



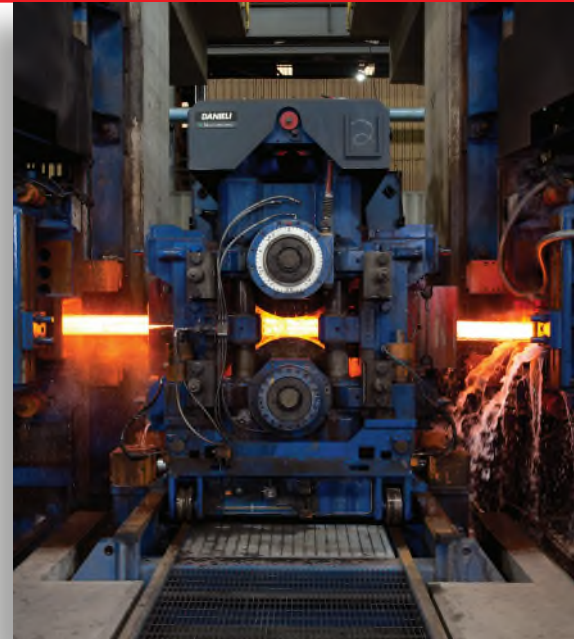
**MADE IN THE
USA**

Gerdau AccuCaliber™ Series of premium gun barrel quality (GBQ) steels are produced to a higher degree of internal and surface quality than

standard steels. To accomplish this, Gerdau uses proprietary practices to ensure sound centers free from segregation, pipe, or porosity and low inclusion content, as well as a surface that is free from laps, seams, cracks, or scabs.

Straightness is a critical characteristic of GBQ material for the purpose of gun drilling. All Gerdau GBQ steel orders are 100% machine straightened, automatic ultrasonically inspected for internal defects and magnaflux leakage inspected for surface defects.

Gerdau's quality and consistency is the industry standard and second to none for the production of handgun, rifle and shotgun barrels, as well as other firearm components. We produce thousands of tons of AccuCaliber™ steel for gun manufacturers each year and look forward to the opportunity to meet your specific requirements. Gerdau steel is produced and tested to exacting military grade requirements.



Gerdau's Unique Steelmaking Process:

- **Melting:** Premium scrap is melted and refined in state-of-the-art electric arc furnaces.
- **Ladle Refining:** All material is ladle refined to produce consistent chemistry, remove non-metallic inclusions and homogenize the molten steel.
- **Vacuum Degassing:** Vacuum degassing results in the removal of inclusive material and detrimental gases for a final "clean steel" product ready for casting.
- **Continuous Casting:** The material is continuously cast using a 240mm X 240mm bloom caster with advanced technology that reduces segregation, and produces a superior consistent structure.
- **Re-Heating and Rolling:** Blooms are re-heated in a walking beam furnace that ensures consistent temperature throughout the entire section. Blooms then pass through a series of reducing rolling stands and finish through precision sizing blocks that result in half ASTM tolerance dimensions.

Available Heat-Treatment Options Include:

- **Normalizing:** Normalizing after hot rolling is recommended to refine grain size and microstructure to optimize subsequent processing. Normalizing produces a consistent and repeatable product ready for finishing operations.
- **Quenching & Tempering:** Gerdau induction hardens and tempers to customer required hardness levels for superior physical properties and residual stress conditions. The Gerdau process produces a "stress free" condition to optimize subsequent operations.
- **Final Stress Relief:** Material is stress relieved for final hardness and physical property requirements. The final stress relief is tailored to each customer's specifications. Residual stress and hardness is analyzed for each batch of material.



AccuCaliber™ Series of Gun Barrel Quality Steels certified to industry and customer specifications

RELEVANT SPECIFICATIONS

- 100% Ultrasonic Inspected
- Mil-B-11595-General Requirments
- ASTM A255- Jominy Hardenability
- ASTM E45- Microcleanliness
- ASTM E18- Hardness
- ASTM E112- Austenitic Grain Size
- ASTM E381- Macrocleanliness
- ASTM A370- Tensile Strength, Yield Strength, and Elongation
- ASTM E23- Charpy Impact
- AMS 2301 (ASTM E1444) - Magnetic Particle Inspection
- Residual Magnetism- less than +/- 10 Gauss



TYPICAL REQUIREMENTS

- Charpy Impact Strength
CrMoV: 40 ft-lbs. minimum at -40°F
4140: 20 ft-lbs. minimum at 70°F
- Hardness Capability Rockwell HRC 23-32
- Macrostructure Per ASTM E381 S2 R2 C2 or Better
- Austenitic Grain Size Per ASTM E1125 or Finer
- Hardenability Per ASTM A225 HRC 52 minimum at 8/16" Location for CrMoV
- 100% Ultrasonic & Magnetic Flux Leakage Tested Per Industry Standard
- Non-Metallic Inclusion Ratings Per ASTM E381 Per Customer Requirements
- Decarburization and Surface Quality Per Customer Specific Requirements
- Magnetic Particle Inspection Per AMS 2301
- Typical Physical Properties Per ASTM A370 Per Customer Specifications for Ultimate Strength, Yield Strength, Elongation
- Minimum Reduction in Area from Cast to Finish Rolled Size Per Customer Requirements met or exceeded by Gerdau

Material is generally supplied in the turned and polished and the quench and tempered condition in the HRC 23-32 range with each customer requiring a specific hardness range and physical properties.

TYPICAL CHEMISTRIES

MIL-B-11595E	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	V	Ca
Chrome-Moly-Vanadium	.41-.49	.60-.90	.040 max	.040 max	.20-.35	.35 max	.20 max	.80-1.15	.30-.40	-	.20-.30	.004 max
ORD 4150	.48-.55	.75-1.00	.040 max	.040 max	.20-.35	.35 max	-	.80-1.10	.15-.25	.040 max	-	-
ORD 4150 Resulfurized	.47-.55	.70-1.00	.040 max	.05-.09	.20-.35	.35 max	-	.80-1.15	.15-.25	-	-	-

ASTM A29/ASTM A108	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al	V	Ca
41V45	.41-.45	.75-.90	.035 max	.025-.040	.20-.35	.35 max	.20 max	.80-1.15	.30-.40	-	.20-.30	.004 max
4140	.35-.44	.65-1.10	.030 max	.020 min	.15-.35	.45 max	.20 max	.75-1.20	.15-.25	-	-	-
1137	.32-.42	.70-1.75	.030 max	.08-.115	.02-.05	.35 max	.30 max	.30 max	.20 max	-	-	-
4130	.28-.33	.40-.60	.030 max	.012-.025	.20-.35	.30 max	.20 max	.80-1.10	.15-.25	-	-	-
1155	.50-.60	1.30-1.65	.035 max	.060-.100	.15-.35	-	-	-	.10-.20	-	-	-