

BLACKMAGIC TAP SERIES



***sutton*tools**

BLACKMAGIC TAP SERIES

Tapping into Sutton Tools' expertise

Sutton Tools' Black Magic Tap range enables component manufacturers to achieve high levels of productivity while minimising tap inventory.

Sutton Tools' Black Magic Taps are multipurpose, suitable for tapping of stainless steels, alloy steels, general steels, low-alloy steels, as well as copper and aluminium alloys, across a broad spectrum of industrial applications from small-scale jobbing shops through to high-volume component production. Testing indicates that these taps perform well in real-life applications. They tolerate higher tapping speeds in synchronised CNC machines compared with conventional taps, to deliver improved surface finish, increased production and longer tool life.

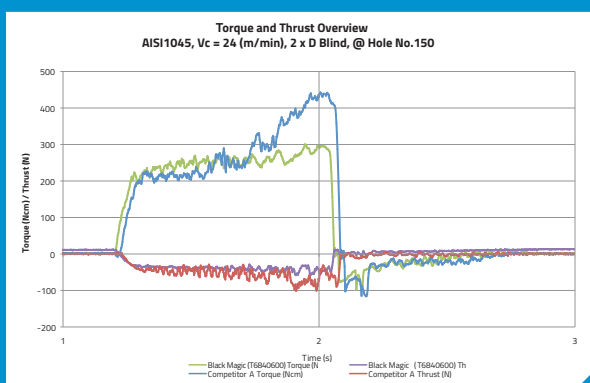
Sutton Tools' Black Magic Tap range eliminates many common problems encountered during tapping. Using a premium three percent vanadium grade of powdered metallurgy high speed steel (PM-HSSE) base material, the design also features a unique 'Hardlube' (TiAlN+WC/C) coating, plus high relief geometry to allow the tap to cut freely and generate less heat.

The base material incorporates a much finer grain and homogenous structure compared with conventional HSS. This design offers greater toughness of the tool while maintaining high hardness. Added to this, the lamellar structure of the tungsten carbide/carbon coating enables the layers to slide as they wear, proving low friction in the contact zone to deliver excellent resistance to cold welding.

The Black Magic Taps family spans the most popular sizes in the Metric coarse, Metric fine, UNC/UNF and G-Series (BSPF) for both spiral and gun taps. The metric coarse line-up is available from 3 to 20mm and the metric fine from 6 to 14mm. UNC/UNF taps are available from #2 to 5/8", and the G-Series from G 1/8" to G 1".

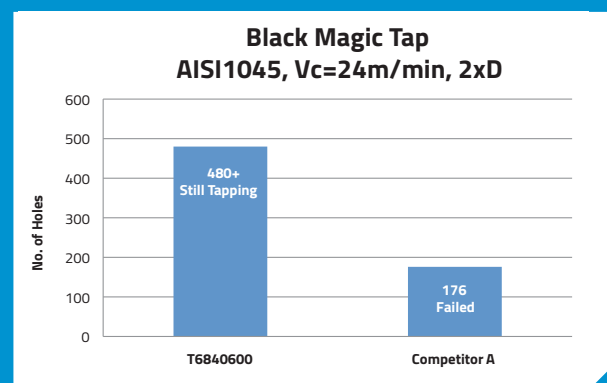
Sutton Tools' Black Magic Taps are truly multipurpose, suitable for CNC synchronised tapping of a wide range of materials, across a broad spectrum of industrial applications from small-scale jobbing shops through to high-volume component production.

PERFORMANCE ASSURANCE



Recognising that a quality tap relies on the accuracy of the pre-tapped hole—parallel and without work hardening having taken place—Sutton Tools is pleased to offer its customers Black Magic drill-and-tap packages to ensure end user tap operations are simplified through the optimum combination of drill and taps for the material that needs to be machined.

Sutton Tools' continual endeavours to improve its end users' production results are well demonstrated

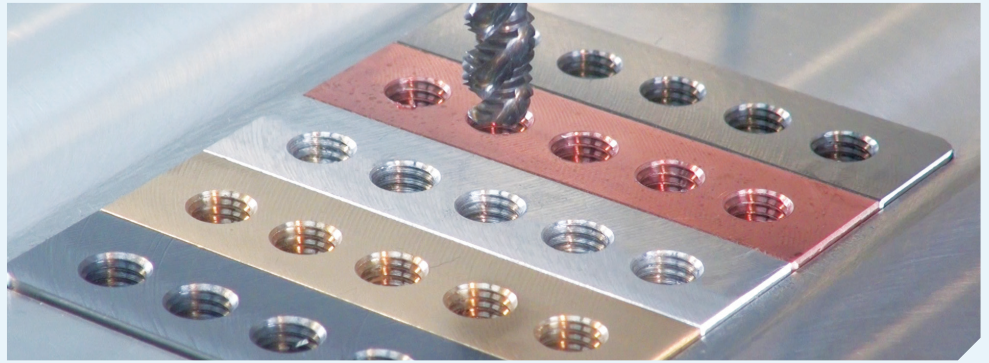


through to its Black Magic family of tools. With the Black Magic Taps, end users can benefit from the performance assurance that industry has come to associate with the Black Magic name, while benefitting from the latest coating technology developed specifically for these taps to deliver improved surface finish, increased production and longer tool life.

Case Study

Capable of tapping a wide range of material groups:

- Carbon Steels • Brass • Aluminium
- Copper • Stainless Steel



TEST 1 Thread Cutting

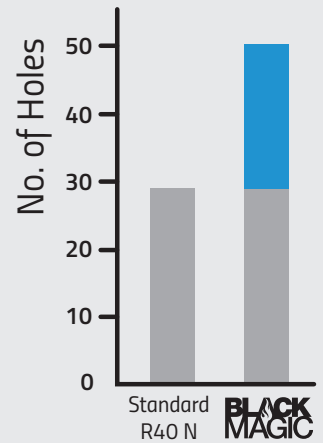
Tap: M8 x 1.25 Spiral Flute

Lubricant: Minimum Quantity (MQL)

Material: AISI 1045 approx 10HRC (medium carbon steel)

	Standard R40 N	Black Magic
Vc	22 m/min	22 m/min
N	876 rpm	876 rpm
Fn	F1.25 mm/rev	F1.25 mm/rev
Vf	1095 mm/min	1095 mm/min
Depth	2.5xD blind	2.5xD blind

**70%
GAIN IN
PRODUCTIVITY**



TEST 2 Thread Forming

Component Name: Clamping of engine support

Material Group (Sutton/Werkstoff/DIN/JIS /BS): C45

Power of Machine: 10KW

Material Hardness: 450N/mm²

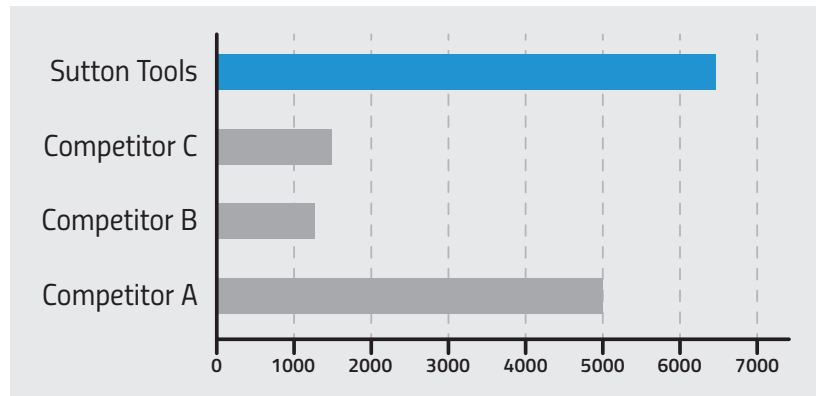
Tap Size: M10 x 1.5

Lubricant: Oil

RPM: 1200

Feed (mm/min): 1800

Thread depth (ap): 4.1



	Competitor A	Competitor B	Competitor C	Sutton Tools - T331
Tool Description / Type & Standard	MF10x150-6G Forming	MF10x150-6G Forming	MF10x150-6G Forming	MF10x150-6G Forming
Tool Part No / Catalogue No	A-XPf-MF10x150	NEW TC430 Supreme	SPECIAL	BM 104TT8163
Number of Flutes / Lobes	7	5	7	7
Tool Material	PM-Co	HSS-E-PM	HSS-E-PM	PM-Co
Surface Finish / Coating	TiCN	TiN (WW60AD)	TiCN	TiN
No. of Parts	5000	1250	1480	6450

IMPERIAL TAPS (inch size)

\emptyset = nominal tap size (inch)
TPI = thread count per inch (TPI)
n = spindle speed (RPM)
v_c = cutting speed (m/min)
v_f = feed rate (mm/min)
v_r = feed rate per rev (mm/rev)

$$n = \frac{v_c \times 1000}{\emptyset \times \pi \times 25.4} \approx \frac{v_c}{\emptyset} \times 12.5$$

$$v_c = \frac{n \times \emptyset \times \pi \times 25.4}{1000} \approx \frac{n \times \emptyset}{12.5}$$

$$v_r = \frac{n \times 25.4}{TPI}$$

METRIC TAPS (mm size)

\emptyset = nominal tap size (mm)
P = thread pitch (mm)
n = spindle speed (RPM)
v_c = cutting speed (m/min)
v_f = feed rate (mm/min)
v_r = feed rate per rev (mm/rev)

$$n = \frac{v_c \times 1000}{\emptyset \times \pi} \approx \frac{v_c}{\emptyset} \times 318$$

$$v_c = \frac{n \times \emptyset \times \pi}{1000} \approx \frac{n \times \emptyset}{318}$$

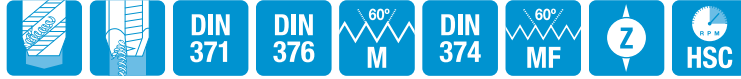
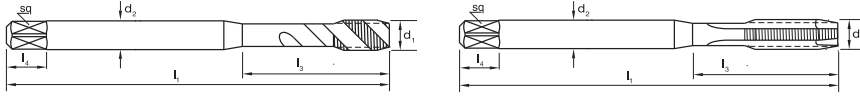
$$v_r = n \times P$$

DIN Taps Metric & Metric Fine, Spiral Flute, Gun, Black Magic

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BLACKMAGIC

- Universal high performance tapping
- PM-HSSE V3 offers superior tool life
- Use in stainless steels and high strength steels up to 850N/mm²
- Through holes up to 3 x d₁
- Suitable for synchronous tapping in machine operations



Discount Group

Material

Surface Finish

Sutton Designation

Geometry

Chamfer

Limit & Nut Tolerance



D0410



D0410

Material	PM-HSSE V3	PM-HSSE V3
Surface Finish	HARDLUBE	HARDLUBE
Sutton Designation	UNI	UNI
Geometry	R50	Special Relief
Chamfer	Form C / 2.5 x P	Form B / 4.5 x P
Limit & Nut Tolerance	6HX	6HX

Size Ref.	d ₁	Pitch	l ₁	l ₃	d ₂	sq	l ₄	z	drill Ø	Item #	Item #
DIN 371 REINFORCED SHANK										T684	T687
0300	M 3	x 0.5	56	18	3.5	2.7	6	3	2.5	T684 0300	T687 0300
0400	M 4	x 0.7	63	21	4.5	3.4	6	3	3.3	T684 0400	T687 0400
0500	M 5	x 0.8	70	25	6.0	4.9	8	3	4.2	T684 0500	T687 0500
0600	M 6	x 1	80	30	6.0	4.9	8	3	5.0	T684 0600	T687 0600
0800	M 8	x 1.25	90	35	8.0	6.2	9	3	6.8	T684 0800	T687 0800
1000	M 10	x 1.5	100	39	10.0	8.0	11	3	8.5	T684 1000	T687 1000
DIN 376 REDUCED SHANK										T685	T688
1200	M 12	x 1.75	110	-	9.0	7.0	10	3	10.2	T685 1200	T688 1200
1400	M 14	x 2	110	-	11.0	9.0	12	3	12.0	T685 1400	T688 1400
1600	M 16	x 2	110	-	12.0	9.0	12	4	14.0	T685 1600	T688 1600
1800	M 18	x 2.5	125	-	14.0	11.0	14	4	15.5	T685 1800	T688 1800
2000	M 20	x 2.5	140	-	16.0	12.0	15	4	17.5	T685 2000	T688 2000
DIN 374 FINE PITCH – REDUCED SHANK										T686	T689
0604	MF 6	x 0.75	80	-	4.5	3.4	6	3	5.3	T686 0604	T689 0604
0805	MF 8	x 1	90	-	6.0	4.9	8	3	7.0	T686 0805	T689 0805
1004	MF 10	x 0.75	90	-	7.0	5.5	8	3	9.3	T686 1004	•
1005	MF 10	x 1	90	-	7.0	5.5	8	3	9.0	T686 1005	T689 1005
1006	MF 10	x 1.25	100	-	7.0	5.5	8	3	8.8	T686 1006	T689 1006
1205	MF 12	x 1	100	-	9.0	7.0	10	3	11.0	T686 1205	T689 1205
1206	MF 12	x 1.25	100	-	9.0	7.0	10	3	10.8	T686 1206	T689 1206
1207	MF 12	x 1.5	100	-	9.0	7.0	10	3	10.5	T686 1207	T689 1207
1405	MF 14	x 1	100	-	11.0	9.0	12	3	13.0	T686 1405	T689 1405
1406	MF 14	x 1.25	100	-	11.0	9.0	12	3	12.8	T686 1406	T689 1406
1407	MF 14	x 1.5	100	-	11.0	9.0	12	3	12.5	T686 1407	T689 1407
1605	MF 16	x 1	100	-	12.0	9.0	12	3	15.0	T686 1605	T689 1605
1607	MF 16	x 1.5	100	-	12.0	9.0	12	3	14.5	T686 1607	T689 1607
1805	MF 18	x 1	110	-	14.0	11.0	14	4	17.0	T686 1805	T689 1805
1807	MF 18	x 1.5	110	-	14.0	11.0	14	4	16.5	T686 1807	T689 1807
2005	MF 20	x 1	125	-	16.0	12.0	15	4	19.0	T686 2005	T689 2005
2007	MF 20	x 1.5	125	-	16.0	12.0	15	4	18.5	T686 2007	T689 2007

ISO	P										M	K										N										S										H									
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37.1	37.2	37.3	37.4	37.5	38.1	38.2	39.1	39.2	40	41		
T684/T685/T686	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
T687/T688/T689	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

P Steel
 M Stainless Steel
 K Cast Iron
 N Non-Ferrous Metals
 S Titanium & Super Alloys
 H Hard Materials
 ● Optimal ○ Effective

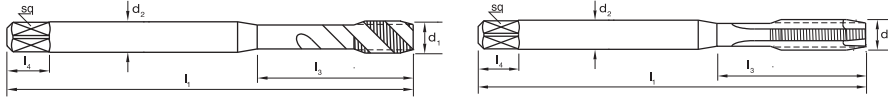
• Available on request as special manufacture. Subject to lead time.

DIN Taps UNC, UNF & G (BSPF), Spiral Flute, Gun, *Black Magic*

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BLACKMAGIC

- Universal high performance tapping
- PM-HSSE V3 offers superior tool life
- Use in stainless steels and high strength steels up to 850N/mm²
- Blind or through holes up to 3 x d₁
- Suitable for synchronous tapping in machine operations



Discount Group	D0410	D0410
Material	PM-HSSE V3	PM-HSSE V3
Surface Finish	HARDLUBE	HARDLUBE
Sutton Designation	UNI	UNI
Geometry	R50°	Special Relief
Chamfer	Form C / 2.5 x P	Form B / 4.5 x P
Limit & Nut Tolerance	2BX	2BX

Size Ref.	d ₁	Pitch	l ₁	l ₃	d ₂	sq	l ₄	z	drill Ø	Item #	Item #
DIN 2184-1 UNC REINFORCED SHANK										T691	T693
0218	# 2	56	45	12	2.8	2.1	5	3	1.85	T691 0218	T693 0218
0284	# 4	40	56	18	3.5	2.7	6	3	2.35	T691 0284	T693 0284
0351	# 6	32	56	20	4	3	6	3	2.85	T691 0351	T693 0351
0417	# 8	32	63	21	4.5	3.4	6	3	3.50	T691 0417	T693 0417
0483	# 10	24	70	25	6	4.9	8	3	3.90	T691 0483	T693 0483
0635	1/4	20	80	30	7	5.5	8	3	5.10	T691 0635	T693 0635
DIN 2184-1 UNC REDUCED SHANK											
0794	5/16	18	90	35	6	4.9	8	3	6.60	T691 0794	T693 0794
0953	3/8	16	100	39	7	5.5	8	3	8.00	T691 0953	T693 0953
1270	1/2	13	110	-	9	7	10	4	10.80	T691 1270	T693 1270
1588	5/8	11	110	-	12	9	12	4	13.50	T691 1588	T693 1588
DIN 2184-1 UNF REINFORCED SHANK										T692	T694
0284	# 4	48	56	18	3.5	2.7	6	3	2.40	T692 0284	T694 0284
0318	# 5	44	56	18	3.5	2.7	6	3	2.65		T694 0318
0351	# 6	40	56	20	4	3	6	3	2.95	T692 0351	T694 0351
0417	# 8	36	63	21	4.5	3.4	6	3	3.50	T692 0417	T694 0417
0483	# 10	32	70	25	6	4.9	8	3	4.10	T692 0483	T694 0483
0635	1/4	28	80	30	7	5.5	8	3	5.50	T692 0635	T694 0635
DIN 2184-1 UNF REDUCED SHANK											
0794	5/16	24	90	35	6	4.9	8	3	6.90	T692 0794	T694 0794
0953	3/8	24	90	39	7	5.5	8	3	8.50	T692 0953	T694 0953
1270	1/2	20	100	-	9	7	10	4	11.50	T692 1270	T694 1270
1588	5/8	18	100	-	12	9	12	4	14.50	T692 1588	T694 1588
DIN 5156*										T699	T700
0973	G 1/8	28	90	-	7.0	5.5	8	4	8.8	T699 0973	T700 0973
1316	G 1/4	19	100	-	11.0	9.0	12	4	11.8	T699 1316	T700 1316
1666	G 3/8	19	100	-	12.0	9.0	12	5	15.3	T699 1666	T700 1666
2096	G 1/2	14	125	-	16.0	12.0	15	5	19.0	T699 2096	T700 2096
2291	G 5/8	14	125	-	18.0	14.5	17	5	21.0	T699 2291	T700 2291
2644	G 3/4	14	140	-	20.0	16.0	19	5	24.5	T699 2644	T700 2644
3020	G 7/8	14	150	-	22.0	18.0	21	5	28.5	T699 3020	T700 3020
3325	G 1	11	160	-	25.0	20.0	23	5	31.0	T699 3325	T700 3325

ISO	P										M	K										N										S										H									
VDI 3323	1	2	3	4	5	6	7	8	9	10	11	12	13	14.1	14.2	14.3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37.1	37.2	37.3	37.4	37.5	38.1	38.2	39.1	39.2	40	41		
T691/T692/T699	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
T693/T694/T700	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

P Steel M Stainless Steel K Cast Iron N Non-Ferrous Metals S Titanium & Super Alloys H Hard Materials ● Optimal ○ Effective

* Limit & Nut Tolerance = ISO 228

Application Chart

ISO	VDI	Material Group	Sutton
P	A	Steel	N
M	R	Stainless Steel	VA
K	F	Cast Iron	GG
N	N	Non-Ferrous Metals, Aluminiums & Coppers	AlW
S	S	Titaniums & Super Alloys	Ti Ni
H	H	Hard Materials (≥ 45 HRC)	H

^ VDI 3323 material groups can also be determined by referring to the material cross reference listing in the application guide at the back of this catalogue.



Catalogue Code	M	T684	T685	T687	T688	T331	T332
MF	T686			T689		T834	
UNC	T691			T693			
UNF	T692			T694			
G (BSPF)	T699			T700			
Material	PM-HSSE V3			PM-HSSE V3		PM-HSS Co	
Surface Finish	Hardlube			Hardlube		TiN	
Surface Designation	UNI			UNI		NH	
Tapping Depth	$\leq 3x\phi$			$\leq 3x\phi$		Multi-Coolant Groove	
Limit & Nut Tolerance	6HX			6HX		$\leq 3x\phi$	

ISO	VDI [^] 3323	Material	Condition	HB	N/mm ²	Vc	Vc	Vc	
P	1	Steel - Non-alloy, cast & free cutting	~ 0.15 %C	A	125	440	17	22	25
	2			A	190	640	17	22	23
	3		QT	250	840	14	18	20	
	4		~ 0.75 %C	A	270	910	16	20	21
	5			QT	300	1010	-	-	18
	6	Steel - Low alloy & cast < 5% of alloying elements	A	180	610	17	22	23	
	7		QT	275	930	12	14	16	
	8		QT	300	1010	-	-	12	
	9		QT	350	1180	-	-	-	
	10	Steel - High alloy, cast & tool	A	200	680	12	14	16	
	11		HT	325	1100	-	-	-	
	12	Steel - Corrosion resistant & cast	Ferritic / Martensitic	A	200	680	7	9	-
	13		Martensitic	QT	240	810	4	5	-
M	14.1	Stainless Steel	Austenitic	AH	180	610	9	11	12
	14.2		Duplex		250	840	6	7	8
	14.3		Precipitation Hardening		250	840	-	-	-
K	15	Cast Iron - Grey (GG)	Ferritic / Pearlitic		180	610	17	22	-
	16		Pearlitic		260	880	14	18	-
	17	Cast Iron - Nodular (GGG)	Ferritic		160	570	17	22	-
	18		Pearlitic		250	840	14	18	-
	19		Ferritic		130	460	22	27	-
20	Cast Iron - Malleable	Pearlitic		230	780	17	22	-	
N	21	Aluminum & Magnesium - wrought alloy	Non Heat Treatable		60	210	17	22	-
	22		Heat Treatable	AH	100	360	22	27	-
	23	Aluminum & Magnesium - cast alloy $\leq 12\%$ Si	Non Heat Treatable		75	270	22	27	-
	24		Heat Treatable	AH	90	320	22	27	-
	25	Al & Mg - cast alloy $> 12\%$ Si	Non Heat Treatable		130	460	14	18	-
	26	Copper & Cu alloys (Brass/Bronze)	Free cutting, Pb $> 1\%$		110	390	12	14	-
	27		Brass (CuZn, CuSnZn)		90	320	26	32	-
	28		Bronze (CuSn)		100	360	-	-	27
	29	Non-metallic - Thermosetting & fiber-reinforced plastics					-	-	-
	30	Non-metallic - Hard rubber, wood etc.					-	-	-
S	31	High temp. alloys	Fe based	A	200	680	-	-	-
	32			AH	280	950	-	-	-
	33		Ni / Co based	A	250	840	-	-	-
	34			AH	350	1180	-	-	-
	35		C	320	1080	-	-	-	
	36	Titanium & Ti alloys	CP Titanium		400 MPa		-	-	-
	37.1		Alpha alloys		860 MPa		-	-	-
	37.2		Alpha / Beta alloys	A	960 MPa		-	-	-
	37.3			AH	1170 MPa		-	-	-
	37.4		Beta alloys	A	830 MPa		-	-	-
37.5	AH			1400 MPa		-	-	-	
H	38.1	Hardened steel		HT	45 HRC		-	-	-
	38.2			HT	55 HRC		-	-	-
	39.1			HT	58 HRC		-	-	-
	39.2			HT	62 HRC		-	-	-
	40	Cast Iron	Chilled	C	400	1350	-	-	-
	41			HT	55 HRC		-	-	-

Condition: A (Annealed), AH (Age Hardened), C (Cast), HT (Hardened & Tempered), QT (Quenched & Tempered)

Blue Bold = Optimal | Regular = Effective

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