our <http://www.plansee.com>

6 Referenced standards

The standards applied for the test methods are listed in the Plansee standard infobase and are made available upon request.

Changes to last version

Replacement for	Changes to last version
00	<ul style="list-style-type: none">▪ New layout▪ Section 1 Dimensions and tolerances Thickness > 0,120 mm / maximal width 254 mm