

**A 1050**

Comalco Ltd.  
Commercially pure aluminum; Al 99.50 min. H12-temper: 97 MPa TS; 83 MPa YS; 15 El. H18-temper: 145 MPa TS; 138 MPa YS; 6 El. Chemical and process plant and equipment.

**A 1100**

Comalco Ltd.  
Aluminum copper alloy; Al 99.0 min; Cu 0.12. O-temper: 90 MPa TS; 34 MPa YS; 35 El. H18-temper: 165 MPa TS; 152 MPa YS; 5 El; 44 HB; Spinnings, holloware and general sheet metal work.

**A 1145**

Comalco Ltd.  
Commercially pure aluminum; Al 99.45 min. General foil uses.

**A 1199**

Comalco Ltd.  
Commercially pure aluminum; Al 99.99 min. Electrical and electronic foil uses.

**A 2011**

Comalco Ltd.  
Aluminum copper alloy; Bi 0.5; Cu 5.5; Pb 0.5; bal Al. T3-temper: 379 MPa TS; 296 MPa YS; 15 El. T4-temper: 469 MPa TS; 310 MPa YS; 20 El. H18-temper: 145 MPa YS; 20 El. Screw machine products not requiring decorative anodizing.

**A 2024**

Comalco Ltd.  
Aluminum copper alloy; Cu 4.5; Mg 1.5; Mn 0.6; bal Al. O-temper: 166 MPa TS; 76 MPa YS; 20 El. T42 temper: 469 MPa TS; 310 MPa YS; 20 El; 120 HB; Aircraft sheeting.

**A 25\***

Johnson Matthey plc, Materials Technology Division Europe  
See MATTHEY A 25.

**A 300\***

Bergische Stahl Industrie  
Martensitic stainless steel; C 0.4-0.5; Cr 12-14; Mn 1 max; Si 1 max; bal Fe. Martensitic stainless steel. WNr. 1.4034.

**A 3003**

Comalco Ltd.  
Aluminum manganese alloy; Cu 0.12; Mn 1.2; bal Al. O-temper: 110 MPa TS; 41 MPa YS; 30 El. H18-temper: 200 MPa TS; 186 MPa YS; 4 El; 55 HB; Chemical equipment, sheet metal work, rigid foil containers.

**A 3004**

Comalco Ltd.  
Aluminum manganese alloy; Mg 1; Mn 1.2; bal Al. O-temper: 179 MPa TS; 69 MPa YS; 20 El. H38-temper: 283 MPa TS; 248 MPa YS; 5 El; 70 HB; Storage tanks, car bodies, seam welded tubing.

**A 3203**

Comalco Ltd.  
Aluminum manganese alloy; Mn 1.2; bal Al. H12 Temper: 131 MPa TS; 117 MPa YS; 32 El. H18 Temper: 200 MPa TS; 172 MPa YS; 4 El. Sheet metal work, high strength foil.

**A 350\***

Bergische Stahl Industrie  
Martensitic stainless steel; C 0.17-0.22; Cr 12-14; Mn 1 max; Si 1 max; bal Fe. Martensitic stainless steel. WNr. 1.4021.

**A 400\***

Bergische Stahl Industrie  
Stainless steel; C 0.08 max; Cr 13-15; Mn 1 max; Si 1 max. Ferritic type stainless steel. WNr. 1.4001.

**A 4543**

Comalco Ltd.  
Aluminum silicon alloy; Mg 0.3; Si 6; bal Al. T1-temper: 145 MPa TS; 83 MPa YS; 20 El; 40 Vickers. T8-temper: 207 MPa TS; 179 MPa YS; 12 El; 75 Vickers. Architectural extrusions.

**A 5\***

Johnson Matthey plc, Materials Technology Division Europe  
See MATTHEY A 5.

**A 500 H\***

Bergische Stahl Industrie  
Cold work tool steel; C 0.75-0.85; Co 0.9-1.3; Cr 12.5-14.5; Mn 0.2-0.5; Si 0.3-0.6; bal Fe. Cold work tool steel. WNr. 1.2883.

**A 5005**

Comalco Ltd.  
Aluminum magnesium alloy; Mg 0.8; bal Al. O-temper: 124 MPa TS; 41 MPa YS; 25 El. H18-temper: 200 MPa TS; 193 MPa YS; 4 El; 56 Vickers. H38-temper: 200 MPa TS; 186 MPa YS; 5 El; 51 HB; Appliances and utensils, high strength foil.

**A 5052**

Comalco Ltd.  
Aluminum magnesium alloy; Cr 0.25; Mg 2.5; bal Al. O-temper: 193 MPa TS; 90 MPa YS; 25 El; 47 HB; H38-temper: 290 MPa TS; 255 MPa YS; 7 El; 77 HB; Sheet metal work, marine applications.

**A 5056**

Comalco Ltd.  
Aluminum magnesium alloy; Cr 0.1; Mg 5.2; Mn 0.1; bal Al. O-temper: 290 MPa TS; 152 MPa YS; 35 El; 70 Vickers. H38-temper: 414 MPa TS; 345 MPa YS; 15 El; 100 HB; Cable sheathing, rivets, zippers, screen wire.

**A 5086**

Comalco Ltd.  
Aluminum magnesium alloy; Cr 0.15; Mg 4; Mn 0.5; bal Al. O-temper: 262 MPa TS; 117 MPa YS; 22 El; 60 HB; H38-temper: 359 MPa TS; 303 MPa YS; 7 El. Unfired pressure vessels, TV towers.

**A 5252**

Comalco Ltd.  
Aluminum magnesium alloy; Mg 2.5; bal Al. H24 temper: 221 MPa TS; 159 MPa YS; 12 El. H28 temper: 283 MPa TS; 241 MPa YS; 5 El; 75 HB; High strength automobile trim.

**A 5454**

Comalco Ltd.  
Aluminum magnesium alloy; Cr 0.1; Mg 2.7; Mn 0.8; bal Al. O-temper: 248 MPa TS; 117 MPa YS; 22 El; 62 HB; H34-temper: 303 MPa TS; 241 MPa YS; 10 El; 81 HB; Welded structures, pressure vessels.

**A 5457**

Comalco Ltd.  
Aluminum magnesium alloy; Cu 0.1; Mg 1; Mn 0.2; bal Al. O-temper: 131 MPa TS; 48 MPa YS; 22 El; 32 HB; H25-temper: 179 MPa TS; 159 MPa YS; 12 El; 48 HB; Automobile trim.

**A 5557**

Comalco Ltd.  
Aluminum magnesium alloy; Cu 0.1; Mg 0.6; Mn 0.2; bal Al. O-temper: 110 MPa TS; 41 MPa YS; 25 El. H25-temper: 159 MPa TS; 138 MPa YS; 12 El. Automobile trim.

**A 60 PB**

Westig (U.K.) Ltd.  
Free machining steel; C 0.7; Mn 0.65; P 0.035 max; Pb 0.2; S 0.2; Si 0.2; bal Fe. Free cutting steel.

**A 600\***

Bergische Stahl Industrie  
Cold work tool steel; C 1-1.1; Cr 0.9-1.1; Mn 0.8-1.1; Si 0.15-0.3; W 1-1.3; bal Fe. Cold work tool steel. WNr. 1.2419.

**A 6061**

Comalco Ltd.  
Aluminum magnesium alloy; Cr 0.2; Cu 0.25; Mg 1; Si 0.6; bal Al. O-temper: 124 MPa TS; 55 MPa YS; 25 El; 30 HB; T6-temper: 310 MPa TS; 276 MPa YS; 12 El; 95 HB; Structural applications, transport.

**A 6262**

Comalco Ltd.  
Aluminum magnesium alloy; Bi 0.6; Cr 0.1; Cu 0.25; Mg 1; Pb 0.6; Si 0.6; bal Al. T6-temper: 310 MPa TS; 276 MPa YS; 12 El; 100 Vickers. T9-temper: 400 MPa TS; 379 MPa YS; 10 El; 125 Vickers. Screw machine products suitable for decorative anodizing.

**A 70\***

Crucible Materials Corp.  
See CRUCIBLE A 70.

**A 8**

English manufacture  
Cast magnesium aluminum alloy; Al 7.5-9; Mn 0.15-0.4; Zn 0.3-1; bal Mg. Sand cast: 140 MPa TS; 85 MPa YS; 2 El; 55 HB; General purpose sand or chill casting. BS 2970 MAG 1.

**A 8 H.P**

English manufacture  
Cast magnesium aluminum alloy; Al 7.5-9; Mn 0.15-0.7; Zn 0.3-1; bal Mg. Sand cast: 140 MPa TS; 85 MPa YS; 2 El; 55 HB; Higher purity sand or chill casting. BS 2970 MAG 2.

**A ALLOY-1**

National Physical Laboratory  
Aluminum zinc alloy; Al 77; Cu 3; Zn 20. Hot rolled: 60,000 TS; 41,000 YS; 21 El; 36 RA. For light alloy wrought parts; non-hardenable.

**A ALLOY-2**

National Physical Laboratory  
Aluminum copper alloy; Cu 4.7; Fe 0.5; Mg 1.34; Ni 1.85; Pb 1.5; bal Al. For light alloy wrought parts; age-hardenable.

**A L 75**

Sterling International Technology Ltd.  
Aluminum alloy; Cr 4-6; Cu 2.8-3.8; Mn 0.3-0.6; bal Al. Chill cast: 36,000-40,000 TS; 14,500-16,800 YS; 8-10 El; 70-80 HB; 3.5 Izod. Gravity die aluminum castings requiring strength and ductility. BS 1490 LM 22-W.

**A L 800\***

AL Tech Specialty Steel Corp.  
Nickel iron superalloy; Al 0.6 max; C 0.1; Cr 19; Ni 30; Ti 0.6 max; bal Fe. Resistant to oxidation and carburization at elevated temperatures.

**A L 825\***

AL Tech Specialty Steel Corp.  
Nickel iron superalloy; C 0.05 max; Cr 19.5; Mo 3.5 max; Ni 38; bal Fe. Excellent corrosion resistance.

**A M 3 DIE STEEL\***

Balfour Darwins Ltd.  
Cold work tool steel; C 0.4; Cr 5; Mo 1.35; Si 1.05; V 1.1; bal Fe. For die casting dies, extrusion dies, upsetters; air hardened, resists heat checking.

**A METAL**

Manufacturer unknown  
Nickel steel; Cu 5-7; Ni 44; bal Fe. For sound transmitting devices.

**A NICKEL ELECTRON GRADE\***

Criterion Metals, Inc.  
See NICKEL 205.

**A NICKEL\***

Harrison Alloys Inc.  
See HAI-NI 200.

**A PHOSPHOR BRONZE**

Criterion Metals, Inc.  
Phosphor bronze; Cu 94.82; Fe 0.1 max; P 0.05; Pb 0.05 max; Sn 5; Zn 0.3 max. Thin gauge sheet, various tempers: 46-100 ksi TS min; 19-98 ksi YS min. ASTM B-103.

**A QUALITY**

Steelmark-Eagle & Globe, ANI Corporation Limited  
Water hardening tool steel; C 0.73; Mn 0.2; Si 0.2; V 0.2; bal Fe. Carbon, water hardened for punches, scale pivots. AS1239 W2A-7; AISI W2.

**A-10 SPB**

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.05-0.15; Mn 1-1.5; P 0.07 max; Pb 0.15-0.3; S 0.3-0.4; Si 0.06 max; bal Fe. Normalized at 900 C (16 mm): 39-52 kgf/mm\*\*2 TS; 22 kgf/mm\*\*2 min YS; 20 min El. Cold drawn (<16 mm): 52-82 kgf/mm\*\*2 TS; 42 kgf/mm\*\*2 min YS; 7 min El. Cold drawn (<40 mm): 47-77 kgf/mm\*\*2 TS; 38 kgf/mm\*\*2 min YS; 8 min El.

**A-10S**

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.05-0.15; Mn 1-1.5; P 0.07 max; S 0.3-0.4; Si 0.06 max; bal Fe. Normalized at 900 C (16 mm): 39-52 kgf/mm\*\*2 TS; 22 kgf/mm\*\*2 min YS; 20 min El. Cold drawn (<16 mm): 52-82 kgf/mm\*\*2 TS; 42 kgf/mm\*\*2 min YS; 7 min El. Cold drawn (<40 mm): 47-77 kgf/mm\*\*2 TS; 38 kgf/mm\*\*2 min YS; 8 min El.

**A-110\***

Heppenstall Co.  
Water hardening tool steel; C 1.2; Mn 0.3; Si 0.3; bal Fe. Water hardened tool steel; AISI W1.

\* Renamed, obsolete or no longer manufactured by this company.

## 18 / WOLDMAN'S ENGINEERING ALLOYS

### A-1110

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.1-0.2; Mn 0.4-0.7; P 0.35 max; S 0.35 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 45-65 kgf/mm\*\*2 TS; 30 kgf/mm\*\*2 min YS; 20 min El.

### A-1120

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.2-0.3; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 54-74 kgf/mm\*\*2 TS; 36 kgf/mm\*\*2 min YS; 19 min El.

### A-1130

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.3-0.4; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 63-83 kgf/mm\*\*2 TS; 43 kgf/mm\*\*2 min YS; 16 min El.

### A-1131

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.3-0.35; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 63-78 kgf/mm\*\*2 TS; 43 kgf/mm\*\*2 min YS; 17 min El.

### A-1132

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.35-0.4; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 68-83 kgf/mm\*\*2 TS; 45 kgf/mm\*\*2 min YS; 16 min El.

### A-1140

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.4-0.5; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 71-91 kgf/mm\*\*2 TS; 48 kgf/mm\*\*2 min YS; 13 min El.

### A-1141

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.4-0.45; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 71-86 kgf/mm\*\*2 TS; 48 kgf/mm\*\*2 min YS; 14 min El.

### A-1142

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.45-0.5; Mn 0.5-0.8; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 76-91 kgf/mm\*\*2 TS; 52 kgf/mm\*\*2 min YS; 13 min El.

### A-1150

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.5-0.6; Mn 0.6-0.9; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
Water quenched and tempered: 80-100 kgf/mm\*\*2 TS; 54 kgf/mm\*\*2 min YS; 12 min El.

### A-1200

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.34-0.41; Cr 0.5-0.8; Mn 0.6-0.9; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
85-105 kgf/mm\*\*2 TS; 60 kgf/mm\*\*2 min YS; 12 min El.

### A-1201

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.34-0.41; Cr 0.9-1.2; Mn 0.6-0.9; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
95-115 kgf/mm\*\*2 TS; 75 kgf/mm\*\*2 min YS; 11 min El.

### A-1202

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.38-0.45; Cr 0.9-1.2; Mn 0.6-0.9; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
100-120 kgf/mm\*\*2 TS; 80 kgf/mm\*\*2 min YS; 11 min El.

### A-1203

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.33-0.4; Mn 1.3-1.65; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
85-105 kgf/mm\*\*2 TS; 65 kgf/mm\*\*2 min YS; 12 min El.

### A-1204

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.37-0.44; Cr 0.4-0.7; Mn 0.7-1; Mo 0.15-0.3; Ni 0.4-0.7; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
105-125 kgf/mm\*\*2 TS; 85 kgf/mm\*\*2 min YS; 10 min El.

### A-1250

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.32-0.38; Cr 0.15-0.85; Mn 0.6-0.9; Mo 0.15-0.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
100-120 kgf/mm\*\*2 TS; 80 kgf/mm\*\*2 min YS; 11 min El.

### A-1251

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.27-0.33; Cr 0.85-1.15; Mn 0.6-0.9; Mo 0.15-0.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
95-115 kgf/mm\*\*2 TS; 75 kgf/mm\*\*2 min YS; 12 min El.

### A-1252

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.37-0.43; Cr 0.85-1.15; Mn 0.6-0.9; Mo 0.15-0.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
110-130 kgf/mm\*\*2 TS; 90 kgf/mm\*\*2 min YS; 10 min El.

### A-1260

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.3-0.37; Cr 1.1-1.4; Mn 0.3-0.6; Mo 0.25-0.4; Ni 3.7-4.2; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
115-135 kgf/mm\*\*2 TS; 100 kgf/mm\*\*2 min YS; 9 min El.

### A-1262

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.3-0.36; Cr 0.7-0.9; Mn 0.6-0.8; Mo 0.3-0.4; Ni 2.75-3.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
110-130 kgf/mm\*\*2 TS; 95 kgf/mm\*\*2 min YS; 9 min El.

### A-1270

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.32-0.38; Cr 0.65-0.95; Mn 0.55-0.85; Mo 0.15-0.8; Ni 1.6-2; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
115-135 kgf/mm\*\*2 TS; 95 kgf/mm\*\*2 min YS; 11 min El.

