P R O D U C T D A T A B U L L E T I N

441 STAINLESS STEEL

(UNS S44100) **PRELIMINARY BULLETIN**

AK Steel

- Equiaxed Microstructure
- Good High-Temperature Strength
- Good High-Temperature Oxidation Resistance

Applications Potential

AK Steel 441 should be useful for applications not requiring the high-temperature strength of AK Steel 18 Cr-Cb Stainless Steel, yet still requiring strength at temperature improvements over Types 409 and 439 (See Figures 1 and 2). In addition, room-temperature formability is enhanced through a refined, equiaxed grain structure (ASTM 7-8).

Table of Contents

PRODUCT DESCRIPTION

AK Steel 441 is a 17-18% by weight, chromium and columbium bearing ferritic stainless steel which provides good high-temperature strength (exceeding that of Types 409 and AK Steel 439 LT Stainless Steels) plus good corrosion resistance in many exhaust gas environments (equivalent to AK Steel 439 LT and 18 Cr-Cb Stainless Steels). Due to its finer, equiaxed grain structure, this alloy offers improved formability over standard AK Steel 18 Cr-Cb Stainless Steel.

The information in this preliminary data bulletin represents data taken from initial trial material. While not guaranteed, it is believed that the data presented will typify the final product.

Available Forms

AK Steel produces 441 Stainless Steel coils and cut lengths in thicknesses 0.018" to 0.100" (0.46 mm to 2.54 mm) and in widths up to and including 48" (1219 mm).

Composition

	1.4509 DIN (441) Specification* %	Typical AK Steel 441 %
Carbon	0.03 max	0.012
Manganese	1.00 max	0.30
Phosphorus	0.04 max	0.023
Sulfur	0.015 max	0.001
Silicon	1.00 max	0.35
Chromium	17.5-18.5	18.0
Columbium	9xC+0.3 to 1.00	0.45
Titanium	0.1-0.6	0.17

*Believed to be accurate DIN specifications for 1.4509.

Metric Practice

The values shown in this bulletin were established in U. S. customary units. The metric equivalents of U. S. customary units shown may be approximate. Conversion to the metric system, known as the International System of Units (SI) has been accomplished in accordance with ASTM E380.

The newton (N) has been adopted by the SI as the metric standard unit of force. The term for force per unit of area (stress) is the newton per square meter (N/m^2). Since this can be a large number, the prefix mega is used to indicate 1,000,000 units and the term meganewton per square meter (MN/m^2) is used. The unit (N/m^2) has been designated a pascal (Pa). The relationship between the U. S. and the SI units for stress is 1000 pounds/in^2 (psi) = 1 kip/in^2 (ksi) = 6.8948 meganewtons/m^2 (MN/m^2) = 6.8949 megapascals (MPa). Other units are discussed in ASTM E380.

Mechanical Properties

Table 1

Mechanical Properties
Annealed Condition

	AK Steel 18 Cr-Cb	DIN 1.4509 (441) Specification*	Typical AK Steel 441
UTS, ksi (MPa)	62 (427) min.	65-80 (448-552)	70.9 (489)
0.2% YS, ksi (MPa)	38 (262) min.	41-51 (283-352)	47.3 (326)
Elong., % in 2" (50.8 mm)	28 min.	26 min.	35.9
Hardness, Rockwell	B88 max.	N/A	B80
r_m	1.25 (typical)	N/A	1.31
n-value	0.18 (typical)	N/A	0.207

*Believed to be accurate DIN specifications for 1.4509.

