Rhenium

Re

Rhenium was discovered in 1925 by W. Noddack, O. Berg and Ida Tacke in Berlin, Germany.

Rhenium was named after "Rhenus", the Latin name for the Rhine. It is a rare element (abundance 4 x 10^{-4} ppm in the earth's crust) and does not occur in quantity in any ore. It is found in ores which contain molybdenum from which it can be readily recovered. The metal is obtained by hydrogen reduction of the potassium perrhenate salt, obtained by precipitation of the perrhenate ion $(ReO_4)^-$ from an oxidized solution.

Rhenium is a silvery colored metal which resists corrosion and oxidation but slowly tarnishes in moist air. It is soluble in nitric and sulfuric acids. Applications for the metal include its use as an alloying element with tungsten, the resulting alloy having a very high electrical resistance making it suitable for electrical filaments. Rhenium has a very high melting point and is used in high temperature thermocouples, electrical contacts and thermistors.

Atomic Properties

Atomic number	75	
Atomic radius - Goldschmidt	0.138 nm	
Atomic weight	186.207 amu	
Crystal structure	Hexagonal close packed	
Electronic structure	Xe $4f^{14}$ $5d^5$ $6s^2$	
Photo-electric work function	5.0 eV	
Thermal neutron absorption cross-section	85 Barns	
Valences shown	-1, 1, 2, 3, 4, 5, 6, 7	
Natural isotope distribution	Mass No.	%
	185	37.4
	187	62.6
Ionization potential	No.	eV
	1	7.87
	2	16.6

Physical Properties

Boiling point	5627 C
Density @20C	21.0 g cm^{-3}
Melting point	3180 C

Electrical Properties

Electrical resistivity @20C	18.7 μOhmcm
Temperature coefficient @0-100C	0.0045 K^{-1}
Superconductivity critical temperature	1.70 K

Thermal Properties

Coefficient of thermal expansion @0-100C	6.6 x10^{-6} K^{-1}
Latent heat of evaporation	3824 J g^{-1}
Latent heat of fusion	179.9 J g^{-1}
Specific heat @25C	138 J K^{-1} kg^{-1}
Thermal conductivity @0-100C	48.0 W m^{-1} K^{-1}

Mechanical Properties

Material condition	Soft	Hard	Polycrystalline	
Bulk modulus			334	GPa
Hardness - Vickers	280	700		
Poisson's ratio			0.26	
Tensile modulus			466	GPa
Tensile strength	1125	2225	MPa	
Yield strength	315	2150	MPa	

Foil

RE000200 Thickness . . . . . **0.0125mm** Purity **99.99%**
Temper . . . . . **Annealed**

Web Code	Size	Quantity 1pc	Quantity 2pcs
699-784-360	25 x 25 mm		
473-039-397	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

RE000214 Thickness . . . . . **0.025mm** Ribbon width **0.76mm**
Purity . . . . . **99.99%** Temper . . . . . **Annealed**

Coil **Width 0.76mm**

Web Code	Length	Quantity 1 Reel
945-831-998	0.1 m	
228-987-622	0.2 m	
623-458-314	0.5 m	
932-288-806	1 m	
536-111-632	2 m	
013-956-044	5 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Random lengths normally between 0.1m and 0.3m.

RE000210 Thickness . . . . . **0.025mm** Purity **99.99%**
Temper . . . . . **Annealed**

Web Code	Size	Quantity 1pc	Quantity 2pcs
129-916-538	25 x 25 mm		
239-566-677	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

RE000220 Thickness . . . . . **0.03mm** Ribbon width **0.76mm**
Purity . . . . . **99.99%** Temper . . . . . **Annealed**

Coil **Width 0.76mm**

Web Code	Length	Quantity 1 Reel
744-508-539	0.1 m	
063-566-953	0.2 m	
945-864-408	0.5 m	
233-055-642	1 m	
131-960-337	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Random lengths normally between 0.1m and 0.3m.

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Foil

RE000228

Thickness **0.04mm**
Purity. **99.99%**
Ribbon width **0.7mm**
Temper . . . . . **Annealed**

Coil **Width 0.7mm**

Web Code	Length	Quantity 1 Reel
992-844-511	0.1 m	
105-572-886	0.2 m	
196-600-804	0.5 m	
575-111-336	1 m	
888-915-092	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Random lengths normally between 0.1m and 0.3m.

RE000234

Thickness **0.05mm**
Purity. **99.99%**
Ribbon width **0.76mm**
Temper . . . . . **Annealed**

Coil **Width 0.76mm**

Web Code	Length	Quantity 1 Reel
029-550-453	0.1 m	
693-803-768	0.2 m	
725-463-073	0.5 m	
682-883-160	1 m	
360-397-646	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Random lengths normally between 0.1m and 0.3m.

RE000230

Thickness **0.05mm**
Temper . . . . . **Annealed**
Purity. **99.99%**

Web Code	Size	Quantity 1pc	2pcs
298-049-805	25 x 25 mm		
256-236-481	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
We can supply longer lengths at 50mm width to special order for delivery in a few weeks.

RE000240

Thickness **0.125mm**
Temper . . . . . **Annealed**
Purity. **99.99%**

Web Code	Size	Quantity 1pc	2pcs
213-336-422	25 x 25 mm		
667-055-215	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Tolerance on thickness : +/-20%.

RE000245

Thickness **0.20mm**
Temper . . . . . **Annealed**
Purity. **99.99%**

Web Code	Size	Quantity 1pc	2pcs
403-225-733	25 x 25 mm		
403-216-402	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

RE000250

Thickness **0.25mm**
Temper . . . . . **Annealed**
Purity. **99.99%**

Web Code	Size	Quantity 1pc	2pcs
662-335-380	25 x 25 mm		
791-914-672	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

RE000270

Thickness **0.5mm**
Temper . . . . . **Annealed**
Purity. **99.99%**

Web Code	Size	Quantity 1pc	2pcs
402-054-169	25 x 25 mm		
614-929-348	50 x 50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Tolerance on thickness : +/-20%.

