

CRUCIBLE

DATA SHEET

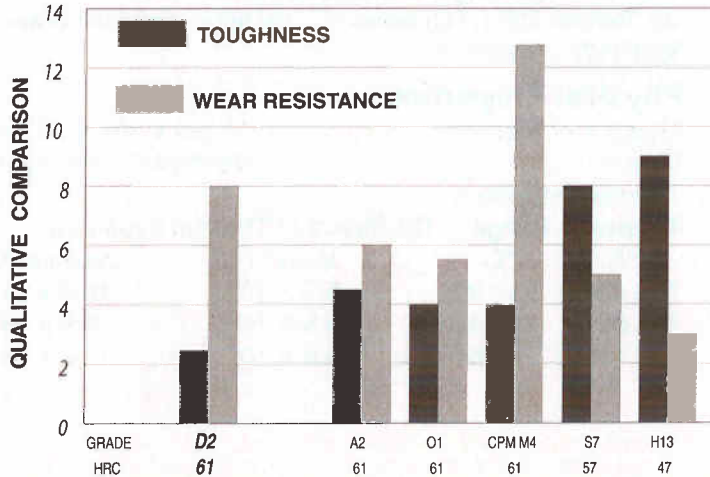
AIRDI 150 is a high carbon, high chromium heat treatable tool steel intended for applications requiring high wear resistance.

We use this material for corrosive & abrasive materials.

AIRDI[®] 150 (AISI D2)

Issue #11

TOOL STEEL COMPARAGRAPH



Typical Chemistry

Carbon	1.55%
Manganese	0.35%
Silicon	0.45%
Chromium	11.50%
Molybdenum	0.90%
Vanadium	0.80%



Typical Applications

- Blanking Dies & Punches
- Draw Dies
- Forming Rolls & Dies
- Injection Screw Components
- Thread Roll Dies
- Trim Dies
- Mold Inserts
- Gages

Note: These are some *typical* applications. Your *specific* application should not be undertaken without independent study and evaluation for suitability.

Hardening

Preheat: 1100/1200F (595/650C), equalize, 1400/1450F (769/790C), equalize.

High Heat: 1825/1875F (995/1025C), hold 30/45 minutes at temperature

Quench: Air or positive pressure vacuum. Cool to 150F(65C).

Temper: 400/1000F (205/540C), hold one hour per inch of thickness (two hours minimum) air cool to room temperature. Temper twice.

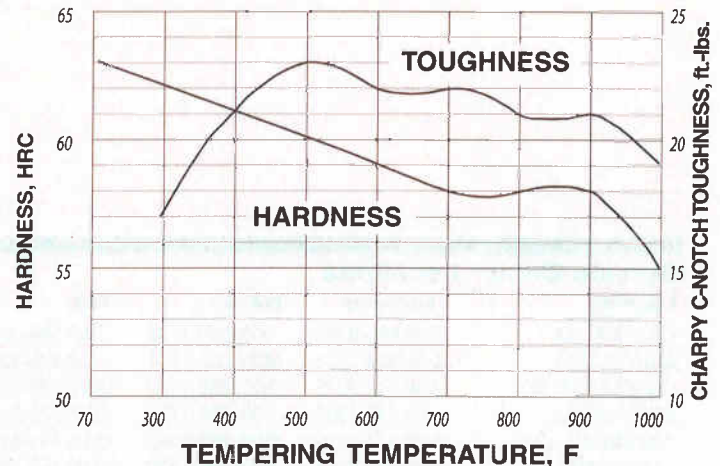
Cryogenic Treating: Refrigeration treatments may improve long term dimensional stability by transformation of retained austenite. Refrigeration treatments should generally be performed after the first temper, and must be followed by a temper.

Hardness and Impact Toughness Data

Air cooled from 1850F (1010C)

Tempering Temperature °F	Hardness HRC	Toughness, Charpy C-notch	
		Ft-lbs	Joules
As quenched	63		
300	150	17	23
400	205	21	29
500	260	23	31
600	315	22	30
700	379	22	30
800	425	21	29
900	480	21	29
1000	540	19	26

Typical Heat Treated Properties



Size Change During Hardening

Hardening Temp. °F	Hardening Temp. °C	Tempering Temp. °F	Tempering Temp. °C	HRC	Longitudinal Size Change %
1850	1010	400	205	61	+0.025
1850	1010	600	315	59	-.010
1850	1010	800	425	58	-.017

Note: Properties shown throughout this data sheet are typical values. Normal variations in chemistry, size and conditions of heat treatment may cause deviations from these values. For additional data or metallurgical engineering assistance consult your local Crucible Service Center.