### A-1272

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.37-0.43; Cr 0.65-0.95; Mn 0.55-0.85; Mo 0.15-0.3; Ni 1.6-2; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
120-140 kgf/mm\*\*2 TS; 100 kgf/mm\*\*2 min YS; 9 min El.

### A-1280

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.32-0.38; Cr 0.6-0.9; Mn 0.5-0.8; Mo 0.15-0.3; Ni 0.7-1; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
100-120 kgf/mm\*\*2 TS; 80 kgf/mm\*\*2 min YS; 11 min El.

### A-1282

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.37-0.42; Cr 0.6-0.9; Mn 0.5-0.8; Mo 0.15-0.3; Ni 0.7-1; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
105-125 kgf/mm\*\*2 TS; 85 kgf/mm\*\*2 min YS; 10 min El.

### A-1310

AFORA (Aceros Afora S.A.)  
Iron alloy; C 0.95-1.1; Cr 1.35-1.6; Mn 0.2-0.4; P 0.03 max; S 0.025 max; Si 0.15-0.35; bal Fe.

### A-1311

AFORA (Aceros Afora S.A.)  
Iron alloy; C 0.95-1.1; Cr 0.4-0.6; Mn 0.2-0.4; P 0.03 max; S 0.025 max; Si 0.15-0.35; bal Fe.

### A-1312

AFORA (Aceros Afora S.A.)  
Iron alloy; C 0.9-1.05; Cr 1.65-1.95; Mn 0.2-0.4; Mo 0.15-0.3; P 0.03 max; S 0.025 max; Si 0.2-0.45; bal Fe.

### A-140C

AFORA (Aceros Afora S.A.)  
Iron alloy; C 0.55-0.65; Cr 0.2-0.5; Mn 0.65-0.95; P 0.03 max; S 0.03 max; Si 1.5-2; bal Fe.  
115-135 kgf/mm\*\*2 TS; 95 kgf/mm\*\*2 min YS; 8 min El.

### A-143

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.45-0.55; Cr 0.8-1.1; Mn 0.5-0.7; P 0.03 max; S 0.03 max; Si 0.15-0.4; V 0.15-0.25; bal Fe.  
115-135 kgf/mm\*\*2 TS; 95 kgf/mm\*\*2 min YS; 8 min El.

### A-144

AFORA (Aceros Afora S.A.)  
Iron alloy; C 0.5-0.6; Mn 0.7-1; P 0.03 max; S 0.03 max; Si 1.5-2; bal Fe.  
110-130 kgf/mm\*\*2 TS; 90 kgf/mm\*\*2 min YS; 8 min El.

### A-145

AFORA (Aceros Afora S.A.)  
Iron alloy; C 0.45-0.55; Mn 0.6-0.9; P 0.03 max; S 0.03 max; Si 1.5-2; bal Fe.  
95-115 kgf/mm\*\*2 TS; 75 kgf/mm\*\*2 min YS; 11 min El.

### A-1510

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.07-0.13; Mn 0.3-0.6; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
45-75 kgf/mm\*\*2 TS; 30 kgf/mm\*\*2 min YS; 15 min El.

### A-1511

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.12-0.18; Mn 0.3-0.6; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
50-80 kgf/mm\*\*2 TS; 85 kgf/mm\*\*2 min YS; 14 min El.

### A-1515

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.18-0.23; Mn 1.3-1.6; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
80-110 kgf/mm\*\*2 TS; 55 kgf/mm\*\*2 min YS; 9 min El.

### A-1516

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.13-0.19; Cr 0.8-1.1; Mn 1.3-1.3; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
85-115 kgf/mm\*\*2 TS; 60 kgf/mm\*\*2 min YS; 10 min El.

### A-1522

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.17-0.22; Cr 0.35-0.65; Mn 0.6-0.9; Mo 0.15-0.25; Ni 0.4-0.7; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
85-115 kgf/mm\*\*2 TS; 60 kgf/mm\*\*2 min YS; 9 min El.

### A-1523

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.18-0.23; Cr 0.3-0.5; Mn 0.6-0.9; Mo 0.4-0.5; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
80-115 kgf/mm\*\*2 TS; 60 kgf/mm\*\*2 min YS; 11 min El.

### A-1524

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.18-0.23; Cr 0.4-0.6; Mn 0.6-0.9; Mo 0.3-0.4; Ni 0.7-0.9; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
95-130 kgf/mm\*\*2 TS; 70 kgf/mm\*\*2 min YS; 9 min El.

### A-1525

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.18-0.23; Cr 0.4-0.8; Mn 0.6-0.9; Mo 0.3-0.4; Ni 1.4-1.7; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
105-135 kgf/mm\*\*2 TS; 80 kgf/mm\*\*2 min YS; 8 min El.

### A-1540

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.1-0.16; Cr 0.6-0.9; Mn 0.35-0.65; Ni 2.75-3.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
95-125 kgf/mm\*\*2 TS; 70 kgf/mm\*\*2 min YS; 9 min El.

### A-1550

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.15-0.21; Cr 0.85-1.15; Mn 0.6-0.9; Mo 0.15-0.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
90-120 kgf/mm\*\*2 TS; 65 kgf/mm\*\*2 min YS; 10 min El.

### A-1551

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.1-0.15; Cr 0.85-1.15; Mn 0.6-0.9; Mo 0.15-0.25; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
80-115 kgf/mm\*\*2 TS; 55 kgf/mm\*\*2 min YS; 10 min El.

### A-1560

AFORA (Aceros Afora S.A.)  
Nickel steel; C 0.11-0.17; Cr 0.8-1.1; Mn 0.3-0.6; Mo 0.2-0.3; Ni 3-3.5; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
115-145 kgf/mm\*\*2 TS; 90 kgf/mm\*\*2 min YS; 10 min El.

### A-1580

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.17-0.22; Cr 0.8-1.2; Mn 0.8-1; Ni 0.8-1.2; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
95-125 kgf/mm\*\*2 TS; 70 kgf/mm\*\*2 min YS; 9 min El.

**A-1581**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.13-0.18; Cr 0.8-1.2; Mn 0.8-1; Ni 0.8-1.2; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
85-115 kgf/mm\*\*2 TS; 60 kgf/mm\*\*2 min YS; 9 min El.

**A-210.G, 35MNS6**

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.32-0.39; Mn 1.35-1.65; P 0.035 max; S 0.08-0.13; Si 0.4 max; bal Fe.  
Quenched and tempered (<16 mm): 76-95 kgf/mm\*\*2 TS; 52 kgf/mm\*\*2 min YS; 12 min El. Quenched and tempered (<40 mm): 68-88 kgf/mm\*\*2 TS; 48 kgf/mm\*\*2 min YS; 14 min El. Quenched and tempered (<63 mm).

**A-286**

Damascus Bishop Tube Co.  
Precipitation hardening stainless steel; Cr 15; Mo 1.5; Ni 24; Ti 2; V 0.3; bal Fe.  
As hardened: 135,000-160,000 psi TS; 85,000-115,000 psi YS; 20-30 El; 24-34 HRC; High strength; corrosion resistant.  
Precipitation hardened alloy. Welded or seamless tubing.

**A-286**

Ulbrich Stainless Steels & Special Metals Inc.  
Precipitation hardening stainless steel; C .08; Cr 13.5-16.0; Mo 1.0-1.75; Ni 24.0-27.0; Ti 1.9-2.3; V .10-.50.

Precipitation hardening alloy with high strength and good corrosion resistance up to 1300 F.

**A-286\***

Driver-Harris Co.  
Welding filler stainless steel; Cr 15; Nb 1; Ni 26; Ti 2; bal Fe.  
Wire and rod for welding wire and fastener stock.

**A-3401**

AFORA (Aceros Afora S.A.)  
Stainless steel; C 0.09-0.15; Cr 11.5-14; Mn 1 max; P 0.04 max; S 0.03 max; Si 1 max; bal Fe.

**A-3507**

AFORA (Aceros Afora S.A.)  
Stainless steel; C 0.12 max; Cr 17.9-19; Mn 2 max; Ni 8-10; P 0.045 max; S 0.03 max; Si 1 max; bal Fe.

**A-60**

Valenite Inc., a Cincinnati Millicron Company  
Cermet.  
Ceramic coating TiC and Al<sub>2</sub>O<sub>3</sub>. For light rough and finishing applications on steel and cast iron. High performance coated grade for high speed machining. Code C-2/C-3/C-4/C-6/C-7/C-8.

**A-7\***

Atrax Co., Wallace Murray Corp.  
Carbide based material.  
Sintered carbide. 200,000 transverse strength; 14.95-15.2 g/cm\*\*3 density; 91.7-92.7 RA. Industry code: C-3-4; ISO K01, 05.

**A-7W\***

Wallace Murray Corp., Heller Tool Division  
Cold work tool steel; C 2.25; Cr 5.25; Mo 1; V 4.75; W 1; bal Fe.  
Air hardening tool steel; AISI A7.

**A-ALLOY GR. A\***

Alloy Engineering & Casting Co.  
Nickel alloy; C 0.4-0.8; Cr 19-21; Mn 0.5-1; Ni 66-68; bal Fe.  
Cast: 60,000-80,000 TS; 40,000-50,000 YS; 40 El; 30 RA; 217 HB; For heat and corrosion resistant parts. Heat and corrosion resistant.

**A-COPPER**

Isabellenhutte Hewster GmbH KG  
Nickel silver; Cu 99.5; Ni 0.5.  
220 N/mm\*\*2 TS. For electrical equipment and instruments. Resistance alloy. Maximum working temperature to 200 C.

**A-COPPER 11**

Isabellenhutte Hewster GmbH KG  
Nickel silver; Cu 95; Mn 2; Ni 3.  
Annealed: 250 N/mm\*\*2 for compensation cables type S, B and R.

**A-D-70**

John A. Crowley Inc.  
Cold work tool steel; C 0.7; Cr 0.3; Mn 0.35; V 0.12; W 0.98; bal Fe.  
For dies, crimpers, punches; oil hardened.

**A-G5**

French manufacture  
Aluminum magnesium alloy; Mg 5; Mn 0.5; bal Al.  
For automobile chassis; light weight construction.

**A-HT\***

Bethlehem Steel Corp.  
Cold work tool steel; C 1; Cr 3; Mo 1.1; Ti 1; V 0.25; W 1.05; bal Fe.  
Air-hardened tool steel. For dies, punches, shear blades, blanking tools.

**A-L 18 NICOMO (250)\***

Allegheny Ludlum Steel  
Maraging steel; B 0.003; C 0.03 max; Co 7-8.5; Mn 0.1 max; Mo 4.6-5.2; Ni 17-19; P 0.01 max; S 0.01 max; Si 0.15 max; Ti 0.3-0.5; Zr 0.02 max; bal Fe.  
Hot rolled: 165,100 TS; 132,600 YS; 10% El; 53.4% RA. Heat treated: 252,000 TS; 245,000 YS; 9.5% El; 46.5% RA. Uses: Rocket cases, aircraft landing gears, crimping dies. Maraging steel. Strengthened by precipitation hardening.

**A-L 18 NICOMO (300)\***

Allegheny Ludlum Steel  
Maraging steel; B 0.003; C 0.03 max; Co 8.5-9.5; Mn 0.1 max; Mo 4.6-5.2; Ni 18-19; P 0.01 max; S 0.01 max; Si 0.15 max; Ti 0.5-0.8; Zr 0.02 max; bal Fe.  
Annealed: 150,000 TS; 120,000 YS; 18% El; 75% RA; HRC 28. Heat treated: 306,000 TS; 303,000 YS; 12% El; 60 RA. Uses: Rocket cases, aircraft landing gears. Maraging steel. Strengthened by precipitation hardening.

**A-L 20 NI (250)\***

Allegheny Ludlum Steel  
Maraging steel; Al 0.2; C 0.03 max; Mn 0.1 max; Nb 0.45-0.6; Ni 19-20; P 0.01 max; S 0.01 max; Si 0.1 max; Ti 1.3-1.6; bal Fe.  
Annealed: 148,500 TS; 110,900 YS; 26.4 % El; 68.9% RA; HRC 29. Hardened: 269,000 TS; 263,000 YS; 12% El; 59% RA; HRC 53. Uses: Rocket cases, aircraft landing gears. Maraging steel. Strengthened by precipitation hardening.

**A-L 25 NI (250)\***

Allegheny Ludlum Steel  
Maraging steel; Al 0.15-0.3; C 0.03 max; Mn 0.1 max; Nb 0.45-0.6; Ni 25-26; P 0.01 max; S 0.01 max; Si 0.08; Ti 1.3-1.6; bal Fe.  
Annealed: 105,000 TS; 38,000 YS; 34% El; 77.3% RA; HRB 89. Heat treated: 286,000 TS; 276,000 YS; 12% El; 57% RA; HRC 54. Uses: Rocket cases, aircraft landing gear. Maraging steel. Strengthened by precipitation hardening.

**A-M52**

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.12-0.2; Mn 0.9-1.4; P 0.035 max; S 0.035 max; Si 0.15-0.4; bal Fe.  
65-85 kgf/mm\*\*2 TS; 55 kgf/mm\*\*2 min YS; 15 min El.

**A-R-COL 360\***

British Steel plc, Technical Swinden Laboratories  
Abrasion resistant steel; C 0.13 max; Cr 0.8; Mn 1.35; Mo 0.4; Si 0.05; bal Fe.  
Abrasion resisting steel for applications such as liner plates, chutes, buckets, storage bins, and mold boards.

**A-R-COL\***

British Steel plc, Technical Swinden Laboratories  
Abrasion resistant steel; C 0.17 max; Cr 0.65-0.95; Mn 1.6 max; Mo 0.3-0.5; P 0.03 max; S 0.015 max; Si 0.5 max; bal Fe.  
Roller quenched: 320 HB; Abrasion resistant plate. For use as hoppers, chutes, and mining equipment.

**A-TU.9**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.15 max; Cr 8-10; Mn 0.3-0.6; Mo 0.9-1.1; P 0.03 max; S 0.03 max; Si 0.5-1; bal Fe.  
65-75 kgf/mm\*\*2 TS; 45 kgf/mm\*\*2 min YS; 20 min El.

**A-TU.D**

AFORA (Aceros Afora S.A.)  
Carbon steel; C 0.12-0.2; Mn 0.5-0.8; Mo 0.45-0.65; P 0.03 max; S 0.03 max; Si 0.15-0.4; bal Fe.  
50-60 kgf/mm\*\*2 TS; 31 kgf/mm\*\*2 min YS; 25 min El.

**A-TU.E**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.1-0.2; Cr 0.5-0.8; Mn 0.3-0.6; Mo 0.45-0.65; P 0.03 max; S 0.03 max; Si 0.15-0.4; bal Fe.  
50-60 kgf/mm\*\*2 TS; 35 kgf/mm\*\*2 min YS; 20 min El.

**A-TU.G**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.15 max; Cr 1-1.5; Mn 0.3-0.6; Mo 0.45-0.65; P 0.03 max; S 0.03 max; Si 0.5-1; bal Fe.  
52-62 kgf/mm\*\*2 TS; 35 kgf/mm\*\*2 min YS; 20 min El.

**A-TU.H**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.15 max; Cr 2-2.5; Mn 0.3-0.6; Mo 0.9-1.1; P 0.03 max; S 0.03 max; Si 0.15-0.5; bal Fe.  
52-75 kgf/mm\*\*2 TS; 32 kgf/mm\*\*2 min YS; 20 min El.

**A-TU.I**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.15 max; Cr 2.7-3.3; Mn 0.3-0.6; Mo 0.8-1.05; P 0.03 max; S 0.03 max; Si 0.15-0.5; bal Fe.  
55-75 kgf/mm\*\*2 TS; 32 kgf/mm\*\*2 min YS; 20 min El.

**A-TU.J**

AFORA (Aceros Afora S.A.)  
Chromium steel; C 0.15 max; Cr 4-6; Mn 0.3-0.6; Mo 0.45-0.65; P 0.03 max; S 0.03 max; Si 0.15-0.5; bal Fe.  
65-75 kgf/mm\*\*2 TS; 45 kgf/mm\*\*2 min YS; 20 min El.

**A-U4G1**

Russian manufacture  
Aluminum copper alloy; Cu 4.36; Mg 1.5; Mn 0.6; Si 0.5; bal Al.  
Heat treated: 75,000 TS; 58,000 YS; 135 HB; For aircraft structures, fittings, hardware, rivets, fastenings; similar to Aluminum 2024, age-hardenable, high strength.

