

# Molybdenum zirconia oxide glass melting electrodes

PS – PRODUCTSPECIFICATION

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## Information about the content

<b>Responsible area:</b>	Plansee SE	<b>Prepared/Updated:</b>	See SAP-DMS
		<b>Released:</b>	See SAP-DMS
<b>Valid from:</b>	14-Feb-2022	<b>Controlled:</b>	PSE-020

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*This specification covers molybdenum zirconia oxide glass melting electrodes in the diameter range of 30 - 130 mm. They are used in electrically heated glass melting furnaces.*

## 1 Dimensions and tolerances

### 1.1 Diameter and guaranteed production tolerances

Forged		Mechanical machined (Ground / Turned)	
Diameter [mm]	Tolerance [mm]	Diameter [mm]	Tolerance [mm]
30,0 - 50,0	± 0,3	30,0 - 49,9	± 0,3
50,1 - 52,0	+0,0 / -0,8	50,0 - 130,0	± 0,4
52,1 - 75,0	± 0,4		
75,1 - 120,0	± 1,0		
> 120,0	± 1,5		

### 1.2 Straightness

Diameter [mm]	Straightness/meter [mm]	
	Forged	Ground / Turned
30,0 - 130,0	< 1,5	< 1,0

### 1.3 Guaranteed length tolerances

Diameter [mm]	Length tolerance	
	< 1000 mm	> 1000 mm
30,0 - 130,0	± 5 %	± 50 mm

Closer tolerances upon request

## 1.4 Typical production lengths

Diameter	Typical production length
[mm]	[mm]
30,0 - 105,0	2000
105,1 – 130,0	1500

Greater lengths upon request

## 1.5 Threading

Upon request, the glass melting electrodes can be supplied with male or female threads at one or both ends. Standard threading is illustrated in fig. 1. Metric and imperial sizes are summarized in the below table. Other threadings are also possible. Electrodes with different threading can also be supplied, but in such a case the customer's drawing should indicate the measurements required for L1 and T (see fig. 1).

### Standard dimensions available ex stock (glass melting electrodes with recommended standard threads – further dimensions upon request)

Ø	Ø-tolerance	Surface	Recommended standard threads		
			[mm]	[mm]	[inch]
31,75	± 0,3	forged	M22 x 1,5	M18 x 1,5	7/8 - 14 UNF
48	± 0,3	forged	M24 x 1,5	M22 x 1,5	7/8 - 14 UNF
50,8	+0/- 0,8	forged	M27 x 3	M24 x 1,5	1 ¼ - 12 UNF
54	± 0,4	forged	M36 x 3	M27 x 3	1 ¼ - 12 UNF
60	± 0,4	forged	M36 x 3	M27 x 3	1 ¼ - 12 UNF
63,5	± 0,4	forged	M36 x 3		1 ¼ - 12 UNF
66	± 0,4	forged	M36 x 3		1 ¼ - 12 UNF
70	± 0,4	forged	M42 x 3		1 ½ - 12 UNF
76,2	± 1,0	forged	M42 x 3		1 ½ - 12 UNF
80	± 1,0	forged	M42 x 3		1 ½ - 12 UNF
90	± 1,0	forged	M58 x 3		2 ¼ - 8 UN
101,2	± 1,0	forged	M58 x 3		2 ¼ - 8 UN

**PLANSEE standard thread shapes, other threads upon request**

Metric threads				UN threads			
Threads	Male thread length	Female thread depth	Chamfer	Threads	Male thread length	Female thread depth	Chamfer
G	L1 [mm]	T [mm]	F [mm]	G	L 1 [mm]	T [mm]	F [mm]
M18 x 1,5	20,5	22,5	1,5	7/8 - 14 UNF	25,5	27,5	2,0
M22 x 1,5	24,5	26,5	1,5	1 ¼ - 12 UNF	29,0	31,0	2,5
M24 x 1,5	26,5	28,5	1,5	1 ½ - 12 UNF	34,0	36,0	2,5
M27 x 3	31,5	33,5	3,0	2 ¼ - 8 UN	51,0	53,0	3,5
M36 x 3	33,5	35,5	3,0				
M42 x 3	38,5	40,5	3,0				
M58 x 3	51,0	53,0	3,0				