Surface Treatments

AIRDI 150 can be given standard surface treatments such as nitriding, titanium-nitride coating, or hard chrome plating if desired. When nitriding, harden from the high side of the temperature range and single temper at 1000F (540C) then use standard nitriding procedures.

Annealing

A. Heat to 1600F (870C), hold 2 hours, cool slowly (25F (15C)/hr maximum) to 1000F (540C), then air cool.

Or

B. Heat to 1600F (870C), hold 2 hours, cool to 1425F (775C), hold 6 hours, air cool.

Typical annealed hardness: 221/225 BHN

Stress Relieving

Annealed Material: Heat to 1200/1250F (650/675C), hold 2 hours, cool in still air.

Hardened Material: Heat to 25/50F (15/30C) below tempering temperature, hold 2 hours, cool in still air.

Welding

Use air hardening tool steel filler material

Annealed Material: Preheat 700/900F (370/485C), maintain over 700F (370C) during welding. Reanneal or temper 1425F (775C) 6 hours after welding.

Hardened Material: Preheat 25/50F (15/30C) below tempering temperature 350F (175C) minimum). Maintain above 350F (175C) during welding. Cool to 150F (65C) after welding. Temper 25F (15C) below original tempering temperature 350F (175C) minimum).

Physical Properties

Modulus of Elasticity..... 30 psi x 10⁶ (207GPA)

Density..... 0.278 lbs/in³ (7695 kg/m³)

Thermal Expansion

Temperature Range		Coefficient of Thermal Expansion	
°F	°C	in./in./°F	mm/mm/°C
70 - 400	21 - 205	5.7 X 10 ⁻⁶	10.3 x 16 ⁻⁶
70 - 800	21 - 425	6.6 X 10 ⁻⁶	11.9 x 16 ⁻⁶
70 - 1000	21 - 540	6.8 X 10 ⁻⁶	12.2 x 16 ⁻⁶

Service Center Locations

Location	Telephone	WATS	FAX	Location	Telephone	WATS	FAX
ATLANTA, GA	(770) 969-9325	(800) 365-1158	(770) 969-7910	KENILWORTH, NJ	(908) 964-0440	(800) 365-1116	(908) 964-8155
AUBURN, MA	(508) 832-5353	(800) 365-1101	(508) 832-2217	LOS ANGELES, CA	(310) 522-9187	(800) 365-1179	(310) 830-9784
CHARLOTTE, NC	(704) 372-3073	(800) 365-1160	(704) 342-0985	MEADVILLE, PA	(814) 337-8804	(800) 365-0530	(814) 337-8808
CHICAGO, IL	(312) 772-0300	(800) 365-1151	(312) 772-2010	MILWAUKEE, WI	(414) 781-6710	(800) 242-0948	(414) 781-6743
CINCINNATI, OH	(513) 771-1310	(800) 365-1163	(513) 771-0119	MINNEAPOLIS, MN	(612) 331-6320	(800) 365-1153	(612) 331-4137
CLEVELAND, OH	(216) 562-3131	(800) 365-1132	(216) 562-7818	MONTERREY, MEX.	(8) 336 90 03		(8) 336 26 68
COLUMBUS, OH	(614) 771-1333	(800) 365-1131	(614) 771-7918	MONTREAL, QUE	(514) 365-4060	(800) 363-8756	(514) 365-9350
DALLAS, TX	(817) 640-7777	(800) 365-1168	(817) 633-8142	NASHVILLE, TN	(615) 361-6699	(800) 365-1162	(615) 360-3742
DAVENPORT, IA	(319) 386-1060	(800) 365-1152	(319) 386-0515	PHILADELPHIA, PA	(610) 834-9240	(800) 396-0218	(610) 834-9245
DETROIT, MI	(810) 528-0332	(800) 365-1133	(810) 528-1977	ROCHESTER, NY	(716) 254-4320	(800) 365-1128	(716) 254-4616
GRAND RAPIDS, MI	(616) 554-9699	(800) 365-1137	(616) 554-9328	TORONTO, ONT	(905) 793-1600	(800) 263-2367	(905) 793-1660
HUNTSVILLE, AL	(205) 772-0201	(800) 365-1161	(205) 772-3361	VANCOUVER, BC	(604) 525-0544		(604) 520-3596
INDIANAPOLIS, IN	(317) 638-4501	(800) 365-1146	(317) 634-7375	WALLACEBURG, ONT.	(519) 627-2245	(800) 365-5293	(519) 627-2247
JACKSONVILLE, FL	(904) 262-8447	(800) 365-1159	(904) 262-3995	DIVISION OFFICES	(315) 487-0800	(800) 365-1185	(315) 487-4028

Crucible Service Centers
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Quality on Time