**A-U4SG**

Russian manufacture  
Aluminum copper alloy; Cu 4.35; Mg 0.5; Mn 0.8; Si 0.85; bal Al.  
Heat treated: 70,000 TS; 60,000 YS; 12 El; 135 HB; For hydraulic fittings, structures, hardware, engine components; similar to Aluminum 2014, age-hardenable, high strength.

**A. D. S.**

T. Inman & Co. Ltd.  
Cast steel; C 0.35; Cr 5; Mn 0.4; Mo 1.5; Si 1; V 0.54; bal Fe.  
Aluminum die-casting steel; air or oil hardenable.

**A. M. C.**

A. Milne & Co.  
High speed tool steel; C 0.7; Cr 4; V 1; W 18; bal Fe.  
For tools, cutters, broaches; high speed steel.

**A.A.A.A\***

Seitzinger's Inc.  
Bearing tin alloy; Pb, Sb; bal Sn.  
For bearings. Babbitt, anti-friction metal.

**A.B.C\***

Balfour Darwins Ltd.  
Tool steel; C 0.4; Cr 0.25; Mn 0.5; Si 0.3; W 0.5; bal Fe.  
For tools, chisels, hammers, drills, gears, shafts; tough and hard.

**A.B.C.**

P.F. McDonald & Co.  
Shock resisting tool steel; high C, alloy; bal Fe.  
For chisels; shock resistant.

**A.C.T.\***

Atlantic Steel Corp.  
High speed tool steel; C 0.65; Co 10; Cr 4.5; Mn 0.15; Mo 0.75; V 2; W 18; bal Fe.  
For tools, drills, cutters, reamers; high speed steel.

**A.D 3 M**

Aubert et Duval, Acierie des Ancizes  
Nickel steel; C 0.1; Cr 0.7; Mo 0.2; Ni 3; bal Fe.  
Annealed: 900-1100 MPa TS; 12-16 El; 180 HB; For shafts, spindles, pins, gears.

**A.E. SUPER NICKEL\***

IMI plc  
Nickel silver; Fe 1; Mn 1; Ni 30; bal Cu.  
Annealed: 65,000-90,000 TS; 25,000-53,000 YS; 44-6 El; 36-22 RA; 77-145 HB; For condensers, coolers, feed heaters; corrosion resistant.

\* Renamed, obsolete or no longer manufactured by this company.

## 20 / WOLDMAN'S ENGINEERING ALLOYS

### A.E.B. STAINLESS

Uddeholm Corp.  
Corrosion resistant steel; C 0.95; Cr 13.5; Mn 1; bal Fe.  
For razor blades, surgical instruments; hardenable, corrosion resistant.

### A.H. CHROME DIE\*

J. Beardshaw & Son Ltd.  
Cold work tool steel; C 1; Cr 5; Mo 1; V 0.3; bal Fe.  
For dies, gages, mandrels; cold work steel, air hardened, non-deforming.

### A.M. 1 SPECIAL\*

Balfour Darwins Ltd.  
Hot work tool steel; C 0.35; Cr 5; Mo 1.5; Si 1; V 0.45; W 1.35; bal Fe.  
For extrusion dies, heading dies, mandrels; hot-work steel, resists heat checking.

### A.M. 230\*

Aluminum Company of America, Wire, Rod and Bar Division  
Cast magnesium aluminum alloy; Al 9-11; Mn 0.1 min; Si 0.5-1; Zn 0.3 max; bal Mg. Die cast: 32,000 TS; 22,000 YS; 1.5 El; 63 HB; For aircraft motor parts, switch housings, vacuum cleaner parts; die casting alloy.

### A.M. 403\*

Aluminum Company of America, Wire, Rod and Bar Division  
Cast magnesium manganese alloy; Mn 1.2-2; Si 0.3 max; bal Mg.  
Sand cast: 14,000 TS; 45,000 YS; 5.0 El; 33 HB; For gasoline tanks, fittings; light casting alloy.

### A.M. 57 S\*

Aluminum Company of America, Wire, Rod and Bar Division  
Magnesium aluminum alloy; Al 6.5; Mn 0.4; Zn 1; bal Mg.  
Extruded: 38,000-42,000 TS; 22,000-28,000 YS; 8-14 El; 15-24 RA; 55 HB; For extrusion and hot pressings; good corrosion resistance.

### A.M. 59S\*

Aluminum Company of America, Wire, Rod and Bar Division  
Magnesium aluminum alloy; Al 9.5-10.5; Mn 0.1 min; Si 0.5 max; Zn 0.3 max; bal Mg.  
Heat treated: 56,000 TS; 40,000 YS; 3.5 El; 85 HB; For light alloy parts.

### A.M.C.O.H. SPECIAL

A. Milne & Co.  
Tool steel; C 0.9; Cr 0.5; Mn 1.2; W 0.5; bal Fe.  
For die, punches; nondeforming.

### A.M.D.\*

Diehl Steel Co.  
Hot work tool steel; C 0.34; Cr 4.75; Mn 0.4; Mo 1.45; W 1.1; bal Fe.  
For hot work dies; hot work steel.

### A.M.I.\*

Balfour Darwins Ltd.  
Die steel; C, alloy; bal Fe.  
For dies; tough and abrasion resistant.

### A.P. 33\*

Alais Forges et Camargue  
Aluminum copper alloy; Cu 4.5; Mg 0.5; Ti 0.4; bal Al.  
36,000-43,000 TS; 29,000-36,000 YS; 1-2 El. For light alloy parts; age-hardenable.

### A.P.X 4

Aubert et Duval, Acierie des Ancizes  
Chromium steel; C 0.06; Cr 16; Mo 1; Ni 4; bal Fe.  
Annealed: 1000-1200 MPa TS; 16-18 El; 269 HB; For welded fabrications exposed to sea water; hydraulic pumps and turbines, shafts, pins, bolts.

### A.P.X.

Aubert et Duval, Acierie des Ancizes  
Bearing steel; C 0.16; Cr 17; Ni 2; bal Fe.  
Annealed: 107,000 TS; 62,000 YS; 18 El; 35 RA; 220 HB; For cutlery, valves, surgical instruments, ball bearings; Type 431; corrosion resistant.

### A.P.Z. 2

Aubert et Duval, Acierie des Ancizes  
Stainless steel; C 0.8; Cr 20; Ni 1.5; Si 1.8; bal Fe.  
Heat treated: 143,000 TS. For exhaust valves; corrosion and heat resistant.

### A.R. ALLOY

International Development Corp.  
Copper alloy; Pb 2; Sn 10; bal Cu.  
10-5 El; 50-60 HB; For bearings for cold rolling mills, landing gears for airplanes; tough, strong.

### A.R. STAINLESS\*

Crucible Steel Castings Co.  
Stainless steel; C 0.2; Cr 18; Ni 8; bal Fe.  
For stainless parts; stainless.

### A.R.C. 2702T\*

Creusot-Loire Industrie  
Austenitic stainless steel; C 0.08 max; Cr 18-20; Mn 2 max; Ni 8-11; bal Fe.  
Annealed: 90,000 TS; 45,000 YS; 60 El; 135 HB; Cold drawn: 180,000 TS; 150,000 YS; 10 El; 330 HB; For chemical plant equipment, welded structures; Type 304; stainless, austenitic.

### A.S. ACK-LOW\*

Ackerlind Steel Co., Inc.  
Cold work tool steel; C 0.7; Cr 1; Mn 2.1; Mo 1.3; bal Fe.  
Air hardening cold work tool steel; AISI A6.

### A.S. BEARCAT\*

Ackerlind Steel Co., Inc.  
Shock resisting tool steel; C 0.5; Cr 3.25; Mn 0.7; Mo 1.4; bal Fe.  
Air or oil hardening tool steel; good resistance to impact; AISI S7.

### A.S. BLUE LABEL\*

Ackerlind Steel Co., Inc.  
Water hardening tool steel; C 1-1.1; Mn 0.25; Si 0.25; bal Fe.  
For taps, drills, reamers, hobs, broaches; Type W1; water hardened.

### A.S. BRAKE & DIE STEEL\*

Ackerlind Steel Co., Inc.  
Chromium steel; C 0.5; Cr 1; Mn 0.9; Mo 0.2; bal Fe.  
For press brakes for forming and bending; resists shock and wear.

### A.S. CROMAT V\*

Ackerlind Steel Co., Inc.  
Hot work tool steel; C 0.35; Cr 5.15; Mo 1.55; Si 1.05; V 0.3; W 1.25; bal Fe.  
Hot work tool steel for forging and hot forming dies, chromium type; AISI H12.

### A.S. DURAMOLD B\*

Ackerlind Steel Co., Inc.  
Mold steel; C 0.07; Cr 1; Mn 0.3; Mo 0.25; Si 0.15; B; bal Fe.  
For cold hubbing and case hardening for plastic molds; AISI P2.

### A.S. HOBBING IRON\*

Ackerlind Steel Co., Inc.  
Mold steel; C 0.05; Mn 0.1; bal Fe.  
For tools, hobbing molds; case-hardened.

### A.S. HOLLOW DIE\*

Ackerlind Steel Co., Inc.  
Die steel; C 1; Cr 1.5; Mn 0.4; bal Fe.  
For dies; tough.

### A.S. HOT DIE\*

Ackerlind Steel Co., Inc.  
Hot work tool steel; C 0.45; Cr 1.15; Si 0.9; V 0.25; W 2.5; bal Fe.  
For hot header dies, forming tools, piercers; hot work steel, oil hardened.

### A.S. LUSTRE-DIE\*

Ackerlind Steel Co., Inc.  
Cold work tool steel; C 0.5; Cr 1.1; Mn 1; Mo 0.25; Si 0.3; bal Fe.  
Oil hardening steel for arbors, shafts, lathe centers.

### A.S. NICKEL-CHROME HOBBING STEEL\*

Ackerlind Steel Co., Inc.  
Mold steel; C 0.1; Cr 0.6; Mn 0.5; Ni 1.25; bal Fe.  
For tools, hobbing molds; case-hardened.

### A.S. NO. 121\*

Ackerlind Steel Co., Inc.  
Cold work tool steel; C 0.95; Cr 2.2; Mn 2; Mo 1.1; bal Fe.  
Air hardening, medium alloy tool steel; for cold working tools; AISI A4.

### A.S. NO. 15\*

Ackerlind Steel Co., Inc.  
Die steel; C 0.5; Cr 0.8-1.1; Mn 0.7; V 0.15; bal Fe.  
For dies; pressure resisting steel.

### A.S. NO. 27\*

Ackerlind Steel Co., Inc.  
Die steel; C 0.95-1.1; Cr 1.5; Mn 0.3; V 0.2; bal Fe.  
For tools, dies; pressure resistant steel.

### A.S. NO. 42\*

Ackerlind Steel Co., Inc.  
Hot work tool steel; C 0.3; Cr 3.5; Mn 0.2; V 0.5; W 9.75; bal Fe.  
For hot dies; hot work steel.

### A.S. NO. 5\*

Ackerlind Steel Co., Inc.  
Cold work tool steel; C 1; Cr 5; Mn 0.7; Mo 1.1; V 0.25; bal Fe.  
For tools and dies. Air hardening; AISI A2.

### A.S. NO. 66\*

Ackerlind Steel Co., Inc.  
High speed tool steel; C 0.8; Cr 4; Mo 4-5; V 2; W 6; bal Fe.  
For lathe and planer tools, drills, form cutters, hot punches; high speed steel.

### A.S. NO. 670\*

Ackerlind Steel Co., Inc.  
Hot work tool steel; C 0.38; Cr 5.25; Mo 1.25; Si 1; V 1.05; bal Fe.  
Air hardening hot work tool and die steel, chromium type; AISI H13.

### A.S. NO. 7\*

Ackerlind Steel Co., Inc.  
Shock resisting tool steel; C 0.45; Cr 1.15; Si 0.9; V 0.2; W 2.5; bal Fe.  
For master hobs, shear blades, and punches. Type S1; shock resisting steel.

### A.S. NO. 85\*

Ackerlind Steel Co., Inc.  
Cold work tool steel; C 0.55; Cr 1; Mn 0.4; Mo 0.3; Ni 3; Si 0.3; bal Fe.  
Oil hardening steel for shafts, lathe centers, tool holders.

### A.S. SPECIAL HOBBING IRON\*

Ackerlind Steel Co., Inc.  
Mold steel; C 0.05; Mn 0.1 min; Si 0.1; bal Fe.  
For cold hubbing; can be case hardened for molds; AISI P1.

### A.S. TRI-ACK\*

Ackerlind Steel Co., Inc.  
Cold work tool steel; C 1.5; Cr 12; Mn 0.3; Mo 0.8; V 0.2; bal Fe.  
For dies; air hardening, nondeforming.

### A.S. TRI-MO\*

Ackerlind Steel Co., Inc.  
Die steel; C 1.5; Cr 12; Mo 0.8; V 0.2; bal Fe.  
For threading dies, cutting tools, punches, dies; nondeforming.

### A.S. WHITE LABEL\*

Ackerlind Steel Co., Inc.  
Water hardening tool steel; C 1.1; V 0.2; bal Fe.  
For blanking and forming dies, plug gauges; water hardened.

### A.S.V.\*

Teledyne Cutting Tool  
Water hardening tool steel; C 0.7; bal Fe.  
For tools, cutters; water hardened.

### A.T. 2 DIE\*

CCS Braeburn Alloy Steel  
Cold work tool steel; C 2.2; Cr 12; Mo 0.9; V 0.25; bal Fe.  
For blanking and forming dies, gauges. Oil hardened, non-deforming.

### A.T. 2\*

CCS Braeburn Alloy Steel  
Cold work tool steel; C 2.2; Cr 12; Mo 0.9; V 0.25; bal Fe.  
Hardened: 63-65 HRC; For blanking and forming dies, gauges, trimmer and drawing dies, lathe centers, brick mold liners. Cold work Type D4, oil or air hardening. High abrasion resistance.

### A.T. STEEL\*

Carpenter Technology Corp.  
Cold work tool steel; C 0.35; Cr 1.5; Mn 0.5; Ni 3.5; Si 0.3; bal Fe.  
Air hardening tool steel.

### A.W. 70-90 TYPE A\*

Alan Wood Steel Co.  
Carbon steel; C 0.25 max; Cu 0.5; Mn 0.7; P 0.1; bal Fe.  
90,000 TS; 70,000 YS; 20 El. For sheets, plates; easy to weld.

### A.W. 70-90 TYPE B\*

Alan Wood Steel Co.  
Steel; C 0.25 max; Cu 0.5; Mn 0.7; P 0.1; bal Fe.  
Rolled: 65,000 TS; 50,000 YS; 20 El. For structural work, transportation industry, truck and tank truck bodies; weldable, atmospheric corrosion resistant.

### A.W. DYNALLOY\*

Alan Wood Steel Co.  
Carbon steel; C 0.12; Mn 0.75; Mo 0.07; Ni 0.7; bal Fe.  
65,000-80,000 TS; 50,000 YS; 25 El. For railroad equipment, trucks, buses, smoke chambers, stacks; good weldability.

\* Renamed, obsolete or no longer manufactured by this company.

### A.Z. ALLOY\*

Atlantic Zinc Works  
Brass; Pb 1; Zn 33; bal Cu.  
For plates for photoengraving. Free-cutting.

### A12

Atrax Co., Wallace Murray Corp.  
Carbide based material.  
Sintered carbide. 2495 N/mm\*\*2 transverse rupture strength; 14.53 +/-0.3g/cm\*\*3 density 91.00 +/-0.3 Rockwell A hardness; ISO K20-K30.

### A201

Fansteel Wellman Dynamics  
Cast aluminum copper alloy; Ag 0.4-1; Be 0.03; Cu 4-5; Fe 0.1; Mg 0.15-0.35; Mn 0.2-0.4; Si 0.05; Ti 0.15-0.35; Zn 0.03; bal Al.  
Aluminum casting alloy. Cast: 60,000 psi TS; 50,000 psi YS; 3-5 EL.

### A206

Fansteel Wellman Dynamics  
Cast aluminum copper alloy; Be 0.05; Cu 4.2-5; Fe 0.1; Mg 0.15-0.35; Mn 0.2-0.5; Si 0.05; Ti 0.15-0.3; Zn 0.1; bal Al.  
Aluminum casting alloy. Cast: 50,000 psi TS; 30,000-40,000 psi YS; 3-10 EL.

### A28

Atrax Co., Wallace Murray Corp.  
Carbide based material.  
Sintered carbide. 1800 N/mm\*\*2 transverse rupture strength; 14.89 +/-0.3g/cm\*\*3 density 92.2 +/-0.3 Rockwell A hardness; ISO M20-M30, K20-K30.

