

AltaSteel HTR50 Grinding Rod Specification

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_c
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_c
2. ½" below surface - 47 R_c

3. Core - 39 R_c
4. Annealed ends – less than 35 R_c
5. Average volumetric hardness - 45 R_c
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

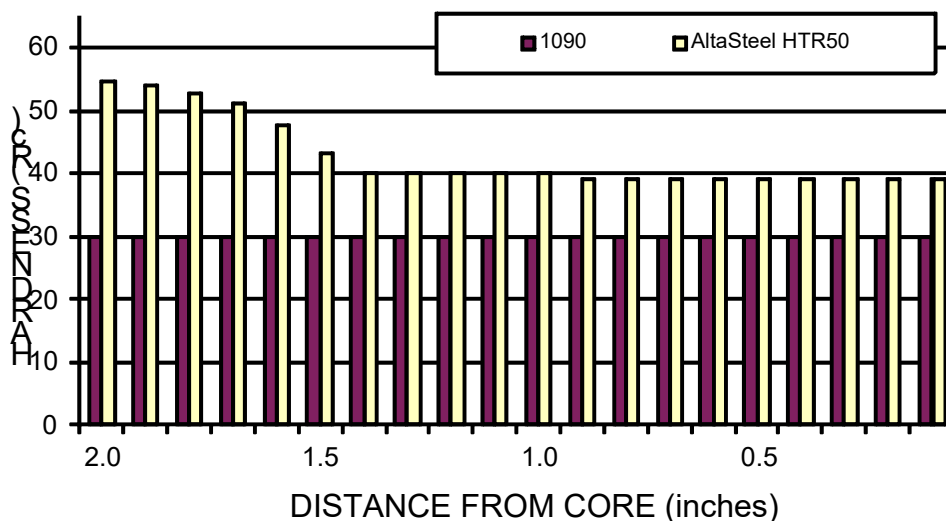
(Cu, Ni, Cr, and Mo are present in residual amounts only)

The as-rolled 1090 grade has a typical through hardness of 30 R_c (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

