

# AIRTRUE A-2

## Air Hardening Tool Steel

Precision Marshall's AIRTRUE is an air hardening tool steel which provides a good combination of wear resistance, toughness, ease of heat treatment and minimum distortion. Special melting and refining practices are utilized to produce a uniform product with high cleanliness and minimum segregation. The material is tested to rigorous tool steel standards to ensure uniformity of structure and freedom from defects. Meets ASTM A-681.

## Typical Analysis

Carbon	1.00	Chromium	5.00
Manganese	.60	Vanadium	.35
Phosphorus	.03 max	Molybdenum	1.10
Sulfur	.03 max	Silicon	.30

## Applications

AIRTRUE is suitable for use in cold work tooling applications requiring a combination of wear resistance and toughness such as thread roll dies, punches, blanking dies, shears and forming dies. The grade is also used for plastic molds requiring high wear resistance.

## Annealing

Heat slowly and uniformly to 1550/1600°F and hold two hours. Cool slowly (50°F per hour max.) to 1400°F, hold six hours and air cool. Hardness 248 BHN maximum.

## Heat Treating

AIRTRUE is subject to decarburization during heat treatment, so a protective atmosphere furnace or vacuum furnace should be used.

After preheating to 1500°F for one half to one hour, heat to 1750/1800°F and soak one half hour when material is up to temperature. Air cool to hand warm (approximately 150°F) and temper immediately.

## Tempering

Double temper one hour per inch of section thickness to desired hardness, two hours minimum per temper. Representative hardness levels after tempering are tabulated below.

Air cooled from 1750°F • Tempered 4 hours  
(Section Size — 4" x 4")

Tempering Temperature (°F)	Rockwell Hardness (RC)
400	60/62
500	59/61
600	58/60
700	57/59
800	56/58
900	56/58
1000	54/56
1100	48/50



*The Deluxe Company*

Note: Variations in section size, heating rate, soak time, quench rate and tempering will cause deviations from the above values. Precision Marshall should be consulted for specific applications.

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## EDM

Electro-discharge machining is used in the production of various tooling. This process produces recast, rehardened and retempered layers on the EDM surface. It is recommended that AIRTRUE be stress relieved at 50°F below the final tool tempering temperature, after the EDM process, to temper the rehardened layer produced by EDM.

## Condition

AIRTRUE A-2 is provided completely decarb free and stress relieved.

## Additional Products

### Deluxe Plates

MARSHALLOY MQ®/FM  
MARSHALLOY™ STD 4142  
PRESCO O-1  
DIECRAT A-6  
SUPER 7 MQ® S-7  
ARISTOCRAT D-2  
FIRECHROME H-13  
TRM-2 M-2  
RUETOM SPECIAL 420 ESR

### Ground Flat Stock

PRESCO O-1  
AIRTRUE A-2  
SUPER 7 S-7  
NUTEC 42® 4142  
ARISTOCRAT D-2  
MARSHALLCRAT® LC

### Drill Rod

WATERCRAT W-1  
OILCRAT O-1  
AIRTRUE A-2  
SUPER 7 S-7  
ARISTOCRAT D-2  
TRM-2 M-2  
WATERCRAT W-1 Cold-drawn

### *The Deluxe Company's Guarantee of Quality*

Precision Marshall's conformance to specifications is the highest in the industry. Precision Marshall assumes complete liability for any costs directly relating to a deviation from our published specifications. Any such costs, properly documented, will be reimbursed.