### A28F

Acieries et Forges d'Anor  
Heat resistant steel; C 0.25-0.45; Cr 28-30; Ni 3-5; bal Fe.  
Heat resisting steel. AFNOR Z35 CN 28.04.

### A319

Bunting Bearings Corp.  
Aluminum silicon alloy; Cu 3.5; Si 6.3; bal Al.  
Permanent mold process.

### A325

Pyron Corp., A Höganas AB company  
Low alloy steel; O 0.0034 max.  
Very fine (minimum 95% <325 mesh) atomized iron powder. Used for magnetic and chemical applications.

### A356

Fansteel Wellman Dynamics  
Cast aluminum silicon alloy; Cu 0.2; Fe 0.2; Mg 0.25-0.45; Mn 0.1; Si 6.5-7.5; Ti 0.2; Zn 0.1; bal Al.  
Aluminum casting alloy. Cast: 38,000-45,000 psi TS; 28,000-34,000 psi YS; 3-5 EL.

### A356.0

Bunting Bearings Corp.  
Cast aluminum silicon alloy; Cu 0.2 max; Fe 0.2 max; Mg 0.25-0.45; Mn 0.1 max; Si 6.5-7.5; Ti 0.2 max; Zn 0.1 max; bal Al.  
MIL-A-21180D specification alloy A356.0.  
Permanent mold process.

### A357

Fansteel Wellman Dynamics  
Cast aluminum silicon alloy; Be 0.04-0.07; Cu 0.2; Fe 0.2; Mg 0.4-0.7; Mn 0.1; Si 6.5-7.5; Ti 0.04 min; Zn 0.1; bal Al.  
Aluminum casting alloy. Cast: 40,000 psi TS; 30,000 psi YS; 2 EL.

### A36CC\*

LTV Steel Co.  
Carbon steel; C 0.16; Mn 0.5; Si 0.04; bal Fe.  
36,000 psi YS min. Good weldability and impact (notch) toughness. For automotive frames and cross members. ASTM A-36.

### A441 STEEL

Gulf States Steel, Inc.  
High strength low alloy steel; C 0.22; Cu 0.20 min; Mn 0.85-1.25; P 0.04; S 0.05; Si 0.3; V 0.02 min; bal Fe.  
High strength low alloy steel with strength, toughness and resistance to atmospheric corrosion. 50,000 YS min; 70,000 TS min; 22 EL.

### A45YO/A45YK/A45YF

Acme Steel Co.  
High strength steel; C 0.22 max; Mn 1.35 max; Nb 0.005 min; P 0.04 max; S 0.05 max; Si 0.3 max; V 0.01 min; Cu optional; bal Fe.  
Plate: 60,000 psi TS; 45,000 psi YS; 25 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A572; SAE J1442. Sheet and strip meets ASTM A607 grade 45, SAE J1392 grade 045YHO/045YHK.

### A50XF

Acme Steel Co.  
High strength steel; C 0.15 max; Mn 1.65 max; Nb 0.005 min; P 0.025 max; S 0.035 max; Si 0.6 max; V 0.01 min; bal Fe.  
Plate: 60,000 psi TS; 50,000 psi YS; 24 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A656 grade 50; SAE J1442. Sheet and strip meets ASTM A715 grade 50; SAE J1392 grade 050XLF.

### A50YO/A50YK

Acme Steel Co.  
High strength steel; C 0.23 max; Mn 1.35 max; P 0.04 max; S 0.05 max; Si 0.3 max; optional; bal Fe.  
Plate: 65,000 psi TS; 50,000 psi YS; 22 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A572; SAE J1442. Sheet and strip meets ASTM A607 grade 50; SAE J1392 grade 050YHO/050VHK.

### A55YO/A55YK

Acme Steel Co.  
High strength steel; C 0.25 max; Mn 1.35 max; Nb 0.005; P 0.04 max; S 0.05 max; Si 0.3 max; V 0.01 min; Cu optional; bal Fe.  
Plate: 70,000 psi TS; 55,000 psi YS; 20 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A572; SAE J1442. Sheet and strip meets ASTM A607 grade 55.

### A6

Atrax Co., Wallace Murray Corp.  
Carbide based material.  
Sintered carbide. 1895 N/mm\*\*2 transverse rupture strength; 14.95 +/-0.3g/cm\*\*3 density; 92.00 +/-0.3 rockwell A; ISO K10-K20.

### A60

Acieries et Forges d'Anor  
Refractory stainless steel; C 0.1-0.15; Cr 24-26; Ni 19-22.  
Refractory stainless steel. AFNOR Z12 CN 25.20.

### A60XF

Acme Steel Co.  
High strength steel; C 0.15 max; Mn 1.65 max; Nb 0.005 min; P 0.025 max; S 0.035 max; Si 0.6 max; V 0.01 min; bal Fe.  
Plate: 70,000 psi TS; 60,000 psi YS; 22 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A656 grade 60. Sheet and strip meets ASTM A715 grade 60; SAE J1392 grade 060XLF.

### A60YO/A60YK

Acme Steel Co.  
High strength steel; C 0.26 max; Mn 1.35 max; Nb 0.005 min; P 0.04 max; S 0.05 max; Si 0.3 max; V 0.01 min; Cu optional; bal Fe.  
Plate: 75,000 psi TS; 60,000 psi YS; 18 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A572; SAE J1442. Sheet and strip meets ASTM A607 grade 60; SAE J1392 grade 060YHO/060YHK.

### A62

Atrax Co., Wallace Murray Corp.  
Carbide based material.  
Sintered carbide. 1860 N/mm\*\*2 transverse rupture strength; 14.95 +/-0.3g/cm\*\*3 density 92.5 Rockwell A hardness; ISO K10-K20.

### A70XF

Acme Steel Co.  
High strength steel; C 0.15 max; Mn 1.65 max; Nb 0.005 min; P 0.025 max; S 0.035 max; Si 0.6 max; V 0.01 min; bal Fe.  
Plate: 80,000 psi TS; 70,000 psi YS; 20 EL.  
For applications requiring high strength with good formability and weldability. Meets A656 grade 70. Sheet and strip meets ASTM A715 grade 70; SAE J1392 grade 070XLF.

### A71NB QUALITY\*

Delta Metal (BW), Ltd.  
Tin brass; Cu 61; Pb 0.5 max; Sn 1.0 min; bal Zn.  
Extruded: 60,000 TS; 25 EL; 25 RA; 120 HB; Drawn: 66,000 TS; 22 EL; 20 RA; 130 HB; For condenser tubes; naval brass.

### A80L

Acieries et Forges d'Anor  
Austenitic stainless steel; C 0.03 max; Cr 17-19; Mn 1.5 max; Mo 2-3; Ni 10-12; Si 1.5 max; bal Fe.  
Austenitic 18/8 plus Mo type stainless steel. AFNOR Z 08 CND 18-08.

### A80XF

Acme Steel Co.  
High strength steel; C 0.15 max; Mn 1.65 max; Nb 0.005 min; P 0.025 max; S 0.035 max; Si 0.6 max; V 0.01 min; bal Fe.  
Plate: 90,000 psi TS; 80,000 psi YS; 18 EL.  
For applications requiring high strength with good formability and weldability. Meets ASTM A656 grade 80. Sheet and strip meets ASTM A715 grade 80; SAE J1392 grade 080XLF.

### A9V\*

Farbenindustrie AG  
Cast magnesium aluminum alloy; Al 8.5; Mn 0.3; Zn 0.5; bal Mg.  
For castings, light metal parts; heat treatable.

### AA 7049

Manufacturer unknown  
Aluminum zinc alloy.  
For production of high quality weapon parts.

### AA NICKEL-COBALT\*

Hanson-Van Winkle-Munning Co.  
Metal alloy; Ni-Co.  
For anodes; electroplating.

### AA-1\*

Glacier Vandervell Ltd.  
Copper alloy; Sn 15; bal Cu.  
For bearings.

### AB 2

Acciaierie Valbruna SpA  
Water hardening tool steel; C 0.7; Mn 0.3 max; Si 0.3 max; bal Fe.  
Cold work tool steel. AISI W1-7; WNr. 1.1520.

### AB 3

Acciaierie Valbruna SpA  
Water hardening tool steel; C 0.85; Mn 0.25 max; Si 0.25 max; bal Fe.  
Cold work tool steel. AISI W1-8.

### AB 4

Acciaierie Valbruna SpA  
Water hardening tool steel; C 0.98; Mn 0.4 max; Si 0.35 max; bal Fe.  
Cold work tool steel. AISI W1-9.5; WNr. 1.1545.

### AB164 QUALITY\*

Delta Metal (BW), Ltd.  
Aluminum bronze; Al, Fe, Ni; bal Cu.  
Extruded: 82,000 TS; 42,000 YS; 20 EL; 12 RA; 170 HB; Drawn: 88,000 TS; 46,000 YS; 18 EL; 10 RA; 180 HB; For engine valve guides; Al bronze, heat resistant.

### AB197 QUALITY\*

Delta Metal (BW), Ltd.  
Aluminum bronze; Al, Fe, Ni; bal Cu.  
Extruded: 110,000 TS; 62,000 YS; 18 EL; 10 RA; 190 HB; Drawn: 115,000 TS; 68,000 YS; 15 EL; 10 RA; 210 HB; For hardware; Al bronze, corrosion resistant.

### AB2

English manufacture  
Aluminum bronze; Al 8.5-10.5; Fe 3.5-5.5; Mn 1.5 max; Ni 4.6-6.5; Zn 0.5 max; bal Cu.  
For impellers and propellers, gears, pumps, shafts, bushings. B.S. 1400 equivalent; heat treatable, corrosion resistant.

### AB49 TRI-FOIL

Johnson Matthey plc, Materials Technology Division Europe  
Welding filler silver alloy; Ag 49; Cu 27.5; Mn 2.5; Ni 0.5; Zn 20.5.  
Silver brazing alloys for tungsten carbide; 670-710 C MP; DIN 8513.

### AB65

Steelmark-Eagle & Globe, ANI Corporation Limited  
Cold work tool steel; C 0.65; Cr 0.75; Mn 0.75; Si 1.6; bal Fe.  
Cold work tool and die steel. General purpose for shear blades, punches, dies and vise jaws. AS1239 S101A.

### ABC 100.30

Hoganas AB  
Iron alloy; C 0.002; bal Fe.  
For powder metallurgy, density 3.00 g/cm3.

### ABC III

Erasteel Inc.  
High speed tool steel; C 0.99; Cr 4.1; Mo 2.7; V 2.4; W 2.8.  
Soft annealed 250 HB; cold rolled or drawn 320 HB; Conventional grade ISO HS 3-3-2; EN HS 3-3-2 EN 1.3333 DIN 1.3333.

### ABEX NO. 10B\*

Abex Corp.  
See C86200, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 10C\*

Abex Corp.  
See C86500, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 10D\*

Abex Corp.  
See C86300, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 15A\*

Abex Corp.  
See C94100, U.S. Bronze Foundry & Machine, Inc.

\* Renamed, obsolete or no longer manufactured by this company.

## 22 / WOLDMAN'S ENGINEERING ALLOYS

### ABEX NO. 20-A\*

Abex Corp.  
See ABEX NO. 20-A, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 20-A\*

U.S. Bronze Foundry & Machine, Inc.  
Cast tin bronze; Cu 97; Sn 2; Zn 1.  
Sand cast: 25,000 psi TS; 8,000 psi YS; 35 El; 35 HB; 28% IACS conductivity.  
Electrode copper.

### ABEX NO. 20-B\*

Abex Corp.  
See C81101, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 20-C\*

Abex Corp.  
See ABEX NO. 20-C, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 20-C\*

U.S. Bronze Foundry & Machine, Inc.  
Cast copper alloy; Cu 99.9.  
Sand cast: 25,000 psi TS; 7,000 psi YS; 35 El; 35 HB; 80% IACS min conductivity.

### ABEX NO. 20-H\*

Abex Corp.  
See C81500, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 20-L\*

Abex Corp.  
See C81100, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 20-Y\*

Abex Corp.  
See C81102, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 41\*

Abex Corp.  
See C83600, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 4K\*

Abex Corp.  
See C90500, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 4L\*

Abex Corp.  
See C90304, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 61\*

Abex Corp.  
See ABEX NO. 61, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 61\*

U.S. Bronze Foundry & Machine, Inc.  
Cast high leaded tin bronze; Cu 75; Pb 16; Sn 6; Zn 3.  
Sand cast: 20,000 psi TS; 14,000 psi YS; 7 El; 50 HB; TIGER bronze. Similar to CDA 939.

### ABEX NO. 622\*

Abex Corp.  
See C92200, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 63\*

Abex Corp.  
See ABEX NO. 63, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 63\*

U.S. Bronze Foundry & Machine, Inc.  
Cast tin bronze; Cu 88; Pb 2; Sn 10.  
Sand cast: 35,000 psi TS; 16,000 psi YS; 10 El; 67 HB; Leaded tin bronze; CDA 927.

### ABEX NO. 64\*

Abex Corp.  
See C93700, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 640\*

Abex Corp.  
See C92500, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 65\*

Abex Corp.  
See C90700, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 65-N\*

Abex Corp.  
See C91700, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 660\*

Abex Corp.  
See C93200, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 6H\*

Abex Corp.  
See C94500, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 6R\*

Abex Corp.  
See C94502, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 6X\*

Abex Corp.  
See C94300, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 7A\*

Abex Corp.  
See C92900, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 964\*

Abex Corp.  
See C96400, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 9A\*

Abex Corp.  
See C95300, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 9AF\*

Abex Corp.  
See C95400, U.S. Bronze Foundry & Machine, Inc.

### ABEX NO. 9L\*

Abex Corp.  
See C95500, U.S. Bronze Foundry & Machine, Inc.

### ABK METAL

Amsco Wear Products Inc.  
Cast iron; C 3-3.75; Cr 1.5-4; Mn 0.3-0.9; Ni 3.5-6.5; Si 0.3-1.2; bal Fe.  
Cast: 35,000-80,000 TS; 0.10-0.30 El; 500-650 HB; For castings, crushing rolls, liners; wear resistant, cast iron.

### ABK NI-HARD\*

Amsco Wear Products Inc.  
Cast steel; C 2.7-3.6; Cr 1.5; Mn 0.3-0.7; Ni 4.5; Si 0.5-1.5; bal Fe.  
Cast: 30,000-40,000 TS; 575-750 HB; For pump plungers, roller bearing races, chilled rolls; corrosion resistant, tough.

### ABRACORR 25

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; Al 0.65; C 0.1; Cr 4; Mn 0.5; Mo 0.2; Ni 0.75; bal Fe.  
Weldable and easily formable. For abrasion and oxidation resisting parts.

### ABRACORR 30

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; Al 0.8; C 0.1; Cr 6; Mn 0.8; Ni 1.5; Mo+V; bal Fe.  
Weldable and easily formable. For abrasion and oxidation resisting parts.

### ABRADUR 500\*

Societe Nouvelle des Acieres de Pompey  
Steel; C 0.4; Cr 1.4; Mo 0.4; Ni 3.5; bal Fe.  
For gears, shafts, crankshafts; oil hardened, shock resistant.

### ABRADUR C

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.9; Mn 0.75; Si 0.25; bal Fe.  
Hardenable to 60 HRC on surface. For wear and abrasion resisting parts.

### ABRADUR C 65 K

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.65; Cr 0.3; Mn 0.8; Si 0.25; bal Fe.  
Hardenable to 55 HRC on surface. For wear and abrasion resisting parts.

### ABRADUR C 75 K

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.75; Cr 0.3; Mn 0.8; Si 0.25; bal Fe.  
Hardenable to 58 HRC on surface. For wear and abrasion resisting parts.

### ABRADUR C 90 K

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.9; Cr 0.35; Mn 0.8; Si 0.25; bal Fe.  
Hardenable to 61 HRC on surface. For wear and abrasion resisting parts.

### ABRADUR PM 25

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.2; Cr 0.75; Mn 1.3; bal Fe.  
Hardenable to 40 HRC (approximate); weldable. For wear and abrasion resisting parts.

### ABRADUR PM 35

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.16; Cr 1.5; Mn 0.2; V 0.1; bal Fe.  
Hardenable to 35 HRC (approximate); weldable. For wear and abrasion resisting parts.

### ABRADUR PM 40

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.28; Cr 1.7; Mn 1.6; Mo 0.45; Ni 0.8; V 0.1; bal Fe.  
Hardenable to 45-50 HRC (approximate); weldable. For wear and abrasion resisting parts.

