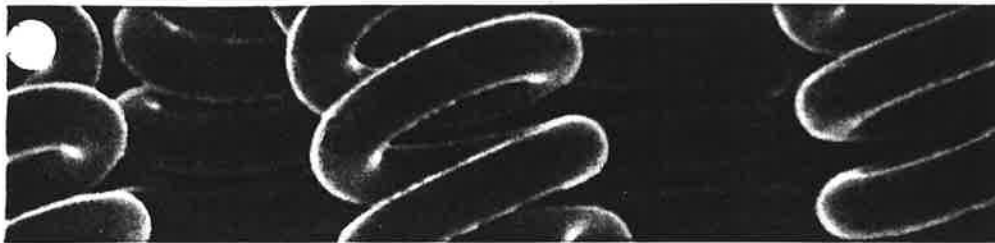


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SYLVANIA

Chemicals/
Metals

GTE



Technical Information Bulletin



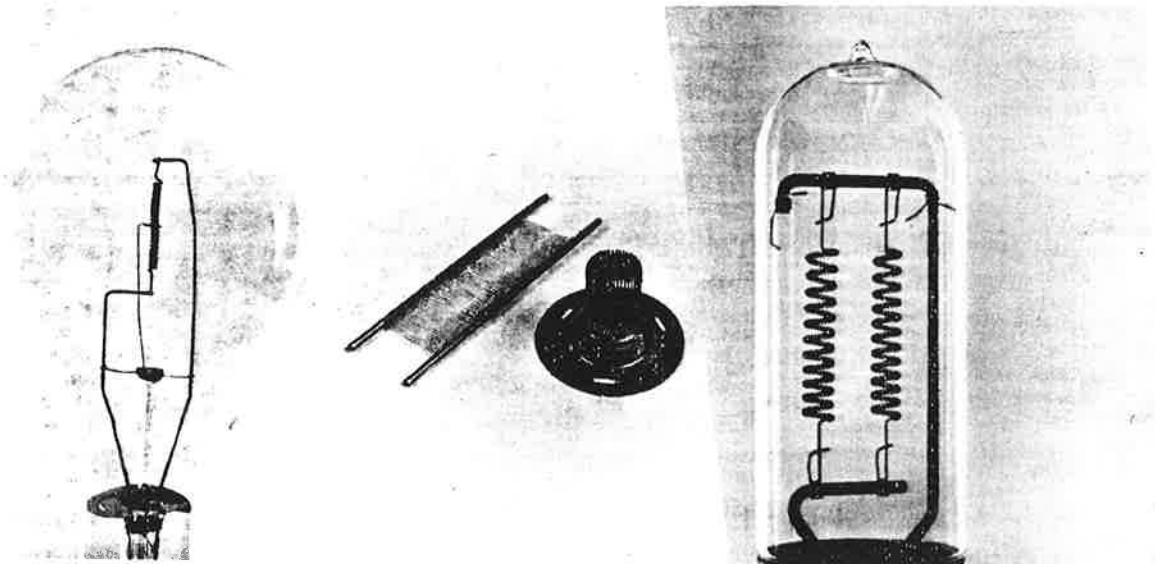
Rod and Wire

MOLYBDENUM WIRE

The Chemical and Metallurgical Division of GTE Products Corporation is a leading manufacturer of molybdenum wire, which is sold under the Sylvania brand and is used in a broad range of applications by many industries. Mandrels for making tungsten filaments along with leads, filament supports, and seals are among the applications in the lighting industry. Other applications include: grid wire for electronic tubes; heating elements for electric furnaces; spray-metallizing

wire for the hardsurfacing of automotive components; electrode wire for the traveling-wire electrical-discharge-machining process.

Sylvania Molybdenum Wire is available in selected combinations of five types and thirteen process variations in diameters from 1.0 to 250 mils (0.0254 to 6.35 mm) either on returnable containers or as self-coils, depending on the diameter.



Some applications for Sylvania Molybdenum Wire. Left-to-right: supports connecting leads and a tungsten filament to the glass stem of an incandescent lamp; receiving- and power-tube grids; lead supports in a high-power tungsten-halogen lamp.

