

# TUNGSTEN

THAKUR JI MACHINE & TOOLS



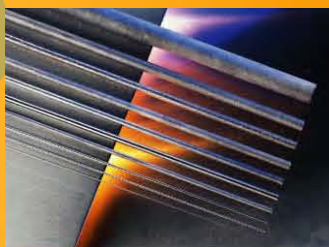
## THAKUR JI MACHINE AND TOOLS

Add : 01, Om Apt., Sahakar Nagar,  
Jivdani Cross Road, Virar (E) - 401 305.

Mob.: +91 9970014420 / 7970649340 / 7494072377

Email : thakurjimachineandtools@gmail.com

Web.: [www.thakurjimachinetools.com](http://www.thakurjimachinetools.com)







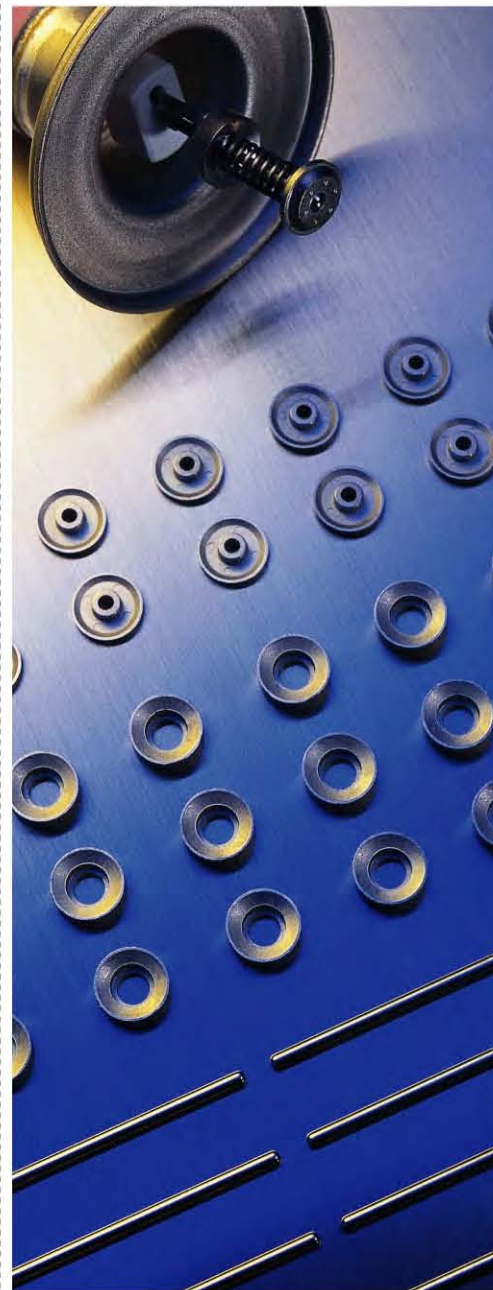
钨系列



Mo



钼系列



粉冶制品系列

PM



钛系列

Ti



模具系列

Dies





# INTRODUCTION

Thanks to the most advanced equipment and technology, Thakur Ji Machine and tools can make the doped tungsten wire and various kinds of special alloy tungsten wire featuring excellent high-temperature and non-sag property, coilability, diameter consistency and performance stability. Quality registers the international advanced level. According to the applications of products, and the requirements of customers, appropriate processes will be adopted to get a best effect.



Direct Sintering Furnaces



Eddy Current Flaw Detector

## PRODUCTION FLOW CHART





# Tungsten Products

## Chemical Composition

### Tungsten Powder

Elements	W	O	Fe	Mo	K	Al	Si	Others
Pure Tungsten Powder	≥99.90	≤0.08	≤0.005	≤0.005	≤0.003	≤0.002	≤0.002	≤0.001
Doped Tungsten Powder	≥99.40	≤0.50	≤0.002	≤0.003	0.006 ~ 0.016	0.003 ~ 0.010	0.015 ~ 0.035	≤0.001

Note: K, Al, Si content of doped tungsten powder could be custom-made.