### ABRADUR S

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.45; Mn 0.7; Si 1.8; bal Fe.  
Heat treatable to 40-55 HRC; For wear and abrasion resisting parts.

### ABRADUR SK

Societe Nouvelle des Acieres de Pompey  
Abrasion resistant steel; C 0.65; Cr 0.85; Mn 0.85; Si 1.65; bal Fe.  
Hardenable to 46-60 HRC; For wear and abrasion resisting parts.

### ABRASALLOY\*

Atlantic Steel Corp.  
Abrasion resistant steel; C 0.35; Cr 1; Mn 0.75; Mo 0.25; Si 0.35; bal Fe.  
For crusher hammers, coal screens, dredge pumps; tough, wear resistant.

### ABRASION RESISTING

Inland Steel Co.  
Abrasion resistant steel; C 0.35-0.5; Mn 1.2-1.65; Si 0.1-0.3; bal Fe.  
Z10 HB; For wear resistant sheet or plate.

### ABRASIST\*

Denver Thomas, Inc.  
Cast steel; C, alloy; bal Fe.  
For machinery castings; abrasion resistant.

### ABRASOCRAFT\*

E.M.F. Electric Co. Ltd.  
Surfacing filler iron alloy; C, alloy; bal Fe.  
Welded: 350-500 HB; For hard surfacing electrode; abrasion resistant.

### ABRASOHARD\*

Universal Power Corp.  
Welding filler steel; C alloy; bal Fe.  
For welding rods; abrasion resistant.

### ABRASOWELD\*

Lincoln Electric Co., Aircro Filler Metal Products  
Surfacing filler iron chromium alloy; C 2.1; Cr 6.5; Mn 1.1; Mo 0.4; Si 0.75; bal Fe.  
Hard surfacing, arc welding electrodes; resistance to abrasion and impact.

### ABRATEC N700

Eutectic Corp., Member of Eutectic + Castolin Companies  
Metal.  
Electrode for AC-DC metallic arc abrasion resistant coating of steel; 60 C.

### ABRAZO 400

British Steel plc, Technical Swinden Laboratories  
Abrasion resistant steel; B 0.003 max; C 0.22 max; Mn 1.6 max; Nb 0.4 max; Si 0.5 max; bal Fe.  
Abrasion resistant steel for applications such as liner plates, chutes, buckets, storage bins and mold boards.

### ABRAZO 500

British Steel plc, Technical Swinden Laboratories  
Abrasion resistant steel; C 0.3 max; Cr 0.6 max; Mn 1.4 max; Mo 0.6 max; Si 0.4 max; bal Fe.  
Abrasion resistant steel for applications such as liner plates, chutes, buckets, storage bins and mold boards.

### ABRAZO 60\*

British Steel plc, Technical Swinden Laboratories  
Abrasion resistant steel; C 0.6 max; Mn 0.6; Si 0.25; bal Fe.  
Abrasion resistant steel for applications such as liner plates, chutes, buckets, storage bins, and mold boards.

### ABROS

English manufacture  
Electrical resistance nickel chromium alloy; Cr 10; Mn 2; Ni 88.  
For electrical resistance, heating elements; stainless and corrosion resistant.

### ABSCO METAL 25H\*

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn; bal Fe.  
Cast: 25,000 TS; 150-210 HB; For ingot molds, pig molds; cast iron, Class 25.

### ABSCO METAL 30\*

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn; bal Fe.  
Cast: 30,000 TS; 20,000 YS; 0.6 El; 170-240 HB; For gears, pulleys, general castings; cast iron, Class 30.

\* Renamed, obsolete or no longer manufactured by this company.

**ABSCO METAL 30H\***

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn, alloy; bal Fe.  
Cast: 30,000 TS; 220-280 HB; For heat and wear resistant castings; cast iron.

**ABSCO METAL 35\***

Amsco Wear Products Inc.  
Cast iron; high C, S, Mn; bal Fe.  
Cast: 35,000 TS; 200-260 HB; For gears, housings, general castings; cast iron, Class 35.

**ABSCO METAL 40\***

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn; bal Fe.  
Cast: 40,000 TS; 210-260 HB; For meter bodies, water valves, compressor cylinders; cast iron, Class 40.

**ABSCO METAL 400\***

Amsco Wear Products Inc.  
Cast steel; high C, Si, Mn, alloy; bal Fe.  
Cast: 400 HB; For ash-sluice pipe chutes, burner nozzles; heat and wear resistant.

**ABSCO METAL 40H\***

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn, alloy; bal Fe.  
Cast: 40,000 TS; 230-290 HB; For heat and wear resistant castings; cast iron.

**ABSCO METAL 50\***

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn; bal Fe.  
Cast: 50,000 TS; 220-280 HB; For press parts, cylinder heads, forming dies; cast iron, Class 50.

**ABSCO METAL 55\***

Amsco Wear Products Inc.  
Cast iron; high C, Si, Mn; bal Fe.  
Cast: 55,000 TS; 45,000 YS; 0.7 El; 230-310 HB; For crankshafts, tool shanks, cutter bodies; cast iron, Class 55.

**ABYSSINIAN GOLD**

English manufacture  
Brass; Cu 90-92; Zn 8-10; 1 plated Au.  
For ornaments, jewelry; sheets plated with Au.

**AC-254\***

Allis-Chalmers Mfg. Co.  
Martensitic stainless steel; B 0.22; C 0.24; Cr 12; Mn 1; Mo 2.5; Ni 1; Si 0.4; V 0.25; W 1; bal Fe.  
For steam turbine blading, jet engine components. Stainless, martensitic, creep resistant.

**AC-325**

Pyron Corp., A Höganäs AB company  
Low alloy steel.  
Very fine (minimum 95% <325 mesh) hydrogen reduced sponge iron powder. Used for chemical applications requiring high specific surface or rapid reactivity.

**AC-AMSCO NO. 217\***

Edgcomb Metals Co.  
Surfacing filler iron tungsten alloy; Cr 8; W 15; bal Fe.  
600-700 HB; For hard facing welding rod; maintains hardness up to 1000 F.

**AC-AMSCO NO. 459\***

Edgcomb Metals Co.  
Surfacing filler iron chromium alloy; C 3; Cr 4; Mo 4; bal Fe.  
500-600 HB; For hard surfacing welding rod; for severe wear and abrasion.

**AC-COATED 18-8\***

Edgcomb Metals Co.  
Welding filler stainless steel; Cr 18; Ni 8; C; bal Fe.  
Coated. For stainless steel welding rod; coated rods.

**AC-WELD\***

Edgcomb Metals Co.  
Welding filler steel; C 0.2; bal Fe.  
Weld: 65,000-70,000 TS; 28-30 El. For welding rod; A.C. welding.

**ACADAL**

Aluminum alloy.  
Aluminum alloy for color anodizing.

**ACCOLLOY\***

American Chain & Cable, Page Steel & Wire Div.  
Nickel steel; C 0.3; Ni 3.5; bal Fe.  
For chains.

**ACCOLOY CN-1\***

Alloy Engineering & Casting Co.  
Ferritic stainless steel; C 0.5 max; Cr 28; Ni 3; bal Fe.  
For chemical, mining, and paper industries; bushings, pump casings, valve bodies, and corrosive resistors; ferritic.

**ACCOLOY CN-10\***

Alloy Engineering & Casting Co.  
Stainless steel; C 0.08 max; Cr 18; Mo 2-3; Ni 9; bal Fe.  
Cast. For corrosion and heat resistance. Austenitic; ACI Type CF-8M.

**ACCOLOY CN-2\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.4; Cr 28; Ni 10; bal Fe.  
Cast: 95,000 TS; 45,000 YS; 20 El; 200 HB; For furnace parts, heat treating equipment, and pots. Type HE; austenitic; heat resistant.

**ACCOLOY CN-3\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.4; Cr 25; Ni 20; bal Fe.  
Cast: 75,000 TS; 50,000 YS; 17 El; 170 HB; For furnace parts, heat treating equipment, and pots. Type HK; austenitic; heat resistant.

**ACCOLOY CN-4\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.3; Cr 25; Ni 12; bal Fe.  
Cast: 80,000 TS; 50,000 YS; 25 El; 185 HB; For furnace parts, heat treating equipment, and pots. Type HH2; austenitic; heat resistant.

**ACCOLOY CN-5\***

Alloy Engineering & Casting Co.  
Stainless steel; C 0.25; Cr 18; Ni 8; bal Fe.  
Cast: 75,000 TS; 45,000 YS; 30 El; 175 HB; For carburizing boxes; corrosion and heat resistant, austenitic.

**ACCOLOY CN-6\***

Sandvik Hard Materials Ltd., Wear Parts Division  
Cast steel; C 0.2-0.6; Cr 30; Ni 20; bal Fe.  
Cast: 82,000 psi TS; 52,000 psi YS; 19 El; 192 Bin. For furnace fixtures, furnace parts, heat treating equipment, radiant tubes. Type HL; heat and corrosion resistant.

**ACCOLOY CN-7\***

Alloy Engineering & Casting Co.  
Tool steel; C 0.2 max; Cr 18; Ni 8; bal Fe.  
Cast. For chemical, petrochemical, and food industries; pumps, return bends, valve bodies, and cylinder liners. Heat and corrosion resistant. ACI Type CF-20.

**ACCOLOY CN-8\***

Alloy Engineering & Casting Co.  
Cast steel; C 0.08 max; Cr 18; Ni 8; bal Fe.  
Cast. For blast furnace, guide rollers, headers, pumps, and corrosion resistant operations. ACI Type CF-8.

**ACCOLOY CNC-4B\***

Alloy Engineering & Casting Co.  
Stainless steel; C 0.1 max; Cr 24; Ni 12; bal Fe.  
For furnace parts, heat treating equipment, pots; corrosion and heat resistant, austenitic.

**ACCOLOY CNC-4D\***

Alloy Engineering & Casting Co.  
Austenitic stainless steel; C 0.2 max; Cr 24; Ni 12; bal Fe.  
For furnace parts, heat treating equipment, pots; heat and corrosion resistant, austenitic.

**ACCOLOY CNC-5A\***

Alloy Engineering & Casting Co.  
Austenitic stainless steel; C 0.07; Cr 18; Ni 8; bal Fe.  
Cast: 85,000 TS; 150 HB; For castings, baskets, carburizing boxes; Type 304; stainless, austenitic.

**ACCOLOY CNC-5B\***

Alloy Engineering & Casting Co.  
Austenitic stainless steel; C 0.1; Cr 18; Ni 8; bal Fe.  
Cast: 85,000 TS; 150 HB; For heat treating boxes, pots, baskets; Type 302; stainless, austenitic.

**ACCOLOY CNC-5C\***

Alloy Engineering & Casting Co.  
Austenitic stainless steel; C 0.16 max; Cr 18; Ni 8; bal Fe.  
Cast: 90,000 TS; 160 HB; For heat treating boxes, chemical plant equipment; Type 302; stainless, austenitic.

**ACCOLOY NC-1\***

Alloy Engineering & Casting Co.  
Nickel alloy; C 0.35-0.75; Cr 18; Ni 68; bal Fe.  
Cast: 65,000 TS; 36,000 YS; 9 El; 176 HB; For furnace parts, radiant tubes, heating elements, and heat treating equipment. ACI Type HX; austenitic.

**ACCOLOY NC-10\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 25; Ni 35; bal Fe.  
Cast: 71,000 TS; 40,000 YS; 11.5 El. For heat treating, petrochemical and petroleum industries. For ethylene heaters, heat treat fixtures, and refinery tubes. Type HP; austenitic; heat resistant.

**ACCOLOY NC-2\***

Alloy Engineering & Casting Co.  
Nickel alloy; C 0.35-0.75; Cr 12; Ni 60; bal Fe.  
Cast: 68,000 TS; 36,000 YS; 4 El; 185 HB; For pots, electric heat elements, retorts, hearth plates, and muffles. ACI Type HW.

**ACCOLOY NC-3\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.35-0.75; Cr 18; Ni 38; bal Fe.  
Cast: 70,000 TS, 40,000 YS; 9 El; 170 HB; For heat treating trays, burner tubes, carburizing retorts, conveyer screws, chains, furnace rolls, and radiant tubes. ACI Type HU; austenitic; heat resistant.

**ACCOLOY NC-4\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.35-0.75; Cr 15; Ni 35; bal Fe.  
Cast: 70,000 TS; 40,000 YS; 10 El; 180 HB; For carburizing containers, furnace parts, heat treating equipment and fixtures, radiant tubes, roller rails, and feed screws. Type HT; austenitic; heat resistant.

**ACCOLOY NC-5\***

Alloy Engineering & Casting Co.  
Cast steel; Cr 10; Ni 30; C; bal Fe.  
For castings; heat resistant.

**ACCOLOY NC-6\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.2-0.5; Cr 20; Ni 25; bal Fe.  
Cast: 68,000 TS; 38,000 YS; 13 El; 160 HB; For brazing fixtures, chains, furnace beams and parts, pier caps, radiant tubes, nozzles, and trays. ACI Type HN; austenitic; heat resistant.

**ACCOLOY NC-7\***

Alloy Engineering & Casting Co.  
Cast austenitic stainless steel; C 0.2-0.4; Cr 21; Ni 9; bal Fe.  
Cast: 92,000 TS; 45,000 YS; 38 El; 165 HB; For annealing boxes and trays, baskets, burner tips, conveyor belts, furnace rails, wear plates, and hearth plates. ACI Type HF; austenitic; heat resistant.

**ACCOLOY NC-9MO\***

Alloy Engineering & Casting Co.  
Cast steel; C 0.35-0.75; Cr 22; Ni 46; bal Fe.  
Cast to resist stress-corrosion cracking in petrochemical applications and furnace applications over 2000 F.

**ACCU-NAMEL**

Bethlehem Steel Corp.  
Cast steel; B 0.004; C 0.03; Mn 0.15; bal Fe.  
Low carbon, continuous cast, continuous annealed, cold rolled sheet steel. For porcelain enameling applications; washing machines, dishwashers, gas and electric ranges, sinks, and bathtubs.

**ACCUFORM**

Bethlehem Steel Corp.  
Steel.  
Continuously annealed sheet.

**ACCULOY 280 C\***

Fuji Iron & Steel Co., Ltd.  
Tin alloy; Au; bal Sn.  
Uses: Brazing alloy for electronic parts. High corrosion and etch resistance. High electrical conductivity.

**ACCUMULATOR METAL**

American manufacture  
Bearing lead alloy; Pb 90; Sb 0.8; Sn 9.2.  
Bearings, battery plates, antrifriction.

**ACCURATE METAL\***

Connecticut Metals Corp.  
Nickel silver; Cu 68.0 min; Fe 0.4-0.7; Ni 29-32.  
Annealed: 57,000 TS; 21,000 YS; 43 El; 44 HRB. Hard: 82,000 TS; 75,000 YS; 5 El; 86 HRB. Soft: 54,000 TS; 16,000 YS; 35 El; 40 HRB. For electronic components, marine hardware, ferrules, pump valves. Corrosion resistant, non-magnetic.

\* Renamed, obsolete or no longer manufactured by this company.

## 24 / WOLDMAN'S ENGINEERING ALLOYS

### ACCURLOY\*

Baldwin Steel Co.  
Steel; C 0.51; Cr 1.05; Mn 0.97; Mo 0.25; Ni 0.53; V 0.21; bal Fe.  
Heat treated: 165,000 TS; 150,000 YS; 20 EI; 59 RA; 280-300 HB; For shafts, pins, boring bars, piston rods; heat treated and stress-relieved bars, shock resistant.

### ACE OIL HARDENING\*

Horace T. Potts Co., Div. of Amari Metal, Roseland, NJ  
Tool steel; C, alloy; bal Fe.  
For tools; non-deforming.

### ACENOR 111

Sidenor  
Steel; C 0.13-0.18; Cr 0.8-1.2; Mn 0.7-1.1; Ni 0.8-1.2; Si 0.35 max; bal Fe.  
15NiCr4. Quenched and treated: 85-115 kg/mm\*\*2 TS. Case hardening steel for gears, bolts, etc.

### ACENOR 15CR3

Sidenor  
Chromium steel; C 0.12-0.18; Cr 0.6-0.8; Mn 0.4-0.6; Si 0.15-0.4; bal Fe.  
Quenched and treated: 70-100 kg/mm\*\*2 TS. Case hardening, carburizing steel for bolts.

### ACENOR 18NICRMO5

Sidenor  
Nickel chromium molybdenum steel; C 0.15-0.21; Cr 0.7-1; Mn 0.5-0.9; Mo 0.15-0.25; Ni 1.2-1.5; Si 0.15-0.4; bal Fe.  
Quenched and treated: 110-140 kg/mm\*\*2 TS. Case hardening, carburizing steel.

