

## General Specification

SS 10 R7 – 410 QDT

Material should conform to all requirements of the listed specifications, except as further modified by the more stringent or restrictive requirements listed in this document.

### Heat Treatment:

Bars shall be furnished in the liquid quenched and double tempered condition.

Austenize at 1800F (982C)-1850F (1010C) for 45 min/inch of X-section plus an hour minimum; and oil or polymer quench to below 440F (227C). Report start and finish quench media temperatures. The temperature of quench oil shall not exceed 100F (38C) at start of quench, nor exceed 120F (49C) at completion of quench. Temper at 1250F (676C)-1350F (732C) for 1 hr/inch of X-section plus an hour minimum. Cool in air or faster to below 400F. Second temper at least 50 degrees lower than first temper, but not less than 1200F, for 1 hr/inch of X section, plus an hour minimum.

1. Tensile test per heat lot.
2. If bars and QTC are heat treated separately, advise the times and temps. for both.
3. Furnaces calibrated to Mil-H-6875 or equivalent.
4. Indicate method of temperature monitoring. Contact or furnace thermocouple.
5. Provide furnace charts.

### Non Destructive Testing <<<<

100% Ultrasonic Inspection must be performed after heat treatment and prior to machining operations. The material shall be inspected using **BOTH** of the following methods:

1. Straight Beam Examination method using FBH reference blocks per ASTM A388.
  - a. Flat Bottom Hole (FBH) reference standards shall contain the following reflectors:
 

Section Thickness FBH	
i. Up to 1-1/2" (38mm) – 1/16" (1.6mm)	
ii. Over 1-1/2 through 6" (150mm) – 1/8" (3.2mm)	
iii. Over 6 - 1/4" (6.4mm)	
2. **Angle Beam** Technique per ASTM A388

### Tolerance:

Rough Turned Bar shipped to ENERGY STEEL PRODUCTS should typically have the following diameter tolerance to allow clean-up to size.

3" to 3-1/2"	+.020/+ .047
Over 3-1/2" to 4-1/2"	+.030/+ .063
Over 4-1/2" to 5-1/2"	+.040/+ .078
Over 5-1/2" to 6-1/2"	+.080/+ .125
Over 6-1/2" to 8"	+.090/+ .156
Over 8" to 10"	+.125/+ .188
Over 10" to 12"	+.125/+ .188
Over 12" to 15"	+.188/+ .219
Over 15" to 22"	+.188/+ .250

**Marking:** Waive continuous line marking. Each bundle must be tagged with E.S.P. PO#, bundle#, grade, size, heat#, net weight, and country of origin. For 1" and over stamp heat number on both ends of bar. No center holes on ends of bars.

**Color Code:** Black (both ends of each bar).

**Length:** 16' – 24' R/L

**Packing and Shipping Requirements:**

1. Tagged with Size, Grade, Heat Number and Net weight, Purchase Order Number, piece count and Country of Origin.
2. Maximum one heat per size per bundle.
3. Flat bed trailers only.
4. Material on 4 x 4 runners for quick unloading.
5. 2000 - 2200 LB bundle weights, 1000 - 1200 LB bundle weights also accepted. 10% allowance for other bundle weights maximum 2500 lb. Houston
6. Houston maximum weight allowance for single bars is 17,000 lb
7. Atlanta maximum weight allowance for single bars is 7,000 lb
8. Chicago maximum weight allowance for single bars is 10,000 lb

**Documents:**

2 copies of MTR with shipments and 2 copies with invoice. Packing list to show country of origin, purchase order number, grade, color code, size, heat number, net weight in pounds.

MATERIAL SPECIFICATION - SS10 REV. 7

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PURCHASING MANAGER

\_\_\_\_\_  
DATE

\_\_\_\_\_  
QUALITY ASSURANCE MANAGER

\_\_\_\_\_  
DATE

\_\_\_\_\_  
PRESIDENT/ CEO

\_\_\_\_\_  
DATE