### Tungsten Wire/Rod

Brands	HW99	HW91	HW66	HW61	HW31	HW41	HW42	HW11	HWR	HWTh	HWLa	HWCe	HWY	HWMX
Elements														
Tungsten	≥99.90	≥99.95	≥99.90	≥99.95	≥99.95	≥99.95	≥99.95	≥99.98	Rest	Rest	Rest	Rest	Rest	Rest
Rare Earth	-	-	-	-	-	-	-	-	-	-	0.05-5	0.05-5	0.05-5	0.05-5
Thoriated	-	-	-	-	-	-	-	-	0.05-5	-	-	-	-	-
Rhenium	-	-	-	-	-	-	-	-	0.05-50	-	-	-	-	-
Potassium	0.0075 ~ 0.010	0.0075 ~ 0.010	0.0070 ~ 0.009	0.0070 ~ 0.0089	0.0060 ~ 0.008	0.0040 ~ 0.007	0.0060 ~ 0.010	≤0.002		≤0.002	≤0.002	≤0.002	≤0.002	≤0.002
Iron	≤0.015	≤0.015	≤0.015	≤0.015	≤0.015	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002
Molybdenum	≤0.003	≤0.003	≤0.003	≤0.003	≤0.003	≤0.010	≤0.010	≤0.010	≤0.005	≤0.005	≤0.005	≤0.005	≤0.005	≤0.005
Others	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002
Total Impurities	≤0.100	≤0.050	≤0.100	≤0.050	≤0.050	≤0.050	≤0.050	≤0.050	≤0.020	≤0.050	≤0.050	≤0.050	≤0.050	≤0.050



# Tungsten Products

## Purchase Guide

Types	Brands	Properties and Characteristics				Diameter Range (mm)	Applications
		Non-Sag Property	Anti-Vibration	Discharge Property	Machine-ability		
Pure Tungsten	HW11	△	△	◎	●	0.1 ~ 60	Furnace body heating materials, nonradicac live welding electrodes, contact materials, etc.
Doped Tungsten	HW31	◎	○	○	●	0.005 ~ 17	Filaments of fluorescent lamps, energy-saving lamps, and HID electrodes, etc.
	HW41	○	△	○	●	0.1 ~ 60	Tungsten vacuum metallizing coils, furnace body heating materials. HID electrodes, support wires, and lead wires, etc.
	HW42	○	○	○	◎	0.1 ~ 17	Tungsten vacuum metallizing coils, support wires, and lead wires, etc.
	HW61	◎	◎	○	◎	0.005 ~ 17	Filaments of incandescent lamps, fluorescent lamps, and energy-saving lamps, support wires, and printer pins, etc.
	HW66	●	●	○	◎	0.005 ~ 17	New type of filaments for energy-saving lamps, etc.
	HW91	●	◎	○	◎	0.005 ~ 17	Filaments of halogen lamps, high color temperature lamps and automotive lamps, etc.
	HW99	●	●	○	◎	0.005 ~ 17	Filaments of long life high luminous efficiency halogen lamps, etc.
Rhenium Tungsten	HWR30	◎	●	○	○	0.02 ~ 3.0	Filaments of electron tubes and cathode ray tubes, vibration resistance filaments, etc.
	HWR50	◎	●	○	○	0.02 ~ 3.0	Thermal couples, filaments of electron tubes and cathode ray tubes, etc.
	HWR260	○	●	○	○	0.05 ~ 3.0	Thermal couples, electron tube devices, etc.

Note: ● best ◎ better ○ good △ not good







# Tungsten Products

## Chemical Composition

Types	Brands	Properties and Characteristics				Diameter Range (mm)	Applications
		Non-Sag Property	Anti-Vibration	Discharge Property	Machine-ability		
Thoriated Tungsten	HWTh10	⊙	⊙	●	○	0.1 ~ 5.0	Magnetron coils, HID electrodes, welding electrodes, etc.
	HWTh20	⊙	⊙	●	△	0.1 ~ 5.0	Welding electrodes, HID electrodes, etc.
	HWTh40	⊙	⊙	●	△	0.1 ~ 5.0	HID electrodes, etc.
Lanthanum Tungsten	HWLa10	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
	HWLa15	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
	HWLa20	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
Cerium Tungsten	HWCe10	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
	HWCe15	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
	HWCe20	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
Yttrium Tungsten	HWY20	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
Compound Rare Earth Tungsten	HWMX	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.
Ternary Re-tungsten	HWCYL20	⊙	⊙	●	○	0.1 ~ 5.0	Non-radioactive welding electrodes, etc.