### ACENOR 27CM12

Sidenor  
Steel; C 0.24-0.3; Cr 2.75-3.25; Mn 0.5-0.7; Mo 0.3-0.5; Si 0.35 max; bal Fe.  
Quenched and treated: 90-110 kg/mm\*\*2 TS. Nitriding steel for gears, bolts, etc.

### ACENOR 27MNCR5

Sidenor  
Chromium steel; C 0.23-0.31; Cr 1-1.3; Mn 1.1-1.4; Si 0.1-0.4; bal Fe.  
Quenched and treated: 85-105 kg/mm\*\*2 TS. Steel for superficial hardening.

### ACENOR 45SCD6

Sidenor  
Spring steel; C 0.42-0.5; Cr 0.5-0.75; Mn 0.5-0.8; Mo 0.15-0.3; Si 1.3-1.7.  
Quenched and treated: 100-120 kg/mm\*\*2 TS. Spring steel.

### ACENOR 55CR3

Sidenor  
Chromium steel; C 0.52-0.57; Cr 0.6-0.8; Mn 0.7-0.9; Mo 0.06 max; Ni 0.2 max; Si 0.2-0.4; bal Fe.  
Quenched and treated: 130-150 kg/mm\*\*2 TS. Spring steel.

### ACENOR ALS

Sidenor  
Rephosphorized resulfurized carbon steel; C 0.11 max; Mn 1-1.4; P 0.03-0.1; S 0.28-0.38; Si 0.05 max; bal Fe.  
Normalized: 38 kg/mm\*\*2 TS min. Free cutting steel for bolts, screws, etc.

### ACENOR ALSP

Sidenor  
Rephosphorized resulfurized carbon steel; C 0.11 max; Mn 1-1.4; P 0.03-0.1; Pb 0.2-0.35; S 0.28-0.38; Si 0.5 max; bal Fe.  
Free cutting leaded steel for screw machine products.

### ACENOR B-137

Sidenor  
Chromium steel; C 0.3-0.38; Cr 1.45-1.65; Mn 0.4-0.7; Mo 0.15-0.3; Ni 1.4-1.7; Si 0.15-0.4; bal Fe.  
Quenched and treated: 100-130 kg/mm\*\*2 TS; for gears, bolts, etc.

### ACENOR CAN

Sidenor  
Steel; Al 0.75-1.25; C 0.35-0.41; Cr 1.3-1.7; Mn 0.4-0.6; Mo 0.15-0.25; Si 0.4 max; bal Fe.  
Quenched and treated: 90-110 kg/mm\*\*2 TS. Nitriding steel.

### ACENOR CB

Sidenor  
Chromium steel; C 0.95-1.2; Cr 1.4-1.8; Mn 0.2-0.4; Si 0.15-0.35; bal Fe.  
Quenched and treated: 60-65 HRC; Ball and roller bearing steel.

### ACENOR CNE

Sidenor  
Steel; C 0.11-0.16; Cr 0.6-0.9; Mn 0.35-0.65; Ni 2.5-3; Si 0.15-0.4; bal Fe.  
Quenched and treated: 95-125 kg/mm\*\*2 TS. Case hardening steel for gear and link components.

### ACENOR DTA

Sidenor  
Nickel steel; C 0.29-0.35; Cr 1.1-1.4; Mn 0.45-0.75; Ni 4-4.5; Si 0.15-0.4; bal Fe.  
Quenched and treated: 110-130 kg/mm\*\*2 TS. Highly stressed crankshafts, seal axle arbors.

### ACENOR ELASTIC

Sidenor  
Steel; C 0.29-0.35; Cr 0.5-0.8; Mn 0.45-0.75; Mo 0.45-0.55; Ni 2.25-2.75; Si 0.15-0.4; bal Fe.  
Quenched and treated: 100-125 kg/mm\*\*2 TS. Oil hardening; high tensile strength for gears, shafts.

### ACENOR F-1130

Sidenor  
Nonresulfurized carbon steel; C 0.3-0.4; Mn 0.5-0.8; Si 0.15-0.4; bal Fe.  
Quenched and treated: 58-78 kg/mm\*\*2 TS. For structural components subjected to high stress.

### ACENOR F-1140

Sidenor  
Nonresulfurized carbon steel; C 0.4-0.5; Mn 0.5-0.8; Si 0.15-0.4; bal Fe.  
Quenched and treated: 67-87 kg/mm\*\*2 TS. Automobile and motor construction. Steel for superficial hardening.

### ACENOR F-1150

Sidenor  
Nonresulfurized carbon steel; C 0.5-0.6; Mn 0.6-0.9; Si 0.15-0.4; bal Fe.  
Quenched and treated: 79-93 kg/mm\*\*2 TS. Automobile and motor construction. Steel for superficial hardening.

### ACENOR F-1202

Sidenor  
Chromium molybdenum steel; C 0.38-0.45; Cr 0.9-1.2; Mn 0.5-0.9; Si 0.15-0.4; bal Fe.  
Quenched and treated: 90-110 kg/mm\*\*2 TS. Axle journals, control components.

### ACENOR F-1282

Sidenor  
Nickel chromium molybdenum steel; C 0.37-0.43; Cr 0.6-0.9; Mn 0.5-0.8; Mo 0.15-0.3; Ni 0.7-1; Si 0.15-0.4; bal Fe.  
Quenched and treated: 100-120 kg/mm\*\*2 TS. Crankshafts, eccentric shafts gear, etc.

### ACENOR F-1515

Sidenor  
Manganese carbon steel; C 0.18-0.23; Mn 1.3-1.6; Si 0.15-0.4; bal Fe.  
Quenched and treated: 70-100 kg/mm\*\*2 TS. Case hardening steel for structural components.

### ACENOR F-1516

Sidenor  
Carbon steel; C 0.13-0.19; Cr 0.8-1.1; Mn 1-1.3; Si 0.15-0.4; bal Fe.  
Quenched and treated: 80-110 kg/mm\*\*2 TS. Small cog wheels, arbors, cardan joints, control parts.

### ACENOR F-1522

Sidenor  
Nickel chromium molybdenum steel; C 0.17-0.23; Cr 0.4-0.6; Mn 0.6-0.9; Mo 0.15-0.25; Ni 0.4-0.6; Si 0.15-0.4; bal Fe.  
Quenched and treated: 85-115 kg/mm\*\*2 TS. Case hardening steel for gear components, bolts, arbors, bushes, coupling boxes.

### ACENOR F-1523

Sidenor  
Nickel chromium molybdenum steel; C 0.18-0.23; Cr 0.3-0.5; Mn 0.6-0.9; Mo 0.4-0.5; Si 0.15-0.4; bal Fe.  
Quenched and treated: 75-105 kg/mm\*\*2 TS. Case hardening steel for gear components, gear boxes, driving pinions, plate, wheels.

### ACENOR F-1525

Sidenor  
Nickel chromium molybdenum steel; C 0.18-0.23; Cr 0.4-0.6; Mn 0.6-0.8; Mo 0.3-0.4; Ni 1.4-1.7; Si 0.15-0.4; bal Fe.  
Quenched and treated: 105-135 kg/mm\*\*2 TS. Case hardening steel for plate wheels, driving pinions, and highly stressed cog wheels.

### ACENOR F-1580

Sidenor  
Steel; C 0.17-0.22; Cr 0.8-1.2; Mn 0.8-1; Ni 0.8-1.2; Si 0.15-0.4; bal Fe.  
Quenched and treated: 95-125 kg/mm\*\*2 TS. Case hardening steel for plate wheels, driving pinions, and highly stressed wheels.

### ACENOR HSL

Sidenor  
Steel; C 0.11-0.17; Cr 0.8-1.2; Mn 0.25-0.55; Ni 3.75-4.25; Si 0.15-0.4; bal Fe.  
Quenched and treated: 115-140 kg/mm\*\*2 TS. Case hardening steel for crankshafts, gear steels, cardan joints for standard stress.

### ACENOR K 1110

Sidenor  
Nonresulfurized carbon steel; C 0.1-0.2; Mn 0.4-0.7; Si 0.15-0.4; bal Fe.  
Quenched and treated: 40-60 kg/mm\*\*2 TS. Small machine components, levers, links, bushes, bolts, pins.

### ACENOR MCV

Sidenor  
Chromium vanadium steel; C 0.45-0.55; Cr 0.85-1.15; Mn 0.6-0.9; Si 0.1-0.35; V 0.11-0.21; bal Fe.  
Quenched and treated: 130-165 kg/mm\*\*2 TS. Spring steel for laminated springs, helical and plate springs, and torsion bar springs (40 mm min).

### ACENOR MP 2311

Sidenor  
Mold steel; C 0.31-0.35; Cr 1.55-1.85; Mn 1-1.25; Mo 0.18-0.22; Si 0.18-0.42; V 0.08-0.12; bal Fe.  
Pressure casting molds for light metals.

### ACENOR SPT

Sidenor  
Rephosphorized resulfurized carbon steel; C 0.11 max; Mn 1-1.4; P 0.03-0.1; Pb 0.2-0.35; S 0.28-0.38; Si 0.05 max; Te 0.035 max; bal Fe.  
Normalized: 38 kg/mm\*\*2 TS min. Free cutting leaded steel; for screw machine products.

### ACENOR TROKER

Sidenor  
Die steel; C 0.5-0.6; Cr 0.9-1.2; Mn 0.4-0.6; Mo 0.25-0.45; Ni 2.8-3.2; Si 0.15-0.35; bal Fe.  
Cold heading dies of all kinds, hobbing dies, shear blades.

### ACEROID\*

Central Foundry Co.  
Cast copper alloy; Zn; bal Cu.  
For castings.

### ACEROLD\*

Central Foundry Co.  
Cast steel; C, alloy; bal Fe.  
For machinery castings.

### ACHORN 100 CHROMIUM\*

Achorn Steel Co.  
Low alloy tool steel; C 1; Cr 1.5; bal Fe.  
Low alloy tool steel, oil hardening. AISI L1.

### ACHORN 11W HOT WORK\*

Achorn Steel Co.  
Hot work tool steel; C 0.4; Cr 3; V 0.45; W 12; bal Fe.  
Oil hardening hot work tool steel, tungsten type; for forging and hot working dies. AISI H22.

### ACHORN 15 W HOT WORK\*

Achorn Steel Co.  
Hot work tool steel; C 0.45; Cr 3.5; V 0.7; W 14; bal Fe.  
Air or oil hardening hot working tool and die steel; AISI H24.

### ACHORN 18-4-1\*

Achorn Steel Co.  
High speed tool steel; C 0.65; Cr 3.75; V 1.2; W 18.5; bal Fe.  
For tools, cutters; high speed steel.

### ACHORN 225 C HIGH PRODUCTION DIE\*

Achorn Steel Co.  
Cold work tool steel; C 2.1; Cr 12; W 0.75; bal Fe.  
Oil or air hardening cold work tool steel; chromium type; for punch and trim dies, thread rolling tools, gages. AISI D3.

### ACHORN 33 HOT WORK\*

Achorn Steel Co.  
Hot work tool steel; C 0.33; Cr 5; Mo 1.45; Si 0.85; V 0.2; W 1.25; bal Fe.  
Hot work tool steel, chromium type; AISI H12.

### ACHORN 33A HOT WORK\*

Achorn Steel Co.  
Hot work tool steel; C 0.4; Cr 5; Mn 0.3; Mo 1.3; Si 0.9; V 0.5; bal Fe.  
Oil or air hardening tool and die steel; for forging dies and hot forming dies. AISI H11.

### ACHORN 33M HOT WORK

Achorn Steel Co.  
Hot work tool steel; C 0.4; Cr 5; Mo 1; Si 1; V 1; bal Fe.  
Air or oil hardening hot work tool steel; AISI H13.

\* Renamed, obsolete or no longer manufactured by this company.



**ACHORN 350 FINISHING\***

Achorn Steel Co.  
Die steel; C 1.3; W 3.5; bal Fe.  
For tools, dies; fast finishing steel.

**ACHORN 512\***

Achorn Steel Co.  
Carbon steel; C 0.1; Cr 1.5; Mn 0.48; Ni 3.5; bal Fe.  
Low carbon steel for cold hubbing and then case hardening for molds.

**ACHORN 6-6-4-2\***

Achorn Steel Co.  
High speed tool steel; C 0.85; Cr 4; Mo 5; V 2; W 6.5; bal Fe.  
For tools, cutters; high speed steel.

**ACHORN 9W HOT WORK\***

Achorn Steel Co.  
Hot work tool steel; C 0.3; Cr 3; V 0.5; W 9.5; bal Fe.  
Hot work tool steel; oil hardening; for forging dies, hot forming dies; AISI H21.

**ACHORN AF-33 HOT WORK\***

Achorn Steel Co.  
Hot work tool steel; C 0.3-0.35; Cr 5; Mo 1.5; Si 0.8-1; W 1.1; bal Fe.  
For hot work dies; hot work steel.

**ACHORN ALLOY PIVOT\***

Achorn Steel Co.  
Low alloy tool steel; C 1.1; Cr 1.35; Mn 0.4; Mo 0.4; Si 0.25; bal Fe.  
Oil hardening steel for shafts, pivots, lathe centers. AISI L7.

**ACHORN BEST CARBON\***

Achorn Steel Co.  
Water hardening tool steel; C 0.8-1.2; Mn 0.25; Si 0.25; bal Fe.  
Water hardened: 166,000-216,000 TS; 110,000-150,000 YS; 11-15 El; 32-37 RA; 330-600 HB; For taps, drills, reamers, punches, stamps, knurls, mandrels, cutters. Type W1 water hardening.

**ACHORN CARBON DRILL ROD\***

Achorn Steel Co.  
Water hardening tool steel; C 1; Mn 0.25; Si 0.28; bal Fe.  
Water hardening tool steel; AISI W1.

**ACHORN CM AIR HARDENING\***

Achorn Steel Co.  
Cold work tool steel; C 0.7; Cr 1; Mn 2; Mo 1.35; Si 0.3; bal Fe.  
Medium alloy, air hardening cold work tool steel; AISI A6.

**ACHORN COLD DRAWN TOOL STEEL\***

Achorn Steel Co.  
Water hardening tool steel; C 1.05; Mn 0.25; Si 0.28; bal Fe.  
Water hardening tool steel, for drills, arbors, lathe centers, bushings. AISI W1.

**ACHORN COLD HEADING\***

Achorn Steel Co.  
Water hardening tool steel; C 0.8-1.2; Mn 0.25; Si 0.25; bal Fe.  
Water hardened: 166,000-216,000 TS; 110,000-150,000 YS; 11-15 El; 32-37 RA; 330-600 HB; For taps, drills, reamers, punches, stamps, knurls, mandrels, cold heading tools. Type W1 water hardening.

**ACHORN COMPOSITE STEEL\***

Achorn Steel Co.  
Cold work tool steel; C 1; Cr 0.4; V 0.4; W 1.25; bal Fe.  
Water or oil hardening steel for shafts, arbors, lathe centers, drill bushings. AISI F1.

**ACHORN CRM-50\***

Achorn Steel Co.  
Hot work tool steel; C 0.5-0.55; Cr 1; Mn 0.6; Mo 0.2; bal Fe.  
For hot work dies; hot work steel.

**ACHORN CVM\***

Forges et Acieries de Voelklingen  
Cold work tool steel; C 0.95; Cr 5; Mn 0.7; Mo 1.2; V 0.25; bal Fe.  
For punches, blanking and forming dies; air hardened, nondeforming.

**ACHORN EXTRA BLADE\***

Achorn Steel Co.  
Cold work tool steel; C 1.1; Mn 0.25; bal Fe.  
For tools, cutters; oil hardened.

**ACHORN EXTRA CARBON\***

Achorn Steel Co.  
Water hardening tool steel; C 1.05; Mn 0.25; Si 0.28; bal Fe.  
Water hardening tool steel; AISI W1.

**ACHORN EXTRA CHISEL\***

Achorn Steel Co.  
Water hardening tool steel; C 0.8-1.1; Mn 0.25; Si 0.25; bal Fe.  
Water hardened: 166,000-216,000 TS; 110,000-150,000 YS; 11-15 El; 32-37 RA; 330-600 HB; For taps, drills, reamers, punches, stamps, knurls, mandrels. Type W1 water hardening.

**ACHORN EXTRA SOLID DRILL\***

Achorn Steel Co.  
Water hardening tool steel; C 1.15; Mn 0.3; bal Fe.  
For tools, drills; water hardened.