RE000301

Thickness **1.0mm**
Temper . . . . . **Annealed**
Purity. **99.99%**

Disks

Web Code	Diameter	Quantity 1 disks	2 disks
958-347-280	12 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Tolerance on thickness : +/-20%.

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RE000300

Thickness **1.0mm**
Temper . . . . . **Annealed**
Purity **99.99%**

Web Code	Size	Quantity 1pc
300-978-186	25 x 25 mm	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
Tolerance on thickness : +/-20%.

Sputtering Target

RE009100

Thickness **1.0mm**
Purity **99.99%**

Web Code	Disk diam.	Quantity 1disk
698-217-695	25.4 mm	POA
354-905-067	50.8 mm	POA

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.
These targets are normally available for immediate shipment from stock. Other sizes are available to special order.

Wire

RE005105

Diameter **0.076mm**
Temper . . . . . **Annealed**
Purity **99.97%**

Web Code	Length	Quantity 1 Reel
041-161-583	0.1 m	
145-191-560	0.2 m	
148-941-639	0.5 m	
617-702-256	1 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005106

Diameter **0.10mm**
Temper . . . . . **Annealed**
Purity **99.97%**

Web Code	Length	Quantity 1 Reel
212-786-408	0.1 m	
598-301-397	0.2 m	
787-667-454	0.5 m	
458-427-330	1 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005108

Diameter **0.125mm**
Temper . . . . . **Annealed**
Purity **99.97%**

Web Code	Length	Quantity 1 Reel
927-727-375	0.1 m	
965-918-754	0.2 m	
739-847-970	0.5 m	
480-991-124	1 m	
123-898-343	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005110

Diameter **0.15mm**
Temper . . . . . **Annealed**
Purity **99.97%**

Web Code	Length	Quantity 1 Reel
008-174-669	0.1 m	
021-832-177	0.2 m	
729-013-240	0.5 m	
126-654-607	1 m	
831-826-209	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005112

Diameter **0.178mm**
Temper . . . . . **Annealed**
Purity **99.97%**

Web Code	Length	Quantity 1 Reel
605-605-132	0.1 m	
700-646-585	0.2 m	
580-819-458	0.5 m	
602-427-230	1 m	
303-411-460	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

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Wire

RE005115 Diameter . . . . . **0.2mm** Purity **99.97%**
Temper . . . . . **Annealed**

Web Code	Length	Quantity 1 Reel
803-868-697	0.1 m	
483-584-350	0.2 m	
448-043-254	0.5 m	
005-411-679	1 m	
676-453-011	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005120 Diameter . . . . . **0.25mm** Purity **99.97%**
Temper . . . . . **Annealed**

Web Code	Length	Quantity 1 Reel
578-639-316	0.1 m	
329-914-860	0.2 m	
239-361-044	0.5 m	
920-127-454	1 m	
015-925-130	2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005125 Diameter . . . . . **0.3mm** Purity **99.97%**
Temper . . . . . **Annealed**

Web Code	Length	Quantity 1 Reel
903-744-412	0.1 m	
968-058-843	0.2 m	
007-353-538	0.5 m	
919-192-904	1 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005130 Diameter . . . . . **0.5mm** Purity **99.97%**
Temper . . . . . **Annealed**

Web Code	Length	Quantity 1 Reel
942-224-587	0.05 m	
778-063-673	0.1 m	
257-960-106	0.2 m	
245-021-156	0.5 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

RE005140 Diameter . . . . . **1.0mm** Purity **99.97%**
Temper . . . . . **Annealed**

Web Code	Length	Quantity 1 Reel
029-783-091	0.025 m	
021-119-373	0.05 m	
639-919-294	0.1 m	
989-900-500	0.2 m	

Typical Analysis : Al 3, B 1, Ca 1, Co 10, Cr 3, Cu 2, Fe 60, K 1, Mg 1, Mn 2, Mo 30, Ni 10, Ti 2, W 10, Zr 2.

Rod

RE007905 Diameter . . . . . **1.5mm** Purity **99.99%**
Temper . . . . . **Annealed**

Web Code	Length	Quantity 1pc	2pcs
131-491-765	25 mm		
505-831-024	50 mm		
693-886-661	100 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

RE007920 Diameter . . . . . **5.0mm** Purity **99.99%**

Web Code	Length	Quantity 1pc	2pcs
135-008-963	25 mm		
926-659-523	50 mm		

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

Powder

RE006011 Max. Particle size . . . . . **45micron** Purity **99.99%**

Web Code	Weight	Quantity 1 Pot
422-681-709	5 g	
835-219-759	10 g	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

Goodfellow Corporation 305 High Tech Drive, Oakdale, PA 15071-3911. USA
Tel: 1-800-821-2870 : Fax 1-800-283-2020

Rhenium
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Lump

RE006100

Max. Lump size **10mm**
Condition. . . . . **Pellets**
Purity. **99.99%**

Web Code	Weight	Quantity 1 Pot
580-230-083	5 g	

Typical Analysis : Al 3, B 1, Ca 1, Co 3, Cr 3, Cu 2, Fe 45, K 1, Mg 1, Mn 2, Mo 30, Ni 3, Ti 2, W 1, Zr 2.

Single Crystal

RE002110

Oriented . . . . . **(0001)**
Purity. **99.999%**
Diameter. **8mm**
Length. **1mm**

Web Code	Quantity 1pc
479-314-860	

Typical Analysis : Not applicable

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