

Drill Rod

HEAT TREATMENT DATA

AISI SAE **O-1 Keystone Ground and Polished Drill Rod**

KEYSTONE DRILL ROD is an electric furnace melt oil-hardening tool steel supplied with a fully-spheroidized structure. A non-shrinking general-purpose tool steel, it has excellent abrasion resistance, toughness, and machinability characteristics.

ANALYSIS C .85-1.00, Mn 1.00-1.40, Si .50 Max, Cr .40-.60, W .40-.60, V .30 Max.

HEAT TREATMENT Sections smaller than 1/4" heat to 1450°-1475°F and hold until heated through. For larger sections, preheat to 1200°F, the raise to 1450°-1500°F to hardening temperature, hold one-half hour per inch of cross section. Quench in oil at 125°-150°F and TEMPER IMMEDIATELY.

Tempering Data	
Temper ° F	Rockwell C Hardness
As Quenched	63-65
300	63-65
400	61-64
500	60-63
600	57-60
800	48-51
1000	44-48

AISI SAE **A-2 Air True Ground and Polished Drill Rod**

AIR TRUE DRILL ROD is made from fine grain, electric furnace air-hardening, 5% chrome tool steel. It is a superior quality steel which has excellent wear and abrasion resistance properties. Air True is furnished with a fully-spheroidized structure and is free of decarb and other surface imperfections.

ANALYSIS C .95-1.25, Mn 1.00 Max, Cr 4.75-5.50, Mo .901-1.40, V .15-.50

HEAT TREATMENT Preheat thoroughly at 1450°F, then raise to hardening temperature 1725°-1800°F and soak uniformly. For larger sections, use high side; for thin or smaller sections, use low side. Quench in still air or dry air blast at 125°-175°F, them TEMPER IMMEDIATELY.

Tempering Data	
Temper ° F	Rockwell C Hardness
As hardened	62-65
300	61-64
400	59-62
500	58-61
600	57-60
800	56-59
900	55-58
1000	56-59

AISI SAE **W-1 Ajax Ground and Polished Drill Rod
Tru-Cor Cold Drawn Flat & Square Drill Rod**

AJAX WATER HARDENING is the most popular, versatile, and least expensive grade of drill rod. The through-hardening quality of Ajax affords optimum response in service. Its high carbon content allows it to be used often without heat treatment for maintenance applications. It is a fine grained electric furnace melted commercial grade tool steel which is supplied in the fully-spheroidized decarb free condition.

ANALYSIS C .90-1.05, Mn .30-.50, Si .10-.25

HEAT TREATMENT Heat thoroughly at 1425°-1500°F. Hold one-half hour per inch of section, quench in water (brine). Sizes below 9/32-inch round may be quenched in oil.

Tempering Data	
Temper ° F	Rockwell C Hardness
As hardened	66-68
300	64-65
400	62-64
500	58-59
600	54-56
700	50-51
800	46-47

AISI SAE **S-7 Hi Shock Ground and Polished Drill Rod**

HI SHOCK DRILL ROD is an excellent shock steel that can be and is often used in hot work applications where the tool temperature does not exceed 1000°F. Hi Shock combines the qualities of high strength and good ductility for cold and medium hot work applications.

ANALYSIS C .45-.55, Mn .20-.80, Si .20-1.00, Cr 3.0-3.5, V .20-.30, Mo 1.30-1.8

HEAT TREATMENT Preheat thoroughly at 1200°-1300°F and raise to hardening temperature of 1725°F. Hold for one hour and quench in still air. Upon reaching 150°F, steel should be tempered without delay.

Tempering Data	
Temper ° F	Rockwell C Hardness
As hardened	59-61
400	56-58
500	54-56
600	53-55
700	52-54
800	52-54
900	51-53
1000	50-52
1100	46-48
1200	40-42
1300	33-35

AISI SAE **D-2 High-Chrome Ground and Polished Drill Rod**

HIGH-CHROME DRILL ROD is fine quality, air hardening, electric furnace melt tool steel. The combination of superior abrasion resistance and toughness found in D-2 results from its high carbon and high chromium analysis. High-Chrome is an extraordinary tool steel that can be specified for the most demanding application. It is, of course, supplied in the full spheroidized condition, free of decarb and other surface imperfections. High-Chrome's low sulphur content makes it non-freemachining.

ANALYSIS C 1.40-1.60, Mn .60 Max, Si .60 Max, Cr 11.00-13.00, V 1.10 Max, Mo .70-1.20, Co 1.00 Max

HEAT TREATMENT Preheat thoroughly to 1450°-1500°F, then raise temperature to 1800°-1850°F and hold until uniformly heated through. Soak at temperature 45-60 minutes per inch of thickness. To minimize surface decarburization use salt bath, controlled atmosphere furnace or pack harden. Use high side of hardness for thicker sections.

Tempering Data	
Temper ° F	Rockwell C Hardness
As hardened	62-65
400	60-60
500	59-62
600	58-60
700	57-59
800	57-59
900	58-60

Specifications

Fine Standard Tolerances



Dimensional accuracy is very closely controlled within narrow limits.
PK Drill Rod is guaranteed to the limits shown below.