Note: ● best ⊙ better ○ good △ not good

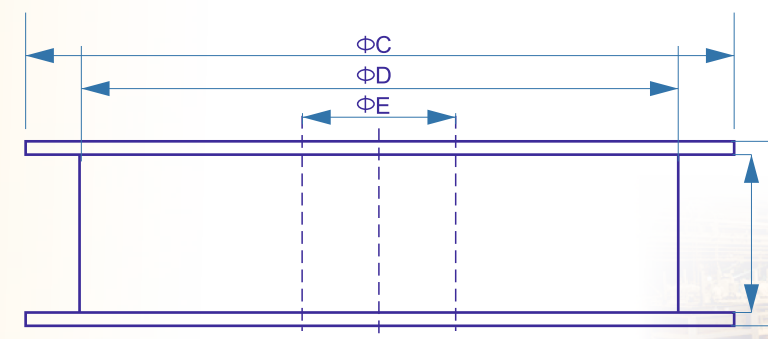


# Tungsten Products

## Packaging



Types	Dimensions	A	B	C	D	E
301#		91	102	300	212	52
302#		85	93	300	180	52
280#		43	57	280	226	218
266#		31	40	268	226	216
220#		155	185	220	110	40
125#		100	125	125	80	16
124#		21	28	124	103	97
120#		25	35	120	90	10
119#		15	22	120	80	10
118#		20	26	118	102	95
110#		20	28	110	90	10
106#		26	34	106	75	14
100#		80	100	100	63	16
58#		6	10	61	39	68
61#		28	25	60	44	14
60#		20	28	60	40	10

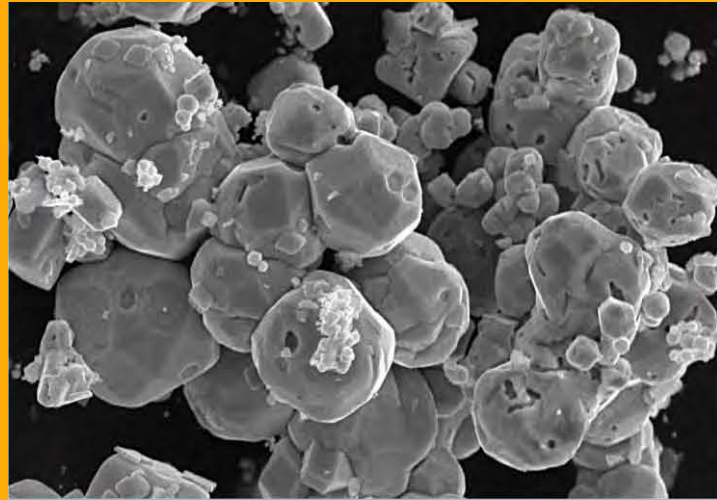






## Tungsten Products

### Tungsten Powder



#### Application

Tungsten powder is used as starting material for the manufacturing of tungsten products, such as tungsten rod, tungsten wire, tungsten alloy, etc.

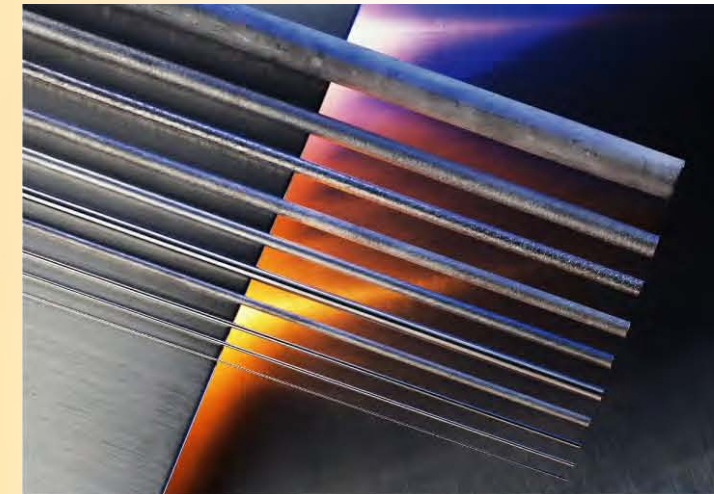
#### Properties and Characteristics

SSS: pure tungsten powder: 0.5~20 $\mu$ m, doped tungsten powder: 2~5 $\mu$ m.  
Particle size distribution: as per the requirements of customers.