## Chemical Compositions (%) (Typical)

Grade	A.I.S.I.	Carbon	Manganese	Silicon	Phosphorus (max)	Sulfur (max)	Chromium	Vandium	Tungsten	Molybdenum
<b>PRESCO</b>	O-1	.90/1.00	1.00/1.15	.20/.35	.020	.020	.40/.60	.08/.15	.45/.60	-
<b>AIR-TRUE</b>	A-2	.90/1.05	.40/.60	.20/.35	.025	.005	4.90/5.30	.15/.20	-	.90/1.10
<b>SUPER-7</b>	S-7	.48/.53	.50/.70	.20/.40	.025	.003	3.10/3.40	.20/.30	-	1.30/1.60
<b>NUTEC 42</b>	4142	.38/.46	.70/1.00	.15/.30	.035	.040	.80/1.15	.030 Max	-	.15/.25
<b>ARISTOCRAT</b>	D-2	1.50/1.60	.20/.40	.20/.60	.030	.020	11.25/12.00	.80/1.00	-	.70/.80
<b>MARSHALLCRAT</b>	C-1018	.15/.25	.60/.90	-	.040	.050	-	-	-	-
<b>PREMAR 440C</b>	440C	1.05	.40	.40	-	-	17.00	-	-	.40
<b>PREMAR 410</b>	410	.13	.05	.40	-	-	12.00	-	-	-
<b>RUETOM SPECIAL 420 SS</b>	420	.46	.40	.40	-	-	13.00	.30	-	-
<b>FIRECHROME</b>	H-13	.40	.40	1.00	.030	.030	5.00	1.00	-	1.20
<b>WATERCRAT</b>	W-1	.95/1.05	.30/.40	.10/.25	.025	.025	.15 Max	.10 Max	.15 Max	.10 Max

\*C-1018 modified for sizes below 5/32". W-1 is cold drawn, not ground.

## Specifications and Physical Properties

Grade	A.I.S.I.	UNS				-----Hardness-----		Machinability
		Designation	S.A.E.	A.S.T.M.	Federal	Brinell	Rockwell	
<b>PRESCO</b>	O-1	T31501	J-437	A-681-07	QQT-570 Rev. C.	177-212	Rb88-95	95
<b>AIR-TRUE</b>	A-2	T30102	J-437	A-681-07	QQT-570 Rev. C.	200-235	Rb93-99	65
<b>SUPER-7</b>	S-7	T41907	J-437	A-681-07	QQT-570 Rev. C.	188-223	Rb90-97	95
<b>NUTEC 42</b>	4142	G41420	-	A-322	-	261-321	Rc26-34	85
<b>ARISTOCRAT</b>	D-2	T30402	J-437	A-681-07	QQT-570 Rev. C.	220-255	Rb97-102	50
<b>MARSHALLCRAT</b>	C-1018	-	-	-	635	168 Max	Rb85 Max	78
<b>PREMAR 440C</b>	440C	-	-	-	-	229-269	Rc21-28	45
<b>PREMAR 410</b>	410	-	-	-	-	217	Rb96	54
<b>RUETOM SPECIAL 420 SS</b>	420	-	-	-	-	255	Rc25	45
<b>FIRECHROME</b>	H-13	-	-	A-681-07	-	230	Rb98	75
<b>WATERCRAT</b>	W-1	T72301	J-437	A-686-79	QQT-580 Rev. C.	200	Rb93	100

\*C-1018 modified.

\*Compared to 1.0% Carbon Tool Steel.

## Tolerances

Thickness.....+/- .001"  
 Thickness (Oversize).....+ .010/.015"  
 Thickness (Metric).....+ .05mm/- .00  
 Thickness 72" Nutec 4142.....+/- .002  
 Width.....+ .000/.005  
 Width (Oversize).....+ .010/.015"  
 Width (Metric).....+ .2mm/- .0  
 Squares (Regular).....+/- .001"  
 Squares (Oversize).....+ .010/.015"

\*Widths of more than 50mm are Blanchard ground.

Length 18".....+ .125/.250"  
 Length 24".....+ .1875/.375"  
 Length 24" Stainless.....+ .500/- .000  
 Length 36".....+ .250/.500"  
 Length 72" Nutec-42.....+ 1.000/- .000  
 Length (Metric).....+ 5mm/+ 8mm  
 Squareness Edge......003" per inch  
 Squareness End......004" per inch  
 (Regular and Oversize)

Please Order From:

Clark & Osborne, LLP  
 Industrial Distributor  
 6617 Ferguson Avenue  
 Indianapolis, IN 46240

(317) 255-5668 Phone  
 (317) 253-4486 Fax

sales@clarkandosborne.com  
 www.clarkandosborne.com

Size	Cold Drawn W-1	
	Standard Tolerance* (section)	Standard Tolerance (length)
1.000" through 0.750" (largest dim.)	±.0015"	+1/8", -.0"
0.749" through 0.250" (largest dim.)	±.001"	+1/8", -.0"
0.249" and smaller	±.0005"	+1/8", -.0"

\*Closer tolerances than standard can be produced by request.