

PURE MOLYBDENUM ABL Arc-Cast Low Carbon Bar

Description of Product This specification covers carbon-deoxidized, low-carbon molybdenum wrought bar of produced from ingots consolidated by the H.C. Starck consumable electrode vacuum-arc-casting process.

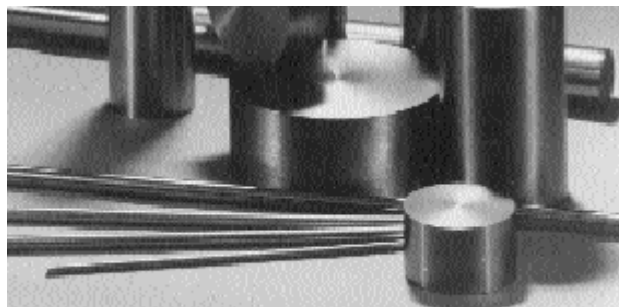
Chemical Characteristics¹⁾
(Mass fraction in % [cg/g]; ppm [μ g/g])

The chemical composition of the billet used for producing the wrought bar shall conform to the following limits:

Mo(By Difference)	min.	99.97	%
*O	max.	0.002	%
*N	max.	0.002	%
Ni	max.	0.002	%
C	max.	0.010	%
Fe	max.	0.010	%
Si	max.	0.010	%

*Unless method of analysis is agreed upon, deviations from these limits alone shall not be cause for rejection.

Structure Bar will be supplied in a stress-relieved condition. Material can be supplied in the recrystallized condition upon request.



Arc-Cast Products

1) Information on testing methods on request.

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Mechanical Properties The hardness shall conform to the following (measured at mid-radius location):

Inches	Diameter		Hardness, DPH (10 kg)	
		mm	Minimum	Maximum
	1/8 to 7/8	3.2 - 22.2	230	280
Over	7/8 to 1 1/8	22.2 - 28.6	225	270
Over	11/8 to 1 7/8	28.6 - 47.6	215	260
Over	17/8 to 2 7/8	47.6 - 73.0	210	250
Over	27/8 to 3 1/2	73.0 - 88.9	205	240

All sizes of recrystallized bar shall exhibit mid-radius hardness of 200 DPH maximum.

Tensile tests are conducted at room temperature (65°F to 85°F) with test specimens made and tested to Specification ASTM E-8) using a strain rate of 0.002 to 0.005 in/in/min through 0.6 % offset and 0.02 to 0.05 in/in/min to fracture.

Tensile properties in the longitudinal direction, using such specimens taken from the center of round bars up to 1 1/4" diameter and from mid-radius location for larger bars, shall meet the following minimum values:

Inches	Diameter		Tensile Strength		Yield Strength (0.2 % Offset)		Elongation % Minimum
		mm	Minimum	Minimum	Minimum	Minimum	
	1/8 to 13/32	3.2 - 10.3	KSI 75	Mpa 515	KSI 55	Mpa 380	15
Over	13/32 to 7/8	10.3 - 22.2	90	620	75	515	15
Over	7/8 to 11/8	22.2 - 28.6	85	585	70	485	15
Over	11/8 to 17/8	28.6 - 47.6	75	515	65	450	10
Over	17/8 to 27/8	47.6 - 73.0	70	485	60	415	10
Over	27/8 to 31/2	73.0 - 88.9	65	450	55	380	10

Dimensional Tolerances

Inches	Diameter		Diameter Variation				Out-of-Round	
		mm	Inches	mm	Inches	mm	Inches	mm
	1/8 to 9/32	3.2 - 7.1	+0.002	-0.002	+0.05	-0.05	0.004	0.10
Over	9/32 to 13/32	7.1 - 10.3	+0.003	-0.003	+0.07	-0.07	0.006	0.15
Over	13/32 to 5/8	10.3 - 15.9	+0.010	-0.005	+0.25	-0.13	0.012	0.30
Over	5/8 to 7/8	15.9 - 22.2	+0.015	-0.005	+0.38	-0.13	0.015	0.38
Over	7/8 to 1	22.2 - 25.4	+0.020	-0.005	+0.51	-0.13	0.015	0.38
Over	1 to 1 3/8	25.4 - 34.9	+0.020	-0.010	+0.51	-0.25	0.018	0.46
Over	13/8 to 11/2	34.9 - 38.1	+0.020	-0.015	+0.51	-0.38	0.020	0.51
Over	11/2 to 15/8	38.1 - 41.3	+0.025	-0.015	+0.64	-0.38	0.020	0.51
Over	15/8 to 2 1/2	41.3 - 50.8	-0.020	+0.76	-0.51	0.025	0.64	
Over	2 to 2 1/2	50.8 - 63.5	+0.032	-0.032	+0.81	-0.81	0.025	0.64
Over	2 1/2 to 31/2	63.5 - 88.9	+0.032	-0.032	+0.81	-0.81	0.027	0.69

Special finished bars can be supplied with a tolerance of ± 0.002 inch for 2 inches diameter or smaller sizes, and ± 0.003 inch for larger size bars.

Maximum variation from straightness will be 0.050 inch per foot.

Maximum variation in cut length will be + 1/4 inch, -0.

Surface Condition and Internal condition	Bars will be supplied with chemically or mechanically cleaned surfaces. Minor surface imperfections, revealed by dye penetrant inspection, may be removed by conditioning, provided such removal does not reduce dimensions below specified tolerance limits. Special finished bars will be supplied with a surface finish of 90 RMS or better. The internal integrity of bar >2.0" diameter will be determined by ultrasonic inspection and shall satisfy H.C. Starck Ultrasonic Specification No. H.C. Starck QC-32 (latest version).
Identification	Bar will be identified with an appropriate lot number. Each shipping container will be marked with the name of the customer and the purchase order number.
Hazards identification in Advertising (Directive 67/548/EEC Article 26, Directive 1999/45/EC Article 13 and REGULATION (EC) No 1272/2008 Article 48)	none.
Reports	A product certification report that details pertinent chemical, mechanical, structural and physical integrity features will be provided.
Rejection	H.C. Starck must receive written notification of rejected material with the reason for rejection. The right is reserved to inspect rejected material at customer plant for claim validation. The material may be returned only after proper authorization.

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