**ACHORN FAGERSTA BEST\***

Achorn Steel Co.  
Water hardening tool steel; C 1.05-1.15; Mn 0.2-0.25; Si 0.25; bal Fe.  
For drills, cutters, reamers, taps, broaches; Type W1; water hardened.

**ACHORN FAGERSTA CHISEL\***

Achorn Steel Co.  
Water hardening tool steel; C 0.8-0.9; Mn 0.3; Si 0.25; bal Fe.  
For chisels, screw drivers; water hardened; Type W1.

**ACHORN FAGERSTA COLD HEADING\***

Achorn Steel Co.  
Water hardening tool steel; C 0.95; Mn 0.3; Si 0.25; bal Fe.  
For cold heading dies, form tools; Type W1; water hardened.

**ACHORN FAGERSTA ENVELOPE DIE\***

Achorn Steel Co.  
Water hardening tool steel; C 1.05-1.15; Mn 0.3; Si 0.25; bal Fe.  
For envelope dies, cutters, drills, form tools; Type W1; water hardened.

**ACHORN FAGERSTA EXTRA CUTLERY\***

Achorn Steel Co.  
Water hardening tool steel; C 1.07-1.12; Mn 0.25; Si 0.3; bal Fe.  
For cutlery tools, drills, taps; Type W1; water hardened.

**ACHORN FAGERSTA EXTRA\***

Achorn Steel Co.  
Water hardening tool steel; C 1-1.1; Mn 0.3; Si 0.25; bal Fe.  
For tools, cutters, drills, taps, reamers; Type W1; water hardened.

**ACHORN FAGERSTA FINISHING\***

Achorn Steel Co.  
Water hardening tool steel; C 1.15; Cr 0.4; Mn 0.4; W 2.5; bal Fe.  
For finishing cutters; water hardened, keen cutting edge.

**ACHORN FAGERSTA HIGH PRODUCTION**

Achorn Steel Co.  
Cold work tool steel; C 1.6; Cr 12; Mn 0.8; V 0.2; bal Fe.  
For blanking and forming dies; air hardened, non-deforming.

**ACHORN FAGERSTA HOT DIE\***

Achorn Steel Co.  
Hot work tool steel; C 0.55; Mn 0.45; Ni 3; W 5; bal Fe.  
For upsetting and forging dies, extrusion rams and liners; hot work steel, oil hardened.

**ACHORN FAGERSTA SHOE DIE**

Achorn Steel Co.  
Cold work tool steel; C 0.55; Cr 0.65; Mo 0.35; bal Fe.  
For shoe dies, cutting dies for leather and rubber; oil hardening.

**ACHORN FAGERSTA SILVER DIE\***

Achorn Steel Co.  
Water hardening tool steel; C 1; Mn 0.25; Si 0.25; bal Fe.  
For silver dies; Type W1; water hardened.

**ACHORN FAGERSTA SMOOTH BOR HOLLOW\***

Achorn Steel Co.  
Water hardening tool steel; C 0.8; Mn 0.25; Si 0.25; bal Fe.  
For rock drills; Type W1; water hardened.

**ACHORN FAGERSTA SOLID DRILL\***

Achorn Steel Co.  
Water hardening tool steel; C 0.8-0.9; Mn 0.35; Si 0.25; bal Fe.  
For solid drills; Type W1; water hardened.

**ACHORN FAGERSTA SPECIAL ALLOY DIE\***

Achorn Steel Co.  
Cold work tool steel; C 0.45-0.55; Cr 0.9; Mo 0.2; W 1.2; bal Fe.  
For dies, tools; oil hardened.

**ACHORN FAGERSTA STANDARD CUTLERY\***

Achorn Steel Co.  
Water hardening tool steel; C 0.85-0.95; Mn 0.35; Si 0.25; bal Fe.  
For cutlery tools, drills; reamers; Type W1; water hardened.

**ACHORN FAGERSTA STANDARD\***

Achorn Steel Co.  
Water hardening tool steel; C 0.9-1; Mn 0.3; Si 0.25; bal Fe.  
For tools, drills, taps, hobs, reamers; Type W1; water hardened.

**ACHORN FAGERSTA SUPERIOR OIL\***

Achorn Steel Co.  
Cold work tool steel; C 1; Cr 0.4; Mn 1; W 0.4; bal Fe.  
For tools, dies, cold headers; water or oil hardened.

**ACHORN FAGERSTA UNBREAKABLE CHISEL\***

Achorn Steel Co.  
Cold work tool steel; C 0.45; Cr 0.9; Mo 0.2; W 1.2; bal Fe.  
For chisels, upsetters; oil hardened, tough.

**ACHORN FAGERSTA WHITE GOLD\***

Achorn Steel Co.  
Water hardening tool steel; C 1.15; Cr 0.4; Mn 0.4; W 1.2; bal Fe.  
For tools, cutters; oil or water hardened.

**ACHORN GRAPHITIC OIL\***

Achorn Steel Co.  
Cold work tool steel; C 1.45; Cr 0.2; Mn 0.8; Mo 0.25; Si 1.15; bal Fe.  
Oil hardening cold work tool steel; AISI O6.

**ACHORN HEAT TREATED MOLD STEEL\***

Achorn Steel Co.  
Mold steel; C 0.3; Cr 1.7; Mn 0.8; Mo 0.4; Si 0.5; bal Fe.  
Hardened, machinable, for molds; AISI P20.

**ACHORN HIGH PRODUCTION\***

Achorn Steel Co.  
Cold work tool steel; C 1.6; Cr 12; Mo 0.8; V 0.8; bal Fe.  
For punches, drawing dies, form tools; air hardened, non-deforming.

**ACHORN HOLLOW DRILL\***

Achorn Steel Co.  
Water hardening tool steel; C 0.75; Mn 0.3; bal Fe.  
Heat treated: 180,000 TS; 130,000 YS; 12 El; 36 RA; 360 HB; For hollow drills, die blocks; water hardened; Type W1.

**ACHORN KLOSTER BRILLIANT AX\***

Achorn Steel Co.  
High speed tool steel; C 0.7; Cr 4; V 1.75; W 18; bal Fe.  
For tools, cutters, reamers, hobs, lathe and planer tools; high speed steel; Type T1.

**ACHORN KLOSTER BRILLIANT WKE\***

Achorn Steel Co.  
High speed tool steel; C 0.7; Co 5; Cr 4.5; V 1.5; W 18; bal Fe.  
For lathe and planer tools, hobs, reamers, taps, drills; high speed steel; Type T4.

**ACHORN KLOSTER PRIOR EXTRA\***

Achorn Steel Co.  
High speed tool steel; C 0.6-0.7; Co 1; Cr 4-5; V 1.2; W 18-19; bal Fe.  
For lathe and planer tools, hobs, reamers, taps, drills; high speed steel, oil hardened.

**ACHORN KLOSTER REMA\***

Achorn Steel Co.  
Die steel; C 0.02-0.05; Mn 0.02-0.07; bal Fe.  
For molding dies for plastics; hobbing steel.

**ACHORN M-2\***

Achorn Steel Co.  
High speed tool steel; C 0.8; Cr 4; Mo 5; V 2; W 6.5; bal Fe.  
For lathe and planer tools, drills, reamers; high speed steel.

**ACHORN M1 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 0.8; Cr 4; Mo 8; V 1; W 1.5; bal Fe.  
High speed steel, molybdenum type; for drills, lathe tools, milling cutters. AISI M1.

\* Renamed, obsolete or no longer manufactured by this company.

26 / WOLDMAN'S ENGINEERING ALLOYS

**ACHORN M10 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 0.85; Cr 4; Mo 8; V 2; bal Fe.  
Molybdenum type high speed steel; AISI M10.

**ACHORN M2 1/2 (CLASS 1) HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 1; Cr 4; Mo 6.25; V 2.5; W 6.25; bal Fe.  
High speed tool steel, molybdenum-tungsten type; AISI M3 Class 1.

**ACHORN M3 (CLASS 2) HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 1.15; Cr 4; Mo 5.5; V 3; W 6; bal Fe.  
High speed steel, tungsten-molybdenum-vanadium-chromium; AISI M3 Class 2.

**ACHORN M34 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 0.9; Co 8; Cr 4; Mo 8.5; V 2; W 1.75; bal Fe.  
High speed steel, molybdenum-cobalt type, AISI M34.

**ACHORN M4 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 1.28; Cr 4.5; Mo 4.5; V 4; W 5.5; bal Fe.  
High speed steel, tungsten-molybdenum-vanadium-chromium; AISI M4.

**ACHORN MANGANESE OIL HARDENING\***

Achorn Steel Co.  
Cold work tool steel; C 0.9; Mn 1.5; Mo 0.3; Si 0.25; bal Fe.  
Oil hardening in small sections; AISI O2.

**ACHORN MOLDALLOY\***

Achorn Steel Co.  
Mold steel; C 0.1; Cr 0.5; Mn 0.5; Ni 1.2; bal Fe.  
For dies, molds; carburizing grade.

**ACHORN NI-CRO-MO\***

Achorn Steel Co.  
Low alloy tool steel; C 0.68; Cr 0.65; Mn 0.6; Mo 0.2; Ni 1.4; Si 0.25; bal Fe.  
Oil hardening, low alloy tool steel for shafts, arbors, lathe centers, tool holders. AISI L6.

**ACHORN OIL HARDENING DRILL ROD\***

Achorn Steel Co.  
Cold work tool steel; C 0.9; Cr 0.5; Mn 1.1; V 0.15; W 0.5; bal Fe.  
Oil hardenable in small sections; AISI O1.

**ACHORN OILWEAR\***

Achorn Steel Co.  
Cold work tool steel; C 1.25; Cr 0.4; Mn 0.3; Si 0.35; V 0.2; W 1.4; bal Fe.  
Oil hardening cold work tool steel, wear resistant type; AISI O7.

**ACHORN REMA IRON\***

Achorn Steel Co.  
Water hardening tool steel; C 0.06; Mn 0.21; bal Fe.  
For plastic mold dies; water hardened.

**ACHORN SOLID DRILL\***

Achorn Steel Co.  
Water hardening tool steel; C 0.85; Mn 0.35; bal Fe.  
Heat treated: 190,000 TS; 145,000 YS; 10 El; 30 RA; 400 HB; For drills, punches, taps, reamers, cutters; water hardened; Type W1.

**ACHORN SPRING STEEL SHEET\***

Achorn Steel Co.  
Steel; C 1; Mn 0.25; Si 0.28; bal Fe.  
Water hardened sheet steel, spring temper; AISI W1.

**ACHORN STANDARD CARBON\***

Achorn Steel Co.  
Water hardening tool steel; C 1-1.1; Mn 0.3; bal Fe.  
For cutters, drills, reamers, punches; water hardened; Type W1.

**ACHORN SUPERIOR OIL HARDENING\***

Achorn Steel Co.  
Cold work tool steel; C, alloy; bal Fe.  
For tools, dies, punches; oil hardened.

**ACHORN T15 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 1.5; Co 5; Cr 4.75; V 5; W 12.5; bal Fe.  
High speed steel, tungsten, cobalt, vanadium type; AISI T15.

**ACHORN T2 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 0.8; Cr 4; Mo 0.75; V 2; W 18.5; bal Fe.  
Tungsten type high speed steel; AISI T2.

**ACHORN T4 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 0.75; Co 5; Cr 4; V 1.05; W 18.5; bal Fe.  
Tungsten-cobalt type high speed steel; AISI T4.

**ACHORN T5 HIGH SPEED\***

Achorn Steel Co.  
High speed tool steel; C 0.8; Co 8; Cr 4.25; Mo 1; V 2; W 19; bal Fe.  
Tungsten-cobalt type high speed steel; AISI T5.

**ACHORN TOOL STEEL SHEET\***

Achorn Steel Co.  
Water hardening tool steel; C 1.05; Mn 0.25; Si 0.28; bal Fe.  
Water hardenable sheet steel; AISI W1.

**ACHORN UBC\***

Achorn Steel Co.  
Hot work tool steel; C 0.48; Cr 0.9; Mo 0.2; W 1.1; bal Fe.  
For hot work dies; hot work steel.

**ACHORN USI STEEL\***

Achorn Steel Co.  
Shock resisting tool steel; Cr 0.25-0.6; Mn 0.85; Mo 0.25; Si 2; V 0.2; bal Fe.  
Water or oil hardening tool steel, shock resisting type; AISI S5.

**ACHORN V85 STEEL\***

Achorn Steel Co.  
Water hardening tool steel; C 0.9; Mn 0.3; Si 0.25; V 0.25; bal Fe.  
Water hardening tool steel; AISI W2.

**ACHORN VAMO\***

Achorn Steel Co.  
Cold work tool steel; C 0.5; Cr 5.2; Mn 0.45; Mo 1.4; Ni 1.5; Si 1; V 1; bal Fe.  
Medium alloy, air hardening cold work tool steel; AISI A9.

**ACHORN VBC\***

Achorn Steel Co.  
Hot work tool steel; C 0.5; Cr 0.9; Mn 0.25; Mo 2; W 1.25; bal Fe.  
For punches, rivet sets, upsetters; oil hardened, hot work steel.

**ACI TYPE CE20N**

Wisconsin Centrifugal  
Cast austenitic stainless steel; C 0.020 max; Cr 23.0-26.0; Mn 1.50 max; Mo 0.50 max; N 0.08-0.20; Ni 8.0-11.0; P 0.040 max; S 0.040 max; Si 1.50 max; bal Fe.  
For refinery hydrocracking and hydrotreating service. Commonly referred to as HF-modified, 5-15% delta ferrite. 550 MPa min TS; 275 MPa min YS; 20 EL.

**ACIBAL**

Manufacturer unknown  
Aluminum alloy.  
Al alloy. For light alloy parts.

**ACIBEL\***

British Steel plc, Technical Swinden Laboratories  
Steel; C 0.07-0.13; Mn 0.85-1.15; Pb 0.15-0.25; S 0.23-0.33; bal Fe.  
Rolled: 70,000 TS. For shafts, gears, machine tool parts; free-cutting, case hardened.

**ACIBRADE\***

British Steel plc, Technical Swinden Laboratories  
Abrasion resistant steel; C 0.6-0.75; Mn 1.25-1.55; Si 0.05; bal Fe.  
Resistant to abrasion and tough in the as-rolled condition. For rod mills, coke crushers, mineral dressing, chutes, conveyers, and buckets.

**ACICULAR\***

Sheepbridge Alloy Castings Ltd.  
Cast iron; C 2.9; Mo 0.9; Ni 2.5; Si 2; bal Fe.  
Cast: 280-350 HB; For castings, gears, housings; alloy cast iron.

**ACID BRONZE-1**

English manufacture  
Copper alloy; Cu 88; Pb 2; Sn 10.  
For bearings, chemical equipment; corrosion resistant.

**ACID BRONZE-2**

English manufacture  
Copper alloy; Cu 82; Pb 8; Sn 8; Zn 2.  
For chemical equipment; corrosion resistant.

**ACID BRONZE-3**

English manufacture  
Copper alloy; Cu 84; Pb 6.3; Sn 9.5.  
For chemical equipment; corrosion resistant.

**ACID BRONZE-4**

English manufacture  
Copper alloy; Cu 74; Pb 17; Sn 8; Zn 1.5.  
For chemical equipment; corrosion resistant.

**ACID METAL**

American manufacture  
Copper alloy; Cu 88; Pb 2; Sn 10.  
For chemical equipment; corrosion resisting.

**ACID RESISTING-1**

English manufacture  
Metal alloy; Cr 10; Fe 40.8; Mn 1.55; Ni 30; Si 0.45; W 6.2.  
For chemical apparatus, acid resisting vessels and tanks; stainless and corrosion resistant.

**ACID RESISTING-2**

English manufacture  
Nickel steel; Co 5; Cr 14.5; Cu 4.5; Fe 56; Ni 20.  
For chemical apparatus; resists attack of HNO<sub>3</sub>.

**ACID RESISTING-3**

English manufacture  
Nickel iron superalloy; Cr 15; Fe 23; Mn 1.25; Ni 53; Si 3.75; W 4.  
For chemical apparatus; heat and corrosion resistant.

**ACIDUR\***

Machinenbau AG  
Cast steel; Si 16-17; bal Fe.  
Cast: for chemical apparatus; corrosion resistant.

**ACIER A3\***

Creusot-Loire Industrie  
Steel; C 0.5; bal Fe.  
Annealed: 96,000 TS; 52,000 YS; 16 El; 23 RA; 170 HB; For axles, gears, bolts, bushings, crankshafts; water hardened.

**ACIER ACM\***

Creusot-Loire Industrie  
Steel; C 0.55; Cr 0.6; Mo 0.35; Ni 1.4; bal Fe.  
For gears, bolts, forging dies; oil hardened, tough.

