CARPENTER TECHNOLOGY

DATASHEET

CONICHROME®

Applicable specifications: AMS 5833 (wire, annealed then cold drawn), 5834 (wire, annealed then cold drawn VIM + consumable remelt, anneal, cold drawn, aged); ASTM F1058 (Grade 1 or 2)

Associated specifications: AISI 1058, DIN 2.4711, ISO 5832-7, NACE MR0175, UNS R30003 / R30008

Type analysis

Single figures are nominal except where noted.

Cobalt	39.0–42.0 %*	**Chromium**	18.5–21.5 %*	**Nickel**	14.0–18.0 %*
Molybdenum	6.0–8.0 %*	**Manganese**	Max 1.0–2.5 %*	**Silicon**	Max 1.20 %
Carbon	Max 0.15 %	**Phosphorus**	Max 0.015 %	**Sulfur**	Max 0.015 %
Beryllium	Max 0.001 %	**Iron**	Balance		

Type analyses of Grade 1 (R30003) and Grade 2 (R30008) differ slightly and are outlined in the industry specifications in more detail. Combined elemental ranges are shown above, indicated by an (*), to provide a nominal type analysis.

Forms manufactured

Bar-Rounds > 0.250 in.	**Strip**	**Wire > 0.250 in.**

Description

Conichrome is a non-magnetic, austenitic nickel-cobalt-chromium-molybdenum alloy possessing a unique combination of extremely high strength, ductility, excellent corrosion resistance, and high fatigue strength. Manufactured using premium melting and remelting operations, the alloy has extremely good cleanliness (low inclusion content) and improved homogeneity, which are vital to the performance, properties, and functionality of this alloy in its demanding applications.

Because of its unique properties, Conichrome is used for a wide variety of medical applications, such as suture wires, surgical clips, pacemaker leads, stents, vena cava filters, and orthopedic nails. It is also commonly used as a precision spring material in the watchmaking industry, torsion bars, seals, and performance springs for various markets.

Key Properties:

- Non-magnetic, austenitic
- High strength and ductility
- Great corrosion resistance
- Superior cleanliness

Markets:

- Defense
- Industrial
- Medical

Applications:

- Numerous surgical, cardiovascular, and orthopedic applications
- Precision and performance springs
- Torsion bars and seals

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Corrosion resistance

Conichrome displays excellent resistance to sulfide stress corrosion cracking, as evident in the alloy's acceptance into NACE MR1075 as an alloy that is acceptable for use in "any combination of temperature, pH2S, chloride concentration, and in situ pH occurring in production environments."

Conichrome exhibits excellent resistance to implantation environments, as evident by its use in medical implants for decades.

IMPORTANT NOTE:
The following 4-level rating scale (Excellent, Good, Moderate, Restricted) is intended for comparative purposes only. Corrosion testing is recommended. Factors that affect corrosion resistance include temperature, concentration, pH, impurities, aeration, velocity, crevices, deposits, metallurgical condition, stress, surface finish, and dissimilar metal contact.

Nitric Acid	Good	**Sulfuric Acid**	Good
Phosphoric Acid	Good	**Acetic Acid**	Excellent
Sodium Hydroxide	Good	**Salt Spray (NaCl)**	Excellent
Sea Water	Excellent	**Sour Oil/Gas**	Excellent
Humidity	Excellent		

Physical properties

PROPERTY	English Units	Metric Units
DENSITY	0.300 lb/in^3	8304 kg/m^3

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Magnetic properties

This material is non-magnetic in its annealed, cold worked, and aged conditions.

Typical mechanical properties

ROOM TEMPERATURE

CONDITION	ORIENTATION	0.2% YIELD STRENGTH		ULTIMATE TENSILE STRENGTH		ELONGATION IN 4D	REDUCTION OF AREA
		ksi	MPa	ksi	MPa	%	%
Annealed	Long	52	359	124	855	80	80
Cold worked	Long	100–250	690–1724	150–280	1034–1930	—	—
Cold worked + aged	Long	—	—	250–300+	1724–2068+	—	—

The ultimate tensile strength values for the cold worked and cold worked + aged conditions are typical, but dependent upon the level of cold work imparted to the material.

Biocompatibility summary

Conichrome has been deployed for various implant applications in contact with both soft tissue and bone. Precedence of acceptability within the medical market has been established, and biocompatibility reports on the alloy are available within the medical community.

Elevated temperature use

Use of Conichrome has been typically used for service between room temperature and 800°F (427°C), but specific temperature studies have not been performed.

Stability at low temperature

Precedence of acceptability down to liquid helium temperatures without phase transformation temperature.

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Heat treatment

Annealing	Conichrome should be annealed at 2000°F+/-25 (1093°C +/-14) and held for a time appropriate for its section thickness to ensure proper soak through entire cross section. This process should be followed by a cooling to room temperature. Typical annealed tensile is 125 ksi. Relevant specification requirements and their dictated expected annealing results should be consulted prior to any heat treat operations.
Age	After work hardening, Conichrome can be aged in the temperature range of 850/1000°F (455/538°C) for increased strength. The alloy will respond to aging only if first work strengthened. No increase in strength will result from aging annealed material. For optimum mechanical properties, cold worked Conichrome should be aged at 900/950°F (482/510°C), and held at the selected temperature within +/-25°F (15°C) for 5–5.5 hours, then air cooled (or an equivalent rate) to room temperature. Relevant specification requirements and their dictated expected aging results should be consulted prior to any heat treat operations.

Workability

Cold working	Conichrome can be satisfactorily cold drawn and formed. It is somewhat stiffer than stainless steels such as Types 316 and 310, due to its higher strength and higher response to cold working. This alloy work hardens rapidly. If annealed properties are required in small section, cold forming should be followed by an anneal.

For additional information, please contact your nearest sales office:
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