Figure 1

Typical Yield Stress versus Temperature

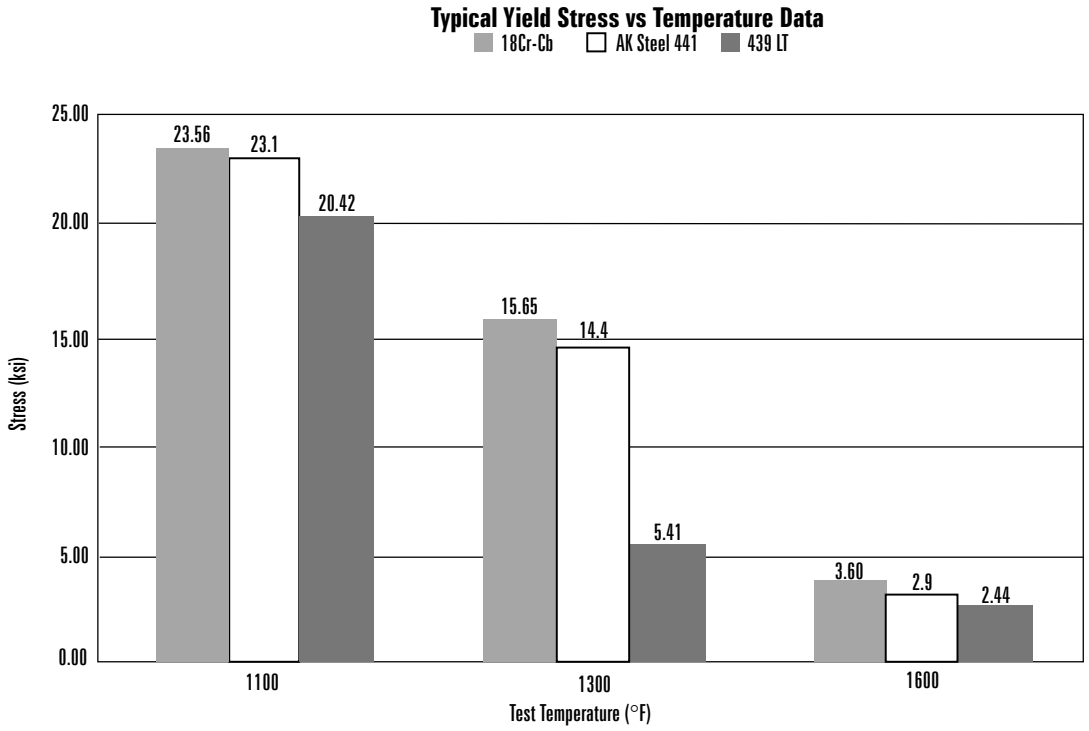

Figure 2
Typical Ultimate Tensile Strength versus Temperature

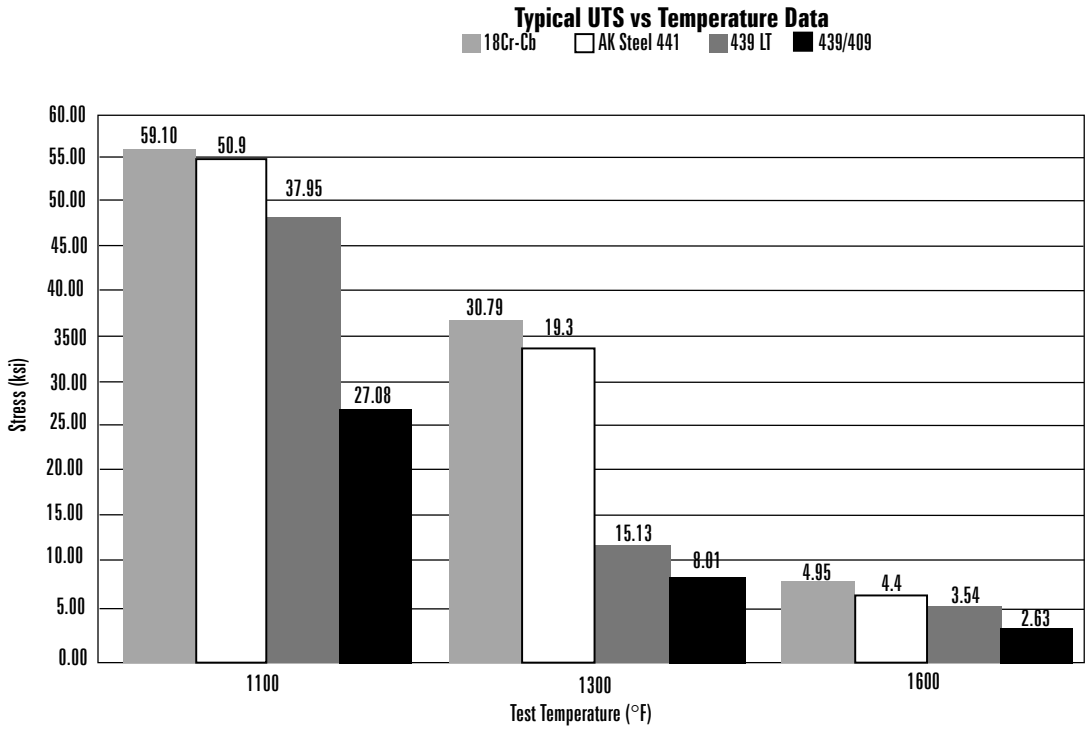

Table 2
Elevated Temperature Stress Rupture

Alloy	Stress to rupture in 100 hours at 1300 °F (°C), ksi (MPa)
Type 409	4.1 (28.3)
Type 439	4.0 (27.6)
AK Steel 441	5.0 (34.5)
AK Steel 18 Cr-Cb	5.8 (49.9)

AK STEEL 441 STAINLESS STEEL

Corrosion Resistance

AK Steel 441 Stainless Steel has proven to be equivalent to AK Steel 18 Cr-Cb in corrosion resistance in continuous corrosion tests conducted to date. Further corrosion testing is underway. Being a 17% chromium alloy, AK Steel 441 Stainless Steel shows improved corrosion and oxidation resistance when compared to standard Type 409 grades (11% chromium) stainless steels.

Cyclic Oxidation Resistance

AK Steel 441 Stainless Steel should possess similar (or slightly reduced) cyclic oxidation resistance compared to AK Steel 18 Cr-Cb Stainless Steel, but improved compared to Types 409, 439 and 439 LT stainless steels.

Weldability

AK Steel 441 Stainless Steel can be welded using current methods for ferritic stainless steels. These include Gas Tungsten-Arc (GTAW), Electrical Resistance, Electron Beam and Gas Metal-Arc methods. While not confirmed, it is believed that High Frequency welding techniques may also be employed.

AK Steel

Customer Service 800-331-5050

AK Steel Corporation
9227 Centre Pointe Drive
West Chester, OH 45069

www.aksteel.com

Stainless Steel — The Value Option

7180-0079 PDF 7/07