**ACIER ACMA\***

Creusot-Loire Industrie  
Steel; C 0.55; Cr 0.6; Mo 0.35; Ni 1.4; bal Fe.  
For gears, forging dies; oil hardened, tough.

**ACIER AF NO. 1\***

Creusot-Loire Industrie  
Water hardening tool steel; C 0.85; bal Fe.  
Heat treated: 200,000 TS; 150,000 YS; 10 El; 30 RA; 400 HB; For drills, taps, reamers, hobs, springs; Type W1; water hardened.

**ACIER AFS\***

Creusot-Loire Industrie  
Water hardening tool steel; C 0.8; bal Fe.  
Heat treated: 188,000 TS; 143,000 YS; 12 El; 35 RA; 388 HB; For drills, punches, reamers taps, springs, hobs; Type W1; water hardened.

**ACIER AM3\***

Creusot-Loire Industrie  
Water hardening tool steel; C 0.35; Mn 1.1; bal Fe.  
For punches, axles, gears, shafts; water hardened.

**ACIER AS\***

Creusot-Loire Industrie  
Steel; C 0.5; bal Fe.  
Annealed: 96,000 TS; 52,000 YS; 16 El; 23 RA; 170 HB; For axles, gears, bolts, tie rods; water hardened.

**ACIER BLN\***

Creusot-Loire Industrie  
Hot work tool steel; C 0.28; Cr 3; Mo 0.3; V 0.3; W 10; bal Fe.  
For extrusion rams and dies, punches; hot work steel, oil hardened.

**ACIER BTR\***

Creusot-Loire Industrie  
Cold work tool steel; C 0.35; Cr 0.3; Mo 1.1; Ni 4.6; bal Fe.  
For gears, dies, crankshafts; oil hardened, tough.

**ACIER CMYO\***

Creusot-Loire Industrie  
Steel; C 1; Cr 1; Mo 0.2; bal Fe.  
For bearings, liners, sleeves; water or oil hardened.

**ACIER CNW\***

Creusot-Loire Industrie  
Hot work tool steel; C 0.38; Cr 2.5; Mo 0.7; V 0.3; W 3; bal Fe.  
For hot work dies and tools; hot work steel.

**ACIER CTN2\***

Creusot-Loire Industrie  
Steel; C 0.1; Ni 2; bal Fe.  
For spindles, gears, cams, camshafts; case hardening steel, tough.

\* Renamed, obsolete or no longer manufactured by this company.

**ACIER CTN6\***

Creusot-Loire Industrie  
Steel; C 0.1; Ni 6; bal Fe.  
For spindles, gears, cams, shafts; case  
hardening steel, tough.

**ACIER DIABOLIQUE SATAN NO. 2\***

Creusot-Loire Industrie  
Water hardening tool steel; C 1.15; Cr 0.5;  
W 1.9; bal Fe.  
For header dies, fast finishing cutters; water  
hardened, wear resistant.

**ACIER FAM\***

Creusot-Loire Industrie  
Heat resistant steel; C 0.42; Mn 0.6; Si 2; bal  
Fe.  
For heat resistant parts; heat resistant.

**ACIER FFV NO. 3\***

Creusot-Loire Industrie  
Water hardening tool steel; C 0.85; Mn 0.3;  
bal Fe.  
Heat treated: 200,000 TS; 150,000 YS; 10  
EI; 30 RA; 400 HB; For drills, taps, reamers,  
springs, hobs; Type W1; water hardened.

**ACIER M13AFY\***

Creusot-Loire Industrie  
Abrasion resistant steel; C 1.1; Mn 13; bal  
Fe.  
For wear resistant parts; wear and abrasion  
resistant.

**ACIER NC2\***

Creusot-Loire Industrie  
Steel; C 0.3; Cr 0.5; Ni 2.8; bal Fe.  
For gears, bolts, machine tool parts; oil  
hardened, tough.

**ACIER TRIPLE SATAN\***

Creusot-Loire Industrie  
Hot work tool steel; C 0.32; Cr 3.2; W 9; bal  
Fe.  
For extrusion rams and dies, punches; hot  
work steel, oil hardened.

**ACIER VOLD\***

Creusot-Loire Industrie  
Steel; C 0.35; Cr 1.5; Ni 3.8; bal Fe.  
For gears, bolts, dies, crankshafts; oil  
hardened, tough.

**ACIER VOLDM\***

Creusot-Loire Industrie  
Steel; C 0.35; Cr 1.5; Mo 0.5; Ni 4; bal Fe.  
For gears, shafts, crankshafts; oil hardened,  
tough.

**ACIERAL-1\***

Acieral Co. of America  
Cast aluminum copper alloy; Cu 6; Fe 0.1;  
Ni 0.9; Si 0.4; Zn 0.4; bal Al.  
Cast: 20,000 TS. For automotive engine  
parts; castings.

**ACIERAL-2\***

Acieral Co. of America  
Aluminum copper alloy; Cu 2.3-3.8; Fe 0.7-  
1.4; Mn 1-1.5; bal Al.  
Rolled: 22,000 TS; 2 EI. For automotive  
engine parts; high strength.

**ACIMET C-1\***

Cleveland Brass Corp.  
Cast aluminum bronze; Al 10; C 0.06 max;  
Cu 90.  
Heat treated: 70,000 TS; 28,000 YS; 20 EI;  
20 RA; 100 HB; For acetic acid equipment  
castings, pumps, impeller shafts for rubber  
pumps; corrosion resistant.

**ACIMET C-2\***

Cleveland Brass Corp.  
Copper alloy; Cu 85; Pb 5; Sn 5; Zn 5.  
30,000-33,000 TS; 18,000-20,000 YS; 20 EI;  
20 RA; 50-60 HB; For fittings and pumps for  
brewery, distilleries, alcohol plants, etc.;  
pressure tight.

**ACIMET C-3\***

Cleveland Brass Corp.  
Brass; Cu 60; Pb 2; Zn 38.  
50,000-75,000 TS; 18,000 YS; 40 EI. For  
close grained forged oil fittings; free-cutting.

**ACIMET C-4\***

Cleveland Brass Corp.  
Brass; Al 0.5; Cu 58; Fe 0.75 max; Mn 0.75  
max; Sn 0.5; Zn 39.  
70,000-75,000 TS; 35,000 YS; 20 EI; 20 RA;  
100-110 HB; For impeller shaft and gland  
fittings for rubber and plastic pumps for  
handling HCl; corrosion resistant.

**ACIMET HARD LEAD ALLOY\***

Cleveland Brass Corp.  
Cast lead alloy; Pb 94.5-95; Sb 4.5-5.5.  
2,800 TS; 1,600 YS; 75 EI; 90 RA. For  
valves, pumps, fittings, castings, handling  
corrosive chemicals; MP 495 F.

**ACIPCO 1020**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.15-0.25; Mn 0.30-0.70; Si 0.15-  
0.80; bal Fe.

**ACIPCO 1025**

American Centrifugal, Div. of ACIPCO  
Cast steel; C 0.2-0.3; Mn 0.3-0.7; bal Fe.  
Cast, normalized and tempered: 65,000 TS;  
35,000 YS; 25 EI; 150 HB; Standard  
structural steel, good weldability. AISI 1025.

**ACIPCO 1030**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.25-0.35; Mn 0.50-0.90; Si 0.15-  
0.80; bal Fe.

**ACIPCO 1035**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.30-0.40; Mn 0.50-0.90; Si 0.15-  
0.80; bal Fe.

**ACIPCO 1040**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.35-0.45; Mn 0.50-0.90; Si 0.15-  
0.80; bal Fe.

**ACIPCO 1045**

American Centrifugal, Div. of ACIPCO  
Cast steel; C 0.4-0.5; Mn 0.5-0.9; bal Fe.  
Cast, normalized and tempered: 85,000 TS;  
45,000 YS; 15 EI; 180 HB; For machine  
parts and for flame hardening. AISI 1045.

**ACIPCO 1070**

American Centrifugal, Div. of ACIPCO  
Cast steel; C 0.65-0.75; Mn 0.5-0.9; bal Fe.  
Cast, normalized and tempered: 105,000 TS;  
50,000 YS; 5 EI; 220 HB; Particularly for  
parts requiring flame or induction hardened  
areas. AISI 1070.

**ACIPCO 4130**

American Centrifugal, Div. of ACIPCO  
Chromium molybdenum steel; C 0.25-0.35;  
Cr 0.8-1.15; Mn 0.4-0.7; Mo 0.15-0.25; bal  
Fe.  
Cast, normalized and tempered: 80,000 TS;  
45,000 YS; 17 EI; 185 HB; Cast, water  
quenched and tempered: 100,000-160,000  
TS; 65,000-145,000 YS; 5-16 EI; 250-450  
HB; Preferred water quenching grade. AISI  
4130.

**ACIPCO 4135**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.30-0.40; Cr 0.80-1.15; Mn 0.60-  
1.00; Mo 0.15-0.25; Si 0.15-0.80; bal Fe.

**ACIPCO 4140**

American Centrifugal, Div. of ACIPCO  
Martensitic stainless steel; C 0.35-0.45; Cr  
0.8-1.15; Mn 0.6-1; Mo 0.15-0.25; bal Fe.  
Cast, normalized and tempered: 100,000 TS;  
50,000 YS; 16 EI; 200 HB; Cast, oil  
quenched and tempered: 120,000-180,000  
TS; 85,000-165,000 YS; 5-16 EI; 250-450  
HB; Oil hardening alloy steel. AISI 4140.

**ACIPCO 4145**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.40-0.50; Cr 0.80-1.15; Mn 0.60-  
1.00; Mo 0.15-0.25; Si 0.15-0.80; bal Fe.

**ACIPCO 4330**

American Centrifugal, Div. of ACIPCO  
Cast steel; C 0.25-0.35; Cr 0.6-0.9; Mn 0.4-  
0.7; Mo 0.2-0.3; Ni 1.65-2; bal Fe.  
Cast, normalized and tempered: 100,000 TS;  
60,000 YS; 16 EI; 200 HB; Cast, quenched  
and tempered: 120,000-180,000 TS; 85,000-  
165,000 YS; 5-16 EI; 250-450 HB;  
Hardenable in heavy sections.

**ACIPCO 5015**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.10-0.20; Cr 0.30-0.50; Mn 0.30-  
0.60; Si 0.15-0.80; bal Fe.

**ACIPCO 52100**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.98-1.10; Cr 1.30-1.60; Mn 0.20-  
0.50; Si 0.15-0.80; bal Fe.

**ACIPCO 8620**

American Centrifugal, Div. of ACIPCO  
Nickel chromium molybdenum steel; C 0.15-  
0.25; Cr 0.4-0.7; Mn 0.6-1; Mo 0.15-0.25; Ni  
0.4-0.7; bal Fe.  
Cast, normalized and tempered: 70,000 TS;  
40,000 YS; 20 EI; 150 HB; Low alloy  
carburizing grade. AISI 8620.

**ACIPCO ACICULAR IRONS\***

ACIPCO Steel Products Division  
Cast steel; C 2.5-3; Mn 0.5-1.5; Mo 0.8-1.2;  
Ni 1.7-2.3; P 0.1 max; S 0.12 max; bal Fe.  
Cast: 60,000 TS; 300 HB; For highly  
stressed rolls and cylinders; heat treatable.

**ACIPCO ALLOY 10**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.10; Cr 1.30; Mo 0.50-0.40; Ni  
0.60; P 0.02; S 0.007; Si 0.45.

**ACIPCO ALLOY 100**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.35; Cr 1.30; Mn 0.80;  
Mo 0.50; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.04; bal Fe.

**ACIPCO ALLOY 110**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.35; Cr 2.20; Mn 0.80;  
Mo 0.70; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 120**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.35; Cr 2.20; Mn 0.80;  
Mo 0.90; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 130**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.40; Cr 1.30; Mn 0.80;  
Mo 0.50; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.04; bal Fe.

**ACIPCO ALLOY 140**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.40; Cr 2.20; Mn 0.80;  
Mo 0.70; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 150**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.40; Cr 2.20; Mn 0.80;  
Mo 0.90; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 20**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.10; Cr 2.20; Mn 0.80;  
Mo 0.90; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 30**

American Centrifugal, Div. of ACIPCO  
Steel; Al 0.01; C 0.10; Cr 2.20; Mn 0.80; Mo  
0.90; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 40**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.20; Cr 1.30; Mn 0.80;  
Mo 0.50; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.04; bal Fe.

**ACIPCO ALLOY 50**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.20; Cr 2.20; Mn 0.80;  
Mo 0.70; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 60**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.20; Cr 2.20; Mn 0.80;  
Mo 0.90; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 70**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.30; Cr 1.20; Mn 0.80;  
Mo 0.50; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.04; bal Fe.

**ACIPCO ALLOY 80**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.30; Cr 2.20; Mn 0.80;  
Mo 0.70; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO ALLOY 90**

American Centrifugal, Div. of ACIPCO  
Metal; Al 0.01; C 0.30; Cr 2.20; Mn 0.80;  
Mo 0.90; Ni 0.60; P 0.02; S 0.007; Si 0.45; V  
0.03; bal Fe.

**ACIPCO CA15**

American Centrifugal, Div. of ACIPCO  
Martensitic stainless steel; C 0.15 max; Cr  
11.5-14; Mn 1 max; Ni 1 max; Si 1.5 max;  
bal Fe.  
Cast, normalized and tempered: 100,000 TS;  
65,000 YS; 18 EI; 228 HB; Heat treatable  
chromium stainless. AISI CA 15; AISI 410.

**ACIPCO CA6NM**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.06 max; Cr 11.5-14.0; Mn 1.00  
max; Mo 0.4-1.0; Ni 3.5-4.5; P 0.04 max; S  
0.03 max; Si 1.00 max; bal Fe.

**ACIPCO CB7CU-1**

American Centrifugal, Div. of ACIPCO  
Metal; C 0.07 max; Cr 15.5-17.70; Cu 2.50-  
3.20; Mn 0.70 max; Nb 0.15-0.35; Ni 3.60-  
4.60; P 0.035 max; S 0.03 max; Si 1.00 max;  
bal Fe.

\* Renamed, obsolete or no longer manufactured by this company.



**ASM International** is the society for materials engineers and scientists, a worldwide network dedicated to advancing industry, technology, and applications of metals and materials.

ASM International, Materials Park, Ohio, USA  
www.asminternational.org

This publication is copyright © ASM International®. All rights reserved.

Publication title	Product code
<b>Woldman's Engineering Alloys, 9<sup>th</sup> Edition</b>	<b>#06821G</b>

**To order products from ASM International:**

**Online** Visit [www.asminternational.org/bookstore](http://www.asminternational.org/bookstore)

**Telephone** 1-800-336-5152 (US) or 1-440-338-5151 (Outside US)

**Fax** 1-440-338-4634

**Mail** Customer Service, ASM International  
9639 Kinsman Rd, Materials Park, Ohio 44073-0002, USA

**Email** [CustomerService@asminternational.org](mailto:CustomerService@asminternational.org)

**In Europe** American Technical Publishers Ltd.  
27-29 Knowl Piece, Wilbury Way, Hitchin Hertfordshire SG4 0SX,  
United Kingdom  
Telephone: 01462 437933 (account holders), 01462 431525 (credit card)  
[www.ameritech.co.uk](http://www.ameritech.co.uk)

**In Japan** Neutrino Inc.  
Takahashi Bldg., 44-3 Fuda 1-chome, Chofu-Shi, Tokyo 182 Japan  
Telephone: 81 (0) 424 84 5550

**Terms of Use.** This publication is being made available in PDF format as a benefit to members and customers of ASM International. You may download and print a copy of this publication for your personal use only. Other use and distribution is prohibited without the express written permission of ASM International.

No warranties, express or implied, including, without limitation, warranties of merchantability or fitness for a particular purpose, are given in connection with this publication. Although this information is believed to be accurate by ASM, ASM cannot guarantee that favorable results will be obtained from the use of this publication alone. This publication is intended for use by persons having technical skill, at their sole discretion and risk. Since the conditions of product or material use are outside of ASM's control, ASM assumes no liability or obligation in connection with any use of this information. As with any material, evaluation of the material under end-use conditions prior to specification is essential. Therefore, specific testing under actual conditions is recommended.

Nothing contained in this publication shall be construed as a grant of any right of manufacture, sale, use, or reproduction, in connection with any method, process, apparatus, product, composition, or system, whether or not covered by letters patent, copyright, or trademark, and nothing contained in this publication shall be construed as a defense against any alleged infringement of letters patent, copyright, or trademark, or as a defense against liability for such infringement.