## Tungsten Products

### Tungsten Rod/Bar



#### Application

Tungsten bars(rod) are used to make emission cathodes, high temperature forming rods, support wires, lead-in wires, printer pins, various electrodes, heating elements of quartz furnace, etc.

#### Sizes / Tolerances

Surface Diameter	Swaged		Drawn		Chemical Cleaning/ Electrolytic Polishing		Ground		Length and Tolerance
	Diameter Tolerance	Ovality	Diameter Tolerance	Ovality	Diameter Tolerance	Ovality	Diameter Tolerance	Ovality	
0.20 ≤ d < 0.50	—	—	±0.01		±0.01		—	—	L < 100, L±1.0 100 ≤ L < 300, L±1.5 300 ≤ L < 500, L±2.0 500 ≤ L < 1000, L±2.5 1000 ≤ L < 2000, L±5.0
0.50 ≤ d < 0.80	—	—	±0.02		±0.02		±0.01	≤0.01	
0.80 ≤ d < 1.00	—	—	±0.02		±0.02		±0.02	≤0.02	
1.00 ≤ d < 1.80	—	—	±0.03		±0.03		±0.02	≤0.02	
1.80 ≤ d < 3.50	—	—	±0.05		±0.05		±0.03	≤0.03	
3.50 ≤ d < 5.00	±0.10	—	—	—	—	—	±0.05	≤0.05	
5.00 ≤ d < 9.00	±0.20	—	—	—	—	—	±0.08	≤0.08	
9.00 ≤ d < 13.0	±0.30	—	—	—	—	—	±0.10	≤0.10	
13.0 ≤ d < 17.0	±0.40	—	—	—	—	—	±0.10	≤0.10	
17.0 ≤ d < 100	±0.50	—	—	—	—	—	±0.15	≤0.10	

Note: Tungsten rods (bars), at or thicker than 100mm, or thinner than 0.2mm could be custom-made; d<sub>max</sub>-d<sub>min</sub>.





# Tungsten Products

## Tungsten Wire



### Application

Tungsten wires are used to make filaments of incandescent lamps, fluorescent lamps, and halogen lamps, electrodes of HID lamps, heating components, vacuum metallizing coils, and TIG welding electrodes.

### Properties and Characteristics

- High temperature property: according to the specific applications, high temperature property requirements are categorized
- Diameter consistency: weight deviation of two consecutive 200mm-wire pieces is less than 0.5% of nominal value
- Straightness:
  - Regular tungsten wire: in accordance with customers' requirements.
  - Straightened tungsten wire: for the tungsten wire thinner than 100um, vertical height of 500mm freely suspended wire should not be less than 450mm; for the tungsten wire at or thicker than 100um, the maximum arc height between two pints with distance of 100mm is 10mm.
- Surface conditions: smooth surface, free of splits, burrs, cracks, dents, dots, grease contamination.
- Coilability: no splits or breaks during coiling process.
- Piece weight: up to 5kgs for fine tungsten wire, 10kgs for heavy tungsten wire.



# Tungsten Products

## Tungsten Wire

### Sizes / Tolerances

Sizes		200mm Weight Tolerance (%)			Diameter Tolerance (%)	
Diameter (μm)	Weight (mg/200mm)	Grade 0	Grade I	Grade II	Grade I	Grade II
8 < d ≤ 14	0.19 < p ≤ 0.59	±3.0	±4.0	±5.0	—	
14 < d ≤ 18	0.59 < p ≤ 0.98	±2.5	±3.0	±4.0	—	
18 < d ≤ 40	0.98 < p ≤ 4.85	±2.0	±2.5	±3.0	—	
40 < d ≤ 80	4.85 < p ≤ 19.39	±1.5	±2.0	±2.5	—	
80 < d ≤ 380	19.39 < p ≤ 272.71	±1.0	±1.5	±2.0	—	
300 < d ≤ 350	272.71 < p ≤ 371.18		±1.0	±1.5	—	
350 < d ≤ 500	—		—		±1.5	±2.0
d > 500	—		—		±1.0	±1.5

Note : Sizes and tolerances could be custom-made.