TYPES

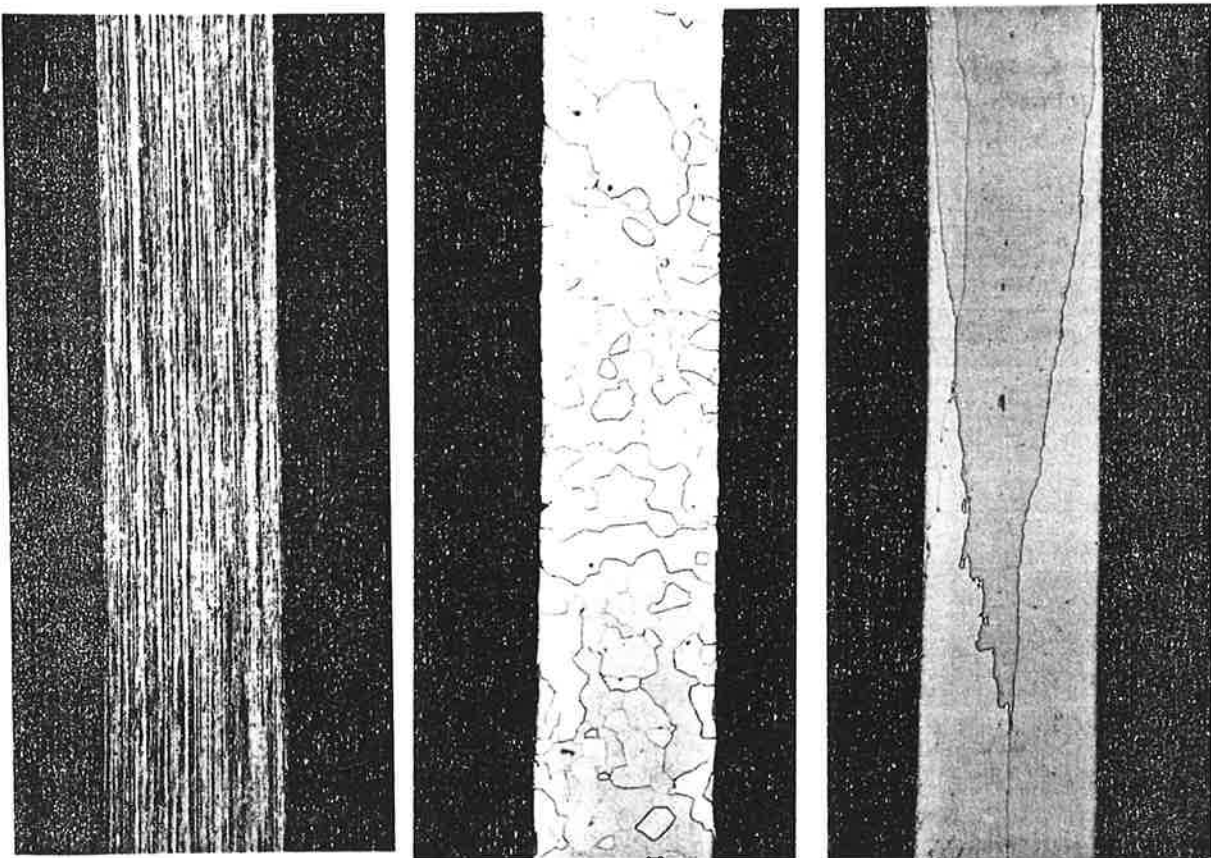
MF - 99.9% pure for the widest range of applications including furnace elements, formed parts, and glass sealing. Available ≥ 25 mils.

MO - 99.9% pure with controlled physical properties suitable for mandrels, supports, and grids. Available < 25 mils except that all wire for redrawing is this type.

MP - 99.95% pure for applications where weldability and machinability are critical.

MH - A doped wire designed to recrystallize at higher temperatures and to give higher ductility after recrystallization than pure wire. Preferred when strength and ductility are required during and after exposure at high temperatures. Available up to 35 mils.

SM - Spray wire is 99.9% pure and is used for hardsurfacing of piston rings and other automotive components and for resurfacing worn parts. Provides a strong bond, a good wear surface, and self-lubricating features.



Grain structures of 13-mil Sylvania Molybdenum Wire. Left-to-right: as-drawn pure wire is strong and ductile; recrystallized pure wire is normally brittle at room temperature; recrystallized doped wire is ductile at room temperature.

Process	Description	Diameter Range	Type				
			MF	MO	MP	MH ^(c)	SM ^(a)
10	As-drawn wire which retains the black finish from the graphite drawing lubricant.	1.00 - 250 mils 0.0254 - 6.35 mm	X ^(a)	X ^(b)	X	X	X
11	As-drawn wire with controlled physical properties suitable for mandrels.	1.00 - 25.0 mils 0.0254 - 0.635 mm		X		X	
15	Process 10 wire with tensile strength suitable for redrawing.	10.0 - 250 mils 0.254 - 6.35 mm		X		X	
30	Process 10 wire which has been cleaned.	1.00 - 125 mils 0.0254 - 3.18 mm	X ^(a)	X ^(b)	X	X	X
35	Process 30 wire which has been drawn to a smooth bright finish.	25.0 - 60.0 mils 0.635 - 1.52 mm	X		X		
41	Clean wire used as the electrode for the traveling-wire electrical-discharge-machining (EDM) process.	1.00 - 10.0 mils 0.0254 - 0.254 mm		X			
70	Process 10 wire which has been cleaned and annealed. Available in a variety of tensile properties for lamp leads and furnace windings.	1.00 - 125 mils 0.0254 - 3.18 mm	X ^(a)	X ^(b)	X	X	
71	Process 11 wire which has been cleaned.	1.00 - 25.0 mils 0.0254 - 0.635 mm		X		X	
72	Process 10 wire which has been cleaned, annealed, and straightened with specific controls for tensile strength and straightness for supports.	1.00 - 25.0 mils 0.0254 - 0.635 mm		X		X	

-continued-

^(a) Available at 25 mils and above.

