

This page is mainly introduced the Alloy 52 Datasheet, including chemical information, mechanical properties, physical properties, mechanical properties, heat treatment, and Micro structure, etc. It also contains the use of Alloy 52, such as it is commonly used in bars, sheet, plates, steel coils, steel pipes, forged and other materials application.

Datasheet for Steel Grades Special Alloy Alloy 52

Alloy 52 Standard Number:

ITEM	Standard Number	Descriptions
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Alloy 52 Chemical composition(mass fraction)(wt.%)

Chemical				Min.(%)			Max.(%)		
C	Si	Mn	P	S	Cr	Ni	Mo	V	Ta
0.05	0.30	0.60	0.025	0.025	0.25	50.5			
W	N	Cu	Co	Pb	B	Nb	Al	Ti	Other
							0.10		Iron:Balance

ALLOY 52, UNS N14052

STRIP, FOIL & WIRE, ASTM F30

Applications

Applications for Alloy 52 include magnetic reed switches and seals that need controlled linear expansion to approximately 977°F (525 °C)

Description

Alloy 52 is a 50.50% nickel-iron alloy developed for glass-to-metal seals for some of the soft glasses and some ceramics. The alloy's rate of thermal expansion is virtually constant to a temperature of about 1050°F (565°C).

Chemistry Typical

Carbon: 0.05 max
Silicon: 0.30 max
Manganese: 0.60 max
Nickel: 50.5 nom
Chromium: 0.25 max
Iron: Balance
Phosphorus: 0.025 max
Sulfur: 0.025 max
Aluminum: 0.10 max
Physical Properties

Density: 0.30 lb/in³, 8.30 g/cm³
Electrical Resistivity: ohm-cir-mil/ft, microhm-cm:
At 68°F (20°C): 258(43)
Thermal Conductivity: BTU-in/hr-ft²-°F (W/m•K):
68-212°F (20-100°C): 97(140)
Mean Coefficient of Thermal Expansion: $\mu\text{in/in-}^\circ\text{F}$ ($\mu\text{m/m-}^\circ\text{C}$):
77-842°F (25-450°C): 5.4 (9.8)
Melting Range: 2600°F (1430°C)
Forms

Coil: Sheet, Strip, Ribbon
Wire – Profile, Round, Flat, Square
Mechanical Properties at Room Temperature

Properties: Annealed Typical Ultimate Tensile Strength: 78 KSI nom (536 MPa nom)
Yield Strength: 35 KSI nom (240 MPa nom)
Elongation: 30% nom

Hardness: Rb 73 nom

Properties: Tempered Alloy 52 can be cold worked to various tempers.
Contact Ulbrich Technical Service for additional information

Additional Properties

Corrosion Resistance Refer to NACE (National Association of Corrosion Engineers) for recommendations.

Finishes

#1 – Hot rolled annealed and descaled. It is available in strip, foil and

ribbon. It is used for applications where a smooth decorative finish is not required. # 2D – Dull finish produced by cold rolling, annealing and descaling. Used for deep drawn parts and those parts that need to retain lubricants in the forming process. # 2B – Smooth finish produced by cold rolling, annealing and descaling. A light cold rolling pass is added after anneal with polished rolls giving it a brighter finish than 2D. #BA Bright annealed cold rolled and bright annealed #CBA Course bright annealed cold rolled matte finish and bright anneal #2 Cold Rolled # 2BA – Smooth finish produced by cold rolling and bright annealing. A light pass using highly polished rolls produces a glossy finish. A 2BA finish may be used for lightly formed applications where a glossy finish is desired in the formed part. Polished – Various grit finish for specific polish finished requirements

* Not All Finishes are Available for All Alloys – Consult Sales for Applicable Finishes

Wire Finishes

XC-Extra clean. Bright annealed or bright annealed and cold rolled

Grease-Ultra bright finish for decorative applications

Soap-Soap is not removed from tempered wire to act as a lubricant.

* Contact Ulbrich Wire with special finish requests.

Heat Treatment Alloy 52 is non hardenable by heat treatment.

Welding For best results refer to: SSINA's "Welding of Stainless Steels and Other Joining Methods".

Alloy 52 Physical Properties

Tensile strength	115-234	σ_b /MPa
Yield Strength	23	$\sigma_{0.2} \geq$ /MPa
Elongation	65	$\delta 5 \geq$ (%)
ψ	-	$\psi \geq$ (%)
Akv	-	Akv \geq /J
HBS	123-321	-
HRC	30	-

Alloy 52 Mechanical Properties

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Tensile strength	231-231	σ_b /MPa
Yield Strength	154	$\sigma_{0.2} \geq$ /MPa
Elongation	56	$\delta 5 \geq$ (%)
ψ	-	$\psi \geq$ (%)
Akv	-	Akv \geq /J
HBS	235-268	-
HRC	30	-

Alloy 52 Heat Treatment Regime

Annealing	Quenching	Tempering	Normalizing	Q & T
√	√	√	√	√

Alloy 52 Range of products

Product type	Products	Dimension	Processes	Deliver Status
Plates / Sheets	Plates / Sheets	0.08-200mm(T)*W*L	Forging, hot rolling and cold rolling	Annealed, Solution and Aging, Q+T, ACID-WASHED, Shot Blasting
Steel Bar	Round Bar, Flat Bar, Square Bar	Φ8-1200mm*L	Forging, hot rolling and cold rolling, Cast	Black, Rough Turning, Shot Blasting,
Coil / Strip	Steel Coil /Steel Strip	0.03-16.0x1200mm	Cold-Rolled & Hot-Rolled	Annealed, Solution and Aging, Q+T, ACID-WASHED, Shot Blasting
Pipes / Tubes	Seamless Pipes/Tubes, Welded Pipes/Tubes	OD:6-219mm x WT:0.5-20.0mm	Hot extrusion, Cold Drawn, Welded	Annealed, Solution and Aging, Q+T, ACID-WASHED

We can produce Special Alloy the specifications follows: