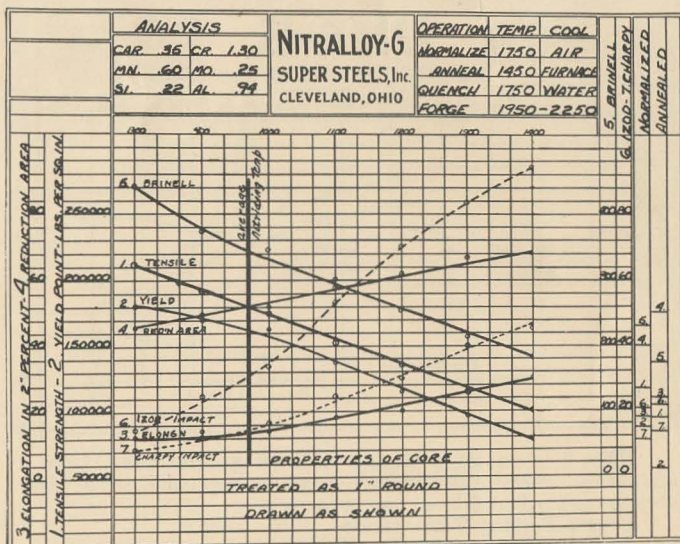




Nitalloy G



Forge — 2250° F. Under 1950° F. the metal flows with difficulty.
 Normalize — 1750° F. All forgings should be normalized or annealed before heat treatment.

Anneal — 1450° F. If annealed bars are machined, heat treat before finish machining.

Quench — 1750° F. Use oil for sections up to 1". Over 1" quench in water.

Draw — 950° F — 1375° F. to secure desired properties of core. All parts must be heat treated before nitriding and must be finish machined after heat treating on the surface which is desired hard.

Physical Properties 1" Round Core

Quenched in Water from 1700° F

Draw	Elastic	Ultimate	El'n.—2"	Red. Area	Izod Impact	Brinell
950	165000	185000	13	52	28	350
1000	158000	175000	14	54	36	330
1100	138000	155000	18	58	54	290
1200	118000	135000	22	62	70	260
1300	98000	118000	26	65	84	220
1400	78000	100000	30	68	94	180

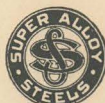
Some Applications for Nitalloy

All parts where a harder and longer wearing surface is needed than can be obtained with case-hardened alloy or tool steels. Hardened parts where warpage must be negligible or reduced to a minimum — arbors, dies, gauges, gears, spindles. Where hardness at elevated temperatures is desirable — bushings, die casting and extrusion or piercing dies, rolls, shafts, valve parts. Resistance to corrosion and wear — pump rods and bushings, valve parts. Gas and Diesel engine parts, machine tool collets, shells, gears, scrolls, spindles.

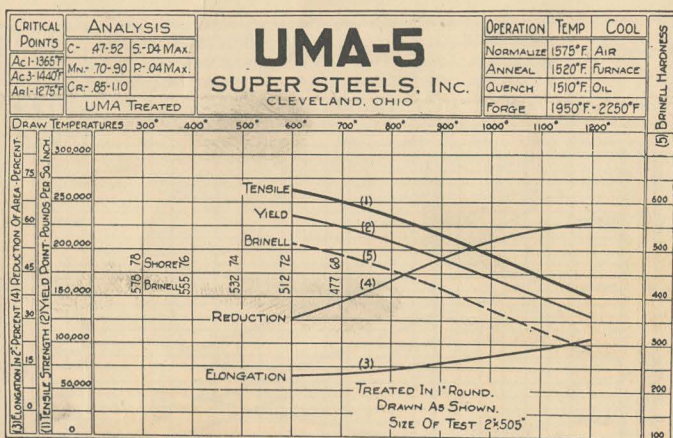
Nitalloy Rounds Heat Treated or Annealed

Size Ins.	Weight Per Foot	Size Extra Per Cwt.	Length of Bars	Size Ins.	Weight Per Foot	Size Extra Per Cwt.	Length of Bars
5/8	1.04	.50	12-14	2 1/2	16.69	Base	18-20
3/4	1.50	.50	12-14	2 3/4	20.20	Base	18-20
1	2.67	Base	12-14	3	24.03	.75	18-20
1 1/4	4.17	Base	12-14	3 1/4	28.20	.75	18-20
1 1/2	6.01	Base	12-14	3 1/2	32.71	.75	18-20
1 3/4	8.18	Base	12-14	4	42.73	.75	18-20
2	10.68	Base	12-14	4 1/4	48.24	1.25	18-20

Larger rounds and forgings from billets in stock furnished smooth forged or turned and annealed or heat treated.



Super Alloy—UMA 5



UMA 5 is an oil-hardening steel for general use. Used to advantage where a lower carbon water-hardening or a higher carbon oil-hardening steel has been used.

Proper Forging Temperature: 1950—2250°F.

Anneal: Heat to 1520°F. Cool in furnace.

Annealed 1" round shows 97000 lbs. per sq. in. tensile—192 Brinell.

Normalize: Heat to 1575°F. Cool in air.

Normalized 1" round shows 135000 lbs. per sq. in. tensile—269 Brinell.

Quench from 1510°F in oil. As diameter increases over 1", raise quenching temperature 25°F for each 1".

Physical Properties 1" Round

Quenched in Oil from 1510° F

Draw	Elastic	Ultimate	El'n. 2"	Red. Area	Shore	Brinell
300	250000	277000	10.0	22.5	78.5	578
400	249000	272000	10.0	23.5	76.5	555
500	243000	269500	10.5	25.5	75.0	534
600	234500	261500	11.5	29.5	72.5	514
700	224000	249000	12.0	34.0	69.0	495
800	209000	232500	14.0	41.5	66.5	461
900	192000	213000	16.0	48.0	62.5	415
1000	171500	192000	18.0	54.0	58.5	375
1100	150000	171000	21.0	58.5	53.0	321
1200	129000	150000	24.0	61.0	48.0	287

Physical results will vary as the size increases, elastic, tensile, and Brinell being lower. Ductility will increase on the low draws but will change little on the higher draws.

For results obtained on large sections see Shafts, page 33.

Treatment for Gears—Quench 1500—Draw 400.

Do not draw this steel between 500 and 700° F.

Better toughness, impact value, is obtained above or below these temperatures.

Large gears will give 62-70 Shore on teeth.

Small gears will give 68-75 Shore on teeth.

If great toughness is necessary for gears, draw 750-900° F. giving shore hardness 60-50.

Some uses for UMA 5—Crank shafts, industrial gearing, axles and drive shafts, high duty bolts, agricultural implements, machine tool gears, boring bars, clutches, spindles, power chains, automotive gears, dies, shear blades, rolls, tools, hammers, adzes.



Super Alloy—UMA 5

What UMA Steels Are

UMA Steels represent the ultimate in development of scientific deoxidation of alloy steels carrying that most useful of all alloying elements—Chromium.

Steels of this character are possible only because of countless refinements of practice, thorough knowledge of manufacture, and scientific control of the various phases of production.

The fact that many automotive, machine tool builders, and other manufacturers have standardized their alloy requirements with UMA Steel is the best evidence of its proven worth.

The Reason for UMA 5

In specializing on UMA 5 the desire was to offer to the special steel users a Super Alloy Steel which would give consistent performances over a wide field of applications and which would be available in a complete range of sizes. You can secure UMA 5 from our stock in the hot rolled, annealed, or heat treated condition. A special treatment can be given this steel in sizes up to 2½" which enables it to be used in automatic machines. See annealed and turned sizes, page 7. Cold drawn or centerless ground bars may be procured.

Wide Application

By quenching in oil and selecting the proper drawing temperature UMA 5 can be applied where other alloy steels from .25 to .50 carbon are used. A high draw will produce the ductility and toughness of the low carbon 3½ percent nickel steel; a low draw, the hardness and resistance to abrasion demanded in gears and other parts which must withstand extreme wear. Between these extremes is the wider field for the use of UMA 5 where high strength and great toughness are wanted with the ability to machine the steel readily. These demands are met by the selection of the proper drawing temperature.

Machinable in Heat Treated Condition

In the heat treated condition with a Brinell hardness varying from 212 to 341, tensile strengths are obtained from 100,000 to 175,000 pounds per square inch, dependent upon the size of the section. The steel is machinable within these ranges. Some high duty shafts are machined on a lathe with hardness values as high as 418. This should only be done in special cases.

How to Order Heat Treated Bars

On heat treated bars specify minimum physical properties or a hardness range. Physical tests can be supplied by special arrangement for which there is a charge. Specify hardness ranges in Brinell numbers as this is the standard metallurgical practice for material machined in the heat treated condition under 61 Shore—Brinell 401. The workable Brinell range is 40 to 60 points, depending upon size, length, and hardness value.

For those who have been using Shore numbers the following figures are suggested for guidance. These will vary with the diameter.

Brinell	Shore	Machining Guide
212—255	32—39	Best machining speeds from heat treated Alloy Steel.
235—277	36—43	Good machining properties.
258—302	40—47	Slower cutting. High duty shafts, etc.
285—331	44—51	Reduced speeds. High tensile strength.
311—363	48—55	Lathe work—Special applications.



Super Alloy—UMA 5

Hot Rolled—Annealed

Heat Treated—Machine Straightened

ROUNDS

Size—Inches	Weight Per Foot Pounds	Size Extra Per Cwt.	Length of Bars
$\frac{1}{4}$	.17	\$1.00	10-16
$\frac{5}{16}$	.26	.70	10-16
$\frac{3}{8}$	.38	.40	10-16
$\frac{7}{16}$	.51	.30	10-16
$\frac{1}{2}$	.67	.20	10-16
$\frac{9}{16}$	.85	.15	10-16
$\frac{5}{8}$	1.04	.10	10-16
$\frac{11}{16}$	1.26	.10	10-16
$\frac{3}{4}$	1.50	Base	10-16
$\frac{13}{16}$	1.76	Base	10-16
$\frac{7}{8}$	2.05	Base	10-16
$\frac{15}{16}$	2.35	Base	10-16
1	2.67	Base	10-20
$1\frac{1}{8}$	3.38	Base	10-20
$1\frac{3}{16}$	3.77	Base	10-20
$1\frac{1}{4}$	4.17	Base	10-20
$1\frac{3}{8}$	5.05	Base	10-20
$1\frac{1}{2}$	6.01	Base	10-20
$1\frac{5}{8}$	7.05	Base	10-20
$1\frac{3}{4}$	8.18	Base	10-20
$1\frac{7}{8}$	9.39	Base	10-20
2	10.68	Base	10-20
$2\frac{1}{8}$	12.06	Base	10-20
$2\frac{1}{4}$	13.52	Base	10-20
$2\frac{3}{8}$	15.06	Base	10-20
$2\frac{1}{2}$	16.69	Base	10-20
$2\frac{5}{8}$	18.40	Base	10-20
$2\frac{3}{4}$	20.20	Base	10-20
$2\frac{7}{8}$	22.07	Base	10-20
3	24.03	Base	10-20
$3\frac{1}{8}$	26.08	.10	10-20
$3\frac{1}{4}$	28.21	.10	10-20
$3\frac{1}{2}$	32.70	.10	10-20
$3\frac{3}{4}$	37.55	.15	10-20
4	42.73	.15	10-20
$4\frac{1}{4}$	48.23	.25	10-20
$4\frac{1}{2}$	54.08	.25	10-20
$4\frac{3}{4}$	60.25	.35	10-20
5	66.75	.35	10-20
$5\frac{1}{4}$	73.60	.45	10-20
$5\frac{1}{2}$	80.78	.45	10-20
$5\frac{3}{4}$	88.29	.55	10-20
6	96.13	.55	10-20
$6\frac{1}{4}$	104.31	.65	10-20
$6\frac{1}{2}$	112.85	.65	10-20
$6\frac{3}{4}$	121.67		10-14
7	130.85	Net	10-14
$7\frac{1}{2}$	150.20		10-14
8	171.0	Prices	10-14
$8\frac{1}{2}$	194.7		10-14
9	218.4	on	10-14
$9\frac{1}{2}$	242.8		10-14
10	267.2	Application	10-14