### Condition and Finished products

Tungsten wires are available in the following conditions:

Code	Conditions of Finished Products	Code	Conditions of Finished Products	Code	Conditions of Finished Products
C	Chemical Cleaned	DS	Drawn + Straightened	EHS	Electrolytic Polished + Annealed + Straightened
CS	Chemical Cleaned + Straightened	E	Electrolytic Polished	ES	Electrolytic Polished + Straightened
D	Drawn	EH	Electrolytic Polished + Annealed	H	Annealed







## Tungsten Products

### Tungsten Vacuum Metallizing Coil



#### Application

Tungsten vacuum metallizing coils are used as heating components to metallize the surfaces of kinescopes, mirrors, plastics, metal matrix and various decorations.

#### Properties and Characteristics

Tungsten vacuum metallizing coils are of high melting point, good corrosion resistance, and long evaporation life. It is also possible to twist metal wire and tungsten wire together, which will be more convenient for further process.

#### Condition and Finished products

- 0.3-1.5mm×n(n≤10).  
Sizes: 00.3-1.5mmxn(n≤10).
- Surface Quality: Chemical Cleaned or Electrolytic Polished.
- Technical Requirements: As per the drawings provided by the customers, or the "Technical Specification of Tungsten Vacuum Metallizing Coils of Xiamen Honglu.



## Tungsten Products

### Special Tungsten Electrode



#### Applications

- HID electrode
- Electric vacuum parts
- Heating elements and high-temperature structural components
- Electrical contacts
- Rare earth smelting electrode

#### Properties and Characteristics

Density: 19.0g/cm<sup>3</sup> min.  
Featuring in strong EI resistance and corrosion resistance, and long service life.

#### Condition and Finished products

Conditions of Finished Products	Diameter	Tolerance	Ovality	Length
Forged	10 ~ 60	±0.5	—	≤1200
Ground	10 ~ 60	±0.1	≤0.10	≤400

Note: Sizes and tolerances could be custom-made





## Tungsten Products

### Tungsten Vacuum Metalizing Coil



#### Application

Tungsten welding electrodes are used for A/C or D/C welding of various kinds of materials.

#### Properties and Characteristics

Tungsten welding electrodes feature in fast arc ignition, low arc maintaining current, high current carrying capability, low rate of burnt area, excellent electric conductivity and welding performance.

#### Condition and Finished products

Tungsten welding electrodes are available in the following conditions:

D-Drawn E-Electrolytic Polished G-Ground S-Swaged



## Tungsten Products

### Tungsten Welding Electrode

	Brands	Color Code	Chemical Composition (%)			Diameter Range (mm)	Surface	Properties and Characteristics
			Dopant	Impurities	Tungsten			
Pure Tungsten	HW11	Green	—	≤0.05	Rest	0.8~15	D,E,G,S	Non-radioactive, suitable for AC welding of aluminum, magnesium, and their alloys.
Thoriated Tungsten	HWTh10	Yellow	0.9~1.1ThO <sub>2</sub>	≤0.05	Rest	0.8~15	D,E,G,S	Radioactive, excellent electron emission and overall performance, overcurrent-carrying capability, suitable for DC welding of carbon steel, stainless steel, nickel alloy and titanium alloys.
	HWTh20	Red	1.8~2.2ThO <sub>2</sub>	≤0.05	Rest	0.8~15	D,E,G,S	
Lanthanum Tungsten	HWLa10	Black	0.8~1.2La <sub>2</sub> O <sub>3</sub>	≤0.05	Rest	0.8~15	D,E,G,S	Non-radioactive, excellent electric conductivity and welding performance. high current-carrying capability, minimum ratio of burnt area, substitute for thoriated tungsten electrode, mainly used in DC welding.
	HWLa15	Golden Yellow	1.3~1.7La <sub>2</sub> O <sub>3</sub>	≤0.05	Rest	0.8~15	D,E,G,S	
	HWLa20	Blue	1.8~2.2La <sub>2</sub> O <sub>3</sub>	≤0.05	Rest	0.8~15	D,E,G,S	
Cerium Tungsten	HWCe10	Pink	0.8~1.2CeO <sub>2</sub>	≤0.05	Rest	0.8~15	D,E,G,S	Non-radioactive, easier arc ignition under low current circumstances, low arc maintaining current, suitable for the welding of pipelines and small components, and discontinuous welding
	HWCe15	Orange	1.3~1.7CeO <sub>2</sub>	≤0.05	Rest	0.8~15	D,E,G,S	
	HWCe20	Grey	1.8~2.2CeO <sub>2</sub>	≤0.05	Rest	0.8~15	D,E,G,S	
Yttrium Tungsten	HWY20	Sky Blue	1.8~2.2Y <sub>2</sub> O <sub>3</sub>	≤0.05	Rest	0.8~15	D,E,G,S	Non-radioactive, long and thin arc beam with high compression, deeper burning groove under medium and high current circumstances.
Ternary Re-Tungsten	HWCYL20	Viridescence	1.8~2.2	≤0.05	Rest	0.8~15	D,E,G,S	Non-radioactive, Ternary compound rare earth tungsten welding electrode, easy arc ignition and good arc stability.
Compound Rare Earth Tungsten	HWMX	Cyan	1.0~5.0MOx	≤0.05	Rest	0.8~15	D,E,G,S	Compound rare earth tungsten welding electrode, doped with various elements, excellent welding performance





# Tungsten Products

## Notes

### Transportation

- 1.1 At room temperature, tungsten is fragile material. Please avoid quick vibration and collision.
- 1.2 Avoid the injury to fingers, eyes, or other body parts caused by wire prick.
- 1.3 Handle carefully and avoid the loss caused by wire tangle or spool damage.

### Storage

Products	Size Range	Storage Life	Environment	
			Temperature	Humidity
Black Tungsten Wire	All sizes	18 Months	≤ 28°C	≤ 60%
Cleaned Tungsten Wire	All sizes	6 Months		
Ground Tungsten Rod	All sizes	6 Months		

- 2.1 Keep products in clean and dry place, with room temperature 28°C max and humidity 60% max.
- 2.2 Please keep products away from chemicals.
- 2.3 Please store cleaned wires appropriately. If oxidized, the surface will lose metal luster and ductility will be lowered even if you reduce these wires in the atmosphere of H<sub>2</sub>.
- 2.4 Please keep the spools vertical (especially for straightened wires).



# Tungsten Products

## Usage

- 3.1 To prevent wires from being tangled, please do not release the end of wires.
- 3.2 Please do not rewind straightened wires.
- 3.3 Please avoid the friction between wires and steel components of equipments during coiling. Otherwise, wires will be scraped and contaminated with iron, finally become fragile.
- 3.4 Check if the clamps of coiling machines damage wires.
- 3.5 Wires shall be free of the contamination by oil, iron scraps, and other foreign materials before annealing.
- 3.6 During the first annealing (to remove graphite layer), humidity of He shall be maintained and its temperature shall not be over 1400°C. The graphite shall be removed thoroughly; otherwise, wires will be carbonized and become fragile.
- 3.7 During the second forming heating, please use molybdenum boats. Filaments shall not contact iron, nickel, copper and other metals, and their alloys, and also be free of contamination by sulfur and phosphor gas, oil, dust, as well as other foreign materials.
- 3.8 Please keep Ha in the heating furnace pure and clean.
- 3.9 To use the specialized heating furnace, and do not share the heating furnace with other materials. Please clean the furnace and replace the furnace body materials periodically to make sure that the inside of furnace is clean.
- 3.10 Inside heating furnace, please do not use the tools of other materials, such as, iron bar, nickel boat, kryptol, brass or stainless steel apparatuses.

## Size-Weight Relationship of Wire

$$d=0.01817 \sqrt{p} \text{ or } p=3030 d^2$$

d-Diameter (mm)      p-Weight of 200mm Wire (mg)

