

## AltaSteel HTR50 Grinding Rod Specification

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AltaSteel Inc. is a major supplier of grinding media to the mining industry. AltaSteel Inc. HTR50 grinding rods are produced in Alberta, Canada by AltaSteel. The AltaSteel HTR50 grade is described below; a comparison to a standard “as-rolled” 1090-grade grinding rod is also included.

### HTR50 Grade

HTR50 is a heat treated high-carbon grinding rod produced by AltaSteel using a patented process and composition to achieve consistent hardness properties after heat-treatment.

### Chemistry

AltaSteel HTR50 chemistry ranges are designed to achieve consistent hardenability factors. Having consistent hardenability factors result in uniform hardness properties after heat-treatment. The hardenability factors and heat-treat parameters are designed to produce a hardness profile that has a high surface hardness (for increased wear) with a lower hardness core (for increased toughness). AltaSteel’s HTR50 grinding rod chemistry is as follows:

C	0.60 - 1.00
Mn	0.60 – 1.00
Si	0.10 – 0.40
Cr	0.15 – 0.60
Mo	< 0.20
P	< 0.025
S	< 0.025

### Specification:

1. Minimum surface hardness of 50 R<sub>c</sub>
2. Straightness of ½” over the length of the bar
3. Chemistry requirements
4. Quenching parameters
5. Product Length tolerance per ASTM A29 (imperial units - Reference Table A1.8) . Note: For a bar diameter of 3”, 3.5” and 4” with a length between 5 to 10 feet the permissible variation over specified length in inches will be -0”/+1”. For a bar diameter of 3”, 3.5” and 4” with a length of 10 to 20 feet the permissible variation over specified length in inches will be -0”/+1.5”.
6. Product Size tolerance per ASTM A29 (imperial units – Reference Table A1.1). Bar ends may deviate from the specified size tolerance due to hot shear cut. Note: For a bar diameter of 3” and 3.5” the permissible variation from specified size is -0”/+ 3/64”. For a bar diameter of 4” the permissible variation from specified size is -0”/+1/16”.

### Typical Results

Following production, AltaSteel performs periodic hardness measurements of the HTR50 rods with the following average results:

1. Surface - 54 R<sub>c</sub>
2. ½” below surface - 47 R<sub>c</sub>

3. Core - 39 R<sub>c</sub>
4. Annealed ends – less than 35 R<sub>c</sub>
5. Average volumetric hardness - 45 R<sub>c</sub>
6. Hardness profile – see Comparison section

## Hazard Identification

Heat Treated Grinding Rods often contain shards or “bear-claws” (partially) attached to the annealed ends. These pose a cutting/laceration hazard when painting and handling bundles. Proper personal protective equipment is to be used when working with processed Grinding Rod.

## 1090 Grade

The 1090 grade has the chemical requirements of AISI 1090.

C	0.85 - 0.98
Mn	0.60 - 0.90
P	0.040 max
S	0.050 max
Si	0.15 - 0.35

(Cu, Ni, Cr, and Mo are present in residual amounts only)

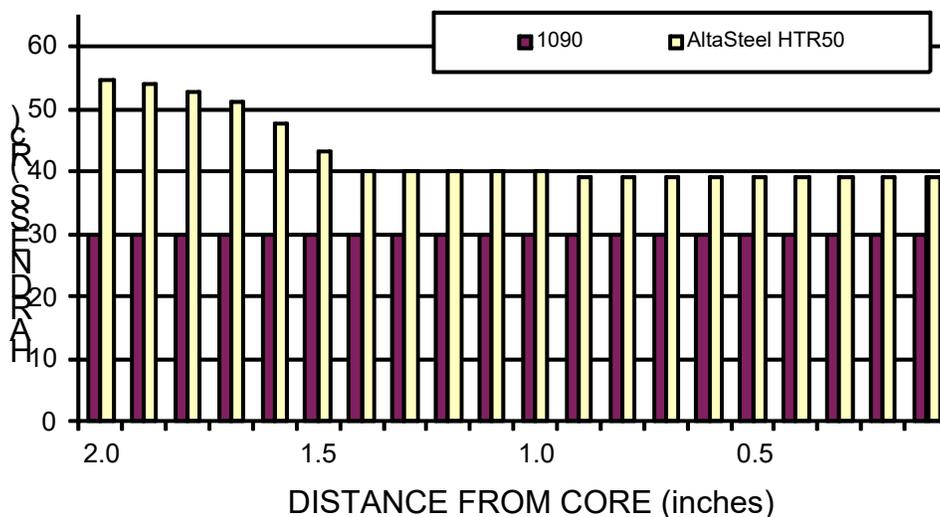
The as-rolled 1090 grade has a typical through hardness of 30 R<sub>c</sub> (see comparison information below).

## Grinding Rod Comparisons

Heat-treated rods contain lower carbon and higher alloy levels than 1090 rods. The heat-treated rods consist of a hard tempered martensite case with a tough bainite/pearlite core.

The higher hardness rods reduce mill consumption significantly. AltaSteel HTR50 mill trials have shown consumption decreases of approximately 20% - 25% over 1090 rods.

## HARDNESS PROFILES



## THEORETICAL WEAR RATE COMPARISON

