

# SHEFFIELD™ vs. COMMERCIAL GRADE STEELS

Sheffield#10 & Sheffield #20 TG&P	SAE 4000 Series Alloy Grade
<b>ELECTRIC FURNACE MELT</b> smaller furnace greater control of the melt	<b>OPEN HEARTH FURNACE</b> large heats – less refinement – little control
<b>CLEAN STEEL TECHNOLOGY</b> the manufacturing process that eliminates impurities in steel and improves fatigue resistance	<b>NOT REQUIRED</b>
<b>VACUUM DEGASSING</b> removes impurities in the steel to refine the chemistry and builds toughness	<b>NOT REQUIRED</b>
<b>UNIQUE CHEMISTRY</b> low phosphorus, low sulfur, nickel enhanced cleaner fine grain chemistry; improved strength	<b>STANDARD CHEMISTRY</b> commercial practice follows minimum standards
<b>HEAT TREATED</b> thermal process is verified against strict guidelines	<b>HEAT TREATED</b> lacks depth and uniformity of hardness compared to <b>Sheffield Steels</b>
<b>PHYSICAL PROPERTIES</b> typical tensile strength 156,000 PSI typical yield strength 125,000 PSI typical hardness 269/321 BHN	<b>PHYSICAL PROPERTIES</b> typically 20% less strength than <b>Sheffield Steels</b> more susceptible to fatigue failure
<b>MACHINE STRAIGHTENED</b> one half of the industry standard; 1/8" in any 5 feet	<b>MACHINED STRAIGHTENED</b> 1/4" in any 5 feet
<b>STRESS RELIEVED</b> thermal treatment process to reduce the chances of "walking" or movement during machining	<b>NOT REQUIRED</b>
<b>FATIGUE RESISTANCE</b> excellent toughness toughness resists fatigue failure	<b>FATIGUE RESISTANCE</b> lower degree of toughness – subject to fatigue failure, the number one cause of shaft failure in heavy industry
<b>MACHINABILITY</b> fine uniform grain promotes ease of machining	<b>MACHINABILITY</b> not consistent; hard and soft spots
<b>MECHANICAL TESTING</b> tensile, yield, elongation, reduction of area, and jominy are checked every 10,000 lbs, resulting in better control over physicals	<b>MECHANICAL TESTING</b> commercially done at 50,000 lb increments less control of physical properties
<b>MAXIMUM VALUE &amp; RELIABILITY</b> <b>Sheffield Steels</b> offer optimum performance, high quality, and improved service life for tough maintenance applications.	<b>MINIMUM VALUE</b> SAE establishes safe <u>minimum</u> standards, not intended to provide optimum performance.