



BRODER METALS GROUP Cold Drawn F55

BMG specification	BMG-F55 (UNS S32760) Strain Hardened FLT+
Associated Specifications	<p>ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes:</p> <ul style="list-style-type: none"> F55 (UNS S32760) Condition A & Condition S F55 (UNS S32760) Strain Hardened Grades FG & FLT Various customer specifications <p>Also referenced: ASTM A320 - Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service EN 10204 / Werkstoffe 1.4501 ISO 15156 / NACE MR0175</p>
As Sold Condition	Solution Annealed & Cold Drawn
Form	Round & Hexagonal bars

Production

Base material for cold drawing is ASTM A276. UNS S32760 F55 solution annealed material that complies with Condition

- A. After cold drawing (strain hardening) material meets ASTM A276, UNS 32760 F55 Condition S. Material that meets required impact test requirements will be further designated as variant 'FG', 'FLT', or 'FLT+'.

BaseMaterial

Weld repairs: not allowed

Melt Practice: Electric Arc / Electric + AOD (or equivalent) Chemistry:

Element	Cr	Ni	Mo	W	Cu	N	Si	C	Mn	P	S	Fe	PREN
Min %	24.0	6.0	3.0	0.5	0.5	0.2	-	-	-	-	-		40.0
Max %	26.0	8.0	4.0	1.0	1.0	0.3	1.0	0.03	1.0	0.03	0.01	Bal	

$$\text{PREN} = \%Cr + (3.3\%Mo) + (16\%N)$$

For Standards ISO 15056 / NACE MR0175 and BS 4515-2 a different PREN formula including tungsten is used: $\text{PREN} = \%Cr + (3.3\%Mo) + (0.5\%W) + (16\%N)$. Result to be > 41.0

Heat Treatment: solution treatment is carried out at temperatures and for times sufficient to produce the required properties and the material is then cooled to prevent 475 degree C embrittlement and sigma-phase embrittlement. Times and temperatures are recorded and reported.

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Tensile Properties: material is tested in the solution annealed condition at room temperature and tested in accordance with ASTM A370 (latest edition) midway between surface and centre of cross-section. Requirements:

ASTM A276. UNS S32760 F55	YS – 0.2% off- set (MPa)	Tensile Strength (MPa)	Elongation in 50mm or 4D (%)	Reduc- tion of area(%)	Hardness (maximum)
Condition A	550 minimum	750 minimum	25 minimum	Reported only	290 HBW / 31 HRC
Condition S	720 minimum	860 minimum	16 minimum	Reported only	335 HBW / 36 HRC

Hardness result conforms to NACE MR0175

MaterialPropertyVerification

Metallographic examination: tests are conducted on samples taken from near surface and mid-thickness. Samples are etched according to ASTM 407 (etchant 98, KOH or NOH). Etching is performed in such a manner as to provide optimum resolution of potential precipitates. The etched sample is examined and reported at a magnification of 500x minimum and acceptance is that the material is free of grain boundary carbides, sigma, chi and laves phases. Intermetallic phases or precipitates are allowed up to a maximum of 0.005%

Ferrite content: determined by manual point count in accordance with ASTM E562 at locations near the surface and at mid-thickness. Samples are electrolytically etched in either NaOH or KOH and in such a manner as to provide optimum contrast for austenite and ferrite phase discrimination. Point count is conducted at a minimum 500x magnification. A minimum of 30 fields and 16 points are used. Ferrite count value is between 35% to 55% and reported.

Stress Corrosion: material is tested in accordance with ASTM G48 (Method A) (latest version). The test piece will be taken from the same location as those for mechanical testing. Acceptance is that no pitting is to be observed at 20x magnification after exposure for 24 hours at 50 degrees C. Weight loss will not exceed 4.0 g/mm². Method and results are reported.

F55 material meeting the above properties will be cold reduced with the cold work sufficient to achieve Condition S requirements and the impact properties required below.

Impact properties: material is tested in accordance with ASTM A320 (after cold working) at the times and temperatures shown below. Sample test pieces are full size at 10 x 10 mm dia unless the bar diameter necessitates a sub-size specimen to be used: (continued overleaf)

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Variant	Test Temperature	Value required
'FLT+'	-101 degrees C	Minimum single value: 35 Joules Minimum average of 3 tests: 45 Joules
'FLT'	-101 degrees C	Minimum single value: 20 Joules Minimum average of 3 tests: 27 Joules
'FG'	-46 degrees C	Minimum single value: 35 Joules Minimum average of 3 tests: 40 Joules

Handling, Storage & Packing

Material handling discipline is such as to avoid free iron contamination of the F55 material. Material is not handled with base iron or steel hooks, chains or lifting forks without the use of protective insulating material. Only stainless steel brushes, designated and labelled for use of stainless steel products, are used for brushing or descaling. Material stored does not come into contact with bare iron or steel rack arms.

Any suspected free iron contamination, such as unusual stains or discolouration, is verified by ferroxyl testing in accordance with ASTM A380 and any free iron contaminated areas are cleaned and passivated in accordance with ASTM A380.

The use of steel strapping of bundles is not permitted. Nylon, neopane, rubber or polythene are acceptable restraining materials.

Certification:

EN 10204 3.1
certificates
showing: De-
scription of ma-
terial
Steel making process
Chemistry
Heat Treatment times, temperature and, where available, temperature monitoring method
Tensile results
Metal structure in-
cluding photographs
Ferrite content test
method and results
G48 corrosion test
method and results
Impact test results
plus copies of independent test certificates

Cold drawn F55 is just one of a range of nickel alloys stocked by Broder Metals Group Ltd – please see our website for the full range stocked: www.broder-metals-group.com

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