^(b) Available below 25 mils.

^(c) Available below 35 mils except for Process 15.

^(d) Available in standard spray-metallizing diameters.

<u>Process</u>	<u>Description</u>	<u>Diameter Range</u>	<u>Type</u>				
			<u>MF</u>	<u>MO</u>	<u>MP</u>	<u>MH^(c)</u>	<u>SM^(d)</u>
73	Process 10 wire which has been cleaned and annealed to meet the requirements of ASTM-F290, electronic-tube grid wire.	1.00 - 10.0 mils 0.0254 - 0.254 mm		X			
75	Process 70 wire which has been drawn to a smooth bright finish.	25.0 - 60.0 mils 0.635 - 1.52 mm	X		X		
80	Process 30 wire which has been electrochemically polished to a smooth bright finish.	1.00 - 20.0 mils 0.0254 - 0.508 mm		X	X	X	
86	Process 70 wire which has been electrochemically polished to a smooth bright finish.	1.00 - 20.0 mils 0.0254 - 0.508 mm		X	X	X	

^(a) Available at 25 mils and above.

^(b) Available below 25 mils.

^(c) Available below 35 mils except for Process 15.

^(d) Available in standard spray-metallizing diameters.

MEASUREMENT OF WIRE SIZE AND TOLERANCE

The diameter of wire below 20 mils is determined and expressed as milligrams per 200 millimeters (mg/200 mm). Cutting and weighing is easier and more accurate than direct measurement of diameter. The weight of a piece of wire is proportional to its cross section and to the square of its diameter according to the following:

$$\text{mg/200 mm} = 1.0276 \times (\text{diameter in mils})^2$$

Calculated milligram weights are rounded to a value consistent with the sensitivity of weighing (usually to the nearest 0.01 mg).

Wire tolerance is based on the center-size. It is expressed as a percentage either of the milligram weight or of the diameter as outlined below:

<u>Wire Size</u>	<u>Tolerance Expressed As</u>	<u>Standard Tolerance, %</u>	<u>Alternate Tolerances, %</u>
Below 20 mils	% of milligram weight	<u>+4</u>	<u>+3, 2.5, 2, 1.5</u>
20 mils and above	% of diameter	<u>+2</u>	<u>+1.5, 1.25, 1.0</u>










SHIPPING CONTAINERS

Sylvania Molybdenum Wire is supplied as self-coils or on returnable containers, depending on wire size.

--SELF-COILS--

<u>Process</u>	<u>Wire Diameter Range, mils</u>	<u>Inside Diameter of Coil, inches</u>
10, 15	15 - 30	7.5
10, 15	30 - 50	12
10, 15	50 - 250	12, 18, 20, 48
30	20 - 30	7.5
30	30 - 125	12, 18, 20
35	25 - 60	18
70	31 - 125	12, 18, 20
72	12 - 25	7.5
75	25 - 60	18

-STANDARD CONTAINERS-

Number	Material	Weight (grams)	Wire Capacity (grams)	inches					Wire Process	
				Bore Diameter	Barrel Diameter	Traverse	Width	Flange Diameter		
	2	plastic	34	300	3/8	1 5/8	1	1 1/4	2 1/4	30, 71, 73, 80
	9	plastic	75	700	5/8	1 3/4	3	3 3/8	2 1/2	71, 41
	23	plastic	160	1500	5/8	3	3 1/2	3 3/4	4 3/4	70
	30	plastic	17	88	1 9/16	1 7/8	5/8	15/16	2 13/16	71
	41	plastic	275	4000	5/8	4	3	4	6	30, 70, 71, 72, 80, 86
	45	steel	81	192	3 3/4	3 3/4	13/16	29/32	4 1/4	70, 71, 72
	47	plastic	58	450	3 3/4	4 1/4	13/16	1 1/16	4 5/8	73, 10, 11, 15, 30, 80
	48	plastic	93	1000	3 7/8	4 1/4	1	1 3/8	5	30, 70, 71, 72, 80, 86
	49	plastic	55	230	3 3/4	4 1/8	13/16	1 1/8	4 1/2	71

SHIPPING INFORMATION

All containers and self coils are labeled or tagged with complete data identifying the wire. One continuous length of wire is wound on a container

and the outer end of the wire is normally secured by a red cork to distinguish it from the inner end.

HOW TO ORDER

Specify wire type and process.
Specify wire size and tolerance.
Specify quantity desired in meters.
Specify container number.

EXAMPLE:

MO-11 Molybdenum Wire
25.70 mg \pm 4%
1,000,000 meters
No. 47 container

CM-9020 (8/83)