**Standard threading of glass melting electrodes**

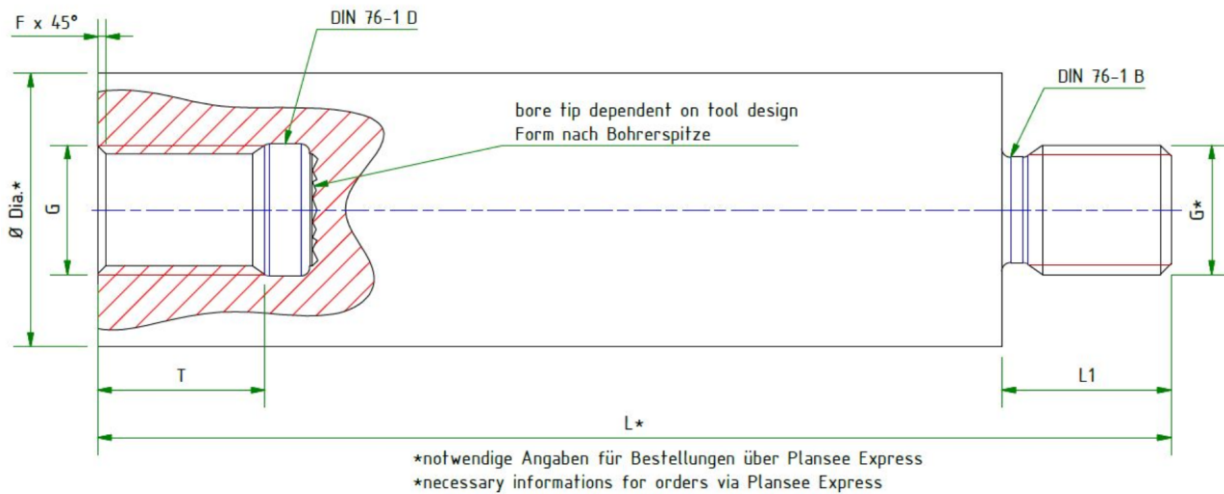


Fig.1

## 2 Physical and mechanical product properties

<b>Density:</b>	Ø 30,0 - 101,0 mm	> 9,95 g/cm <sup>3</sup>
	Ø ≥ 101,0 mm	> 9,85 g/cm <sup>3</sup>

<b>Non destructive tests:</b>	Ultrasonic testing
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### 2.1 Surface condition

<b>Surface:</b>	Forged
	Mechanically machined (ground / turned)
	Coated

### 3 Chemical composition

Main and minor components	Plansee		EU-directives
	Min. content [%]		RoHS <sup>a)</sup>
Mo	Balance <sup>b)</sup>		-
Zr	1,25 ± 0,13 %		-
ZrO <sub>2</sub>	1,68 ± 0,17 %		-
Impurities	Max. values [µg/g]		Max. values [µg/g]
	Typical	Guaranteed	
Al	1	10	-
Cr	3	20	-
Cu	2	20	-
Fe	5	20	-
K	6	20	-
Ni	1	10	-
Si	2	20	-
W	169	300	-
C	18	70	-
H	-	10	-
N	5	10	-
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 H<sub>2</sub>-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:** wooden case

**Special packings:** Upon request, the electrodes can be packed one by one in PE-bags with addition of a drier agent

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

<b>Producer's name:</b>	Plansee
<b>Plansee order number:</b>	
<b>Lot number:</b>	
<b>Material number:</b>	
<b>Material:</b>	MoZrO <sub>2</sub>
<b>Dimension:</b>	Diameter, length
<b>Surface condition</b>	
<b>Quantity:</b>	Total quantity in pieces and/or kg
<b>Date:</b>	

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 material is stored under unusual conditions or aggressive atmosphere (e.g. 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)
- Diameter of the glass melting electrode
- Thread size (should non-standard threads be required, a drawing with all relevant sizes should be made available)
- Total length of the electrode
- Quantity (number of electrodes or total weight 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
PSE-660-PS-194 Rev.00	<ul style="list-style-type: none"><li>▪ Change of document number due to internal restructuring.</li><li>▪ New document layout</li></ul>