CMC

CRYOSTEEL®

CMC's innovative cryogenic rebar

CryoSteel® is a specially-engineered reinforcing steel that does not compromise performance when designing and building for extremely cold applications. CMC's advanced production process for CryoSteel® yields results that exceed minimum specifications and published temperatures of other cryogenic rebar producers while meeting all specification strength and ductility requirements. This additional safety factor provides peace of mind when designing and building structures exposed to extreme environments and temperatures.

CryoSteel® has been independently lab tested at temperatures down to -274°F (-170°C) to ensure it exceeds all specifications for cryogenic applications. CMC will individually test CryoSteel® to the required design temperature for your project or specific need, allowing you to design and build confidently.

Grades and Specifications

CryoSteel® rebar is produced in imperial units and is available in any specified length from 20 feet, up to 60 feet, in one-inch increments (40 feet maximum for international shipments).

Specifications

EN14620-3 Annex A3 (ACI 376)
ASTM A615 Grade 60*
(60,000 PSI/420 MPa)

* CMC will guarantee the 500 MPa minimum that is commonly specified internationally (at room temperature).

Sizes

Rebar #4	(13mm)
Rebar #5	(16mm)
Rebar #6	(19mm)
Rebar #8	(25mm)
Rebar #9	(29mm)
Rebar #10	(32mm)

BENEFITS

1
Domestically produced means shorter lead times in North America

2
Custom lengths available

3
Lab tested at temperatures down to -274°F (-170°C)

FOR MORE INFORMATION:

website: **cmc.com/cryosteel**
email: **cryosteel@cmc.com**
or contact: **your local CMC sales representative**

CRYOSTEEL®

Testing Criteria

With CryoSteel® you are assured that all specifications are met through rigorous testing with certifications issued for each heat delivered. Testing is performed to ACI 376-11 “Code Requirements for Design & Construction of Concrete Structures for Containment of Refrigerated Liquefied Gases” and BS EN 14620-3:2006 Annex A.3 for reinforcing steel for the “Design and manufacture of site built, vertical, cylindrical, flat-bottomed, steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 deg. C and -170 deg. C. Part 3: Concrete Components.”

Tensile tests are carried out under cold conditions (at the design metal temperature) to establish the suitability of the steel. The design metal temperature is determined from the lowest temperature that the reinforcement bar would be subjected to under abnormal loading conditions. During the test, the specimen temperature is as uniform as possible. The difference between the temperatures at any two points of the specimen or the difference between the temperature at any point and the design temperature does not exceed 5°C.

Tensile tests in accordance with EN 10002-1 are conducted on un-notched and notched bar specimens.

Notch Sensitivity Ratio (NSR) Calculation

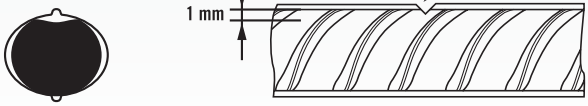
NSR = Tensile strength of notched bar / 0.2% proof stress of un-notched bar

or:

NSR = Tensile strength of notched bar / Lower yield stress of un-notched bar

A NSR value of 1 or greater is required to achieve acceptable toughness.

The test specimen for notched bar tests is notched at the half-length position between the machine grips. A V-notch has an internal angle of 45° and a radius at the base of 0.25 mm. Machining techniques and tolerances are in accordance with EN 10045-1. For longitudinal ribbed bars, the notch is placed across the rib and penetrates 1 mm into the underlying bar.



Plastic Elongation

Each un-notched specimen demonstrates a percentage plastic elongation of at least 3%. The percentage plastic elongation is the permanent percentile increase of the original gauge length corresponding to tensile strength.

Yield Strength

The yield strength of the un-notched specimen found during testing is at least 1.15 times the minimum yield strength used in the design.