	DIMENSIONAL TOLERANCES		
	Standard Tolerance*	Concentricity Max T.I.R	Standard Tolerance (Length)
Round Drill Rod 2.000" to 1.500" dia. 1.5" to .125" dia. .124" and smaller dia.	+/- .00075" +/- .0005" +/- .0003"	.005"	+1/8"-0 +1/8"-0 +1/8"-0
Flat & Square Drill Rod 1.000" thru .750" (largest dim.) .749" thru .250" (largest dim.) .249" and smaller	+/- .0015" +/- .001" +/- .0005"		+1/8"-0 +1/8"-0 +1/8"-0

*Closer tolerances than standard can be produced upon inquiry.

Closely-controlled Chemical Compositions

Uniform machining properties and consistent response to heat treatment are obtained through careful control of chemical analysis. Identification of each production lot is carefully maintained, and certified chemical analysis can be supplied upon request.

PK Drill Rod also meets the following specifications:

A.I.S.I	S.A.E.	A.S.T.M.	FEDERAL
W-1	J-437	A-686-92	QQ-T-580 Rev. C.
O-1	J-437	A-681-92	QQ-T-570 Rev. C.
A-2	J-437	A-681-92	QQ-T-570 Rev. C.
S-7	J-437	A-691-92	QQ-T-570 Rev. C.
D-2	J-437	A-681-92	QQ-T-570 Rev. C.

CHEMICAL COMPOSITIONS %											
PK DRILL ROD	UNS* DESIGNATION	AISI SAE TYPE	Carbon	Manganese	Silicon	Phosphorus	Sulfur	Chromium	Vanadium	Tungsten	Molybdenum
AJAX	T72301	W-1	0.90/1.05	0.30/0.50	0.10/0.25	0.040	0.050	0.15 Max	0.10 Max	0.15 Max	0.10 Max
KEYSTONE	T35501	O-1	0.85/1.00	1.00/1.40	0.50 Max	0.030	0.030	0.40/0.70	0.30 Max	0.40/0.60	—
AIR TRUE	T30102	A-2	0.95/1.05	1.00 Max	0.50 Max	0.030	0.030	4.75/5.50	0.15/0.50	—	0.90/1.40
HI SHOCK	T41907	S-7	0.45/0.55	0.20/0.80	0.20/1.00	0.030	0.030	3.00/3.50	0.20/0.30	—	1.30/1.80
TRU-COR	T72301	W-1	0.90/1.050	0.30/0.50	0.10/0.25	0.040	0.050	0.15 Max	0.10 Max	0.15 Max	0.10 Max
HIGH-CHROME	T30402	D-2	1.40/1.60	0.60 Max	0.60 Max	0.030	0.030	11.00/13.00	1.10 Max	—	0.70/1.20

*New designation in accordance with ASTM E 527 and SAE J 1086. Recommended for numbering metals and alloys (UNS).

Specifications



Exceptional Surface Finish and Surface Quality

The very high polish on P-K Drill Rod allows it to be utilized without the need for further expensive grinding or polishing. Because P=K Ground and Polished Drill Rod is guaranteed to be 100% free of decarburization, seams, laps, pits, and other surface imperfections, heat treatment can confidently be undertaken without further metal removal.

Size	Surface Finish	Surface Quality – (max. allowable depth of defect)
2.000" to .875" dia.	30 RMS Max	.000
.875" to .500" dia.	20 RMS Max	.000
.500" to .125" dia.	15 RMS Max	.000
.125" and smaller	10 RMS Max	.000
Cold Drawn Squares and Flats	50 RMS Max	.008/side

Absolute Control of Microstructure and Physical Properties

P-K's modern annealing furnace and instrumentation produces finely-controlled microstructures that are consistent lot-to-lot. P-K Drill Rod has guaranteed 90% minimum spheroidization. This, coupled with closely controlled processes, assures uniform machining and response to heat treatment.

Size	Hardness (max)		Machinability
	BHN	RB	
to .125" dia	341	110	W-1 = 100
.125" to .250"	275	104	O-1 = 90
.250" to .876"	241	101	A-2 = 65
.876" and larger	207	96	S-7 = 95 D-2 = 50

Color Codes

To prevent any chance of distributors mixing grade, P-K will color code the ends of the Drill Rod bars or the boxes in any color code designated by our distributors. If the distributor wishes, the P-K standard color codes shown to the right will be used.

P-K Standard Color Codes		
Grade		Color
AJAX	W-1	Red
KEYSTONE	O-1	Yellow
AIR TRUE	A-2	Blue
HI SHOCK	S-7	Black
TRU-COR	W-1	Red
HIGH-CHROME	D-2	White

Saw-cut and Chamfered Ends

All ends of P-K Ground and Polished Drill Rod 3 foot bars in 1/2" through 2.0" diameter are saw-cut and chamfered. This protects other lengths from scratching, facilitates set-ups, and ensures safety in handling. Smaller diameters are accurately and precisely cut on automatic die-cutters that provide a precise clean end cut.