

TCA-SMA50

Cobalt-Iron-Vanadium Soft Magnetic Alloy | ASTM A801 Type 1 | UNS R30005

Overview

TCA-SMA50 is TCA's cobalt-iron-vanadium soft magnetic alloy produced to ASTM A801 Type 1 (UNS R30005), the 49Co-49Fe-2V composition commonly referred to as HIPERCO® 50. Equiatomic iron-cobalt alloys offer the highest saturation magnetic flux density of any commercial soft magnetic material; the vanadium addition improves ductility and workability and raises electrical resistivity.

High flux density allows magnetic circuits to be made smaller and lighter for the same performance, which is why Co-Fe-V alloys are the material of choice where weight and space are critical — notably in aerospace generators, motors and actuators.

TCA supplies TCA-SMA50 as forging billet. Chemical composition (Table 1) and DC magnetic properties (Table 2) are verified against ASTM A801 Type 1 requirements.

Key Features

- Composition within ASTM A801 Type 1 limits, with low carbon (0.006%) and sulfur (0.004%)
- Flux density of 20.53 kG at 10 Oe — about 37% above the ASTM minimum of 15.0 kG
- Flux density of 21.81 kG at 20 Oe vs. the ASTM minimum of 17.5 kG
- Supplied as forging billet

Chemical Composition

Table 1 – Chemical composition (wt.%)

		C	Mn	Si	P	S	Cr	Ni	Co	V	Fe
ASTM A801	Max.	0.025	0.15	0.15	0.015	0.010	0.15	0.25	49.50	2.10	Bal.
	Min.								47.50	1.75	
TCA result		0.006	0.039	0.017	0.009	0.004	0.08	0.12	48.4	1.97	Bal.

C and S determined with a carbon/sulfur (C/S) analyzer; other elements by spark optical emission spectrometry (OES).

Material at a Glance	
Designation	TCA-SMA50
Specification	ASTM A801 Type 1
UNS	R30005
Alloy system	49Co-49Fe-2V
Product form	Forging billet
Comparable to	HIPERCO® 50

Magnetic Properties

DC magnetic properties of TCA-SMA50 forging billet are compared with the ASTM A801 Type 1 minimum flux density requirements in Table 2. At magnetizing field strengths of 10 Oe (800 A/m) and 20 Oe (1.6 kA/m), TCA-SMA50 reaches 20.53 kG (2.053 T) and 21.81 kG (2.181 T), respectively — exceeding the specification minimums by a wide margin.

Table 2 – DC magnetic properties: flux density, kG (T)

Product form	Item	Field strength 10 Oe (800 A/m)	Field strength 20 Oe (1.6 kA/m)
Forging billet	ASTM A801 Type 1 minimum	15.0 (1.50)	17.5 (1.75)
Forging billet	TCA result	20.53 (2.053)	21.81 (2.181)

ASTM A801 magnetic property requirements apply to material in the annealed condition. Test conditions are available from TCA on request.

Typical Applications

- Aerospace generators, motors and actuators
- Solenoid and electromagnet pole pieces
- Magnetic bearings and high-flux-density cores

Why TCA

- Specialty alloy manufacturer since 1984
- Chemistry verified by C/S analyzer and spark OES
- Material supplied to ASTM / AMS specifications
- ISO 9001 / AS9100D and ISO/IEC 27001 certified
- ISO/IEC 17025 accredited laboratory (TAF No. 4378)

Ordering Information

Please include the following information with your inquiry so that TCA can quote and certify TCA-SMA50 to your requirements:

- Material designation: TCA-SMA50 (ASTM A801 Type 1, UNS R30005)
- Product form, dimensions and quantity
- Required test reports, e.g. chemical analysis and DC magnetic properties
- Any customer-specific annealing or magnetic test conditions

Contact us for billet sizes and quotations: info@tcaic.com | www.tcaic.com

The data in this publication were obtained from tests on TCA-SMA50 forging billet and are representative values for reference only; they are not guaranteed minimums or design values. TCA-SMA50 is produced by TCA. Generic alloy designations are used for identification purposes only. HIPERCO® is a registered trademark of CRS Holdings, LLC; TCA is not affiliated with or endorsed by CRS Holdings, LLC or Carpenter Technology Corporation. © 2026 Transcrystal Alloy Industrial Corporation. All rights reserved.



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