

# ALLOY STEEL COMPOSITIONS



THE INTERNATIONAL NICKEL COMPANY, INC.

One New York Plaza, New York, N.Y. 10004

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# Alloy Steel Compositions

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## Key to Print Type — Tables I to IV

- **Bold Face:** Standard Steels (1978)
- **Light Face:** Nickel Steels formerly Standard
- *Italics:* SAE Temporary Steel Numbers

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## Notes — Tables I to IV

1. Prefix letter E is for basic electric furnace steel. All others normally are made by the basic open hearth or basic oxygen processes.
2. Silicon range is 0.20-0.35%, except silicon minimum is 0.15% for acid open hearth or acid electric furnace alloy steel. Phosphorus and sulfur limitations for each process follow:

|   | Maximum, % |      |
|---|------------|------|
|   | P          | S    |
| Basic electric . . . . .                    | .025       | .025 |
| Basic open hearth or basic oxygen . . . . . | .035       | .040 |
| Acid electric . . . . .                     | .050       | .050 |
| Acid open hearth . . . . .                  | .050       | .050 |

Incidental elements, not specified, are acceptable to the following maximum amounts: copper to 0.35%, nickel to 0.25%, chromium to 0.20%, and molybdenum to .06%.

3. The boron steels can be expected to contain .0005% minimum boron.

**Table I**  
**ALLOY STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |                        |           |           |           |                       |
|-----------------------|----------------|------------------------|-----------|-----------|-----------|-----------------------|
|                       | C              | Mn                     | Ni        | Cr        | Mo        | Others and<br>Remarks |
| 1320                  | 0.18-0.23      | 1.60-1.90              | —         | —         | —         | —                     |
| •1330                 | 0.28-0.33      | 1.60-1.90              | —         | —         | —         | —                     |
| •1335                 | 0.33-0.38      | 1.60-1.90              | —         | —         | —         | —                     |
| •1340                 | 0.38-0.43      | 1.60-1.90              | —         | —         | —         | —                     |
| •1345                 | 0.43-0.48      | 1.60-1.90              | —         | —         | —         | —                     |
| 2317                  | 0.15-0.20      | 0.40-0.60              | 3.25-3.75 | —         | —         | —                     |
| 2330                  | 0.28-0.33      | 0.60-0.80              | 3.25-3.75 | —         | —         | —                     |
| 2335                  | 0.33-0.38      | 0.60-0.80              | 3.25-3.75 | —         | —         | AISI only             |
| 2340                  | 0.38-0.43      | 0.70-0.90              | 3.25-3.75 | —         | —         | —                     |
| 2345                  | 0.43-0.48      | 0.70-0.90              | 3.25-3.75 | —         | —         | —                     |
| E2512                 | .09-0.14       | 0.45-0.60 <sup>b</sup> | 4.75-5.25 | —         | —         | SAE No. 2512          |
| 2515                  | 0.12-0.17      | 0.40-0.60              | 4.75-5.25 | —         | —         | —                     |
| E2517                 | 0.15-0.20      | 0.45-0.60 <sup>b</sup> | 4.75-5.25 | —         | —         | SAE No. 2517          |
| 3115                  | 0.13-0.18      | 0.40-0.60              | 1.10-1.40 | 0.55-0.75 | —         | —                     |
| 3120                  | 0.17-0.22      | 0.60-0.80              | 1.10-1.40 | 0.55-0.75 | —         | —                     |
| 3130                  | 0.28-0.33      | 0.60-0.80              | 1.10-1.40 | 0.55-0.75 | —         | —                     |
| 3135                  | 0.33-0.38      | 0.60-0.80              | 1.10-1.40 | 0.55-0.75 | —         | —                     |
| 3140                  | 0.38-0.43      | 0.70-0.90              | 1.10-1.40 | 0.55-0.75 | —         | —                     |
| 3141                  | 0.38-0.43      | 0.70-0.90              | 1.10-1.40 | 0.70-0.90 | —         | —                     |
| 3145                  | 0.43-0.48      | 0.70-0.90              | 1.10-1.40 | 0.70-0.90 | —         | —                     |
| 3150                  | 0.48-0.53      | 0.70-0.90              | 1.10-1.40 | 0.70-0.90 | —         | —                     |
| 3240                  | 0.35-0.45      | 0.30-0.60              | 1.50-2.00 | 0.90-1.25 | —         | —                     |
| E3310                 | .08-0.13       | 0.45-0.60 <sup>b</sup> | 3.25-3.75 | 1.40-1.75 | —         | SAE No. 3310          |
| E3316                 | 0.14-0.19      | 0.45-0.60 <sup>b</sup> | 3.25-3.75 | 1.40-1.75 | —         | SAE No. 3316          |
| •4012 <sup>a</sup>    | .09-0.14       | 0.75-1.00              | —         | —         | 0.15-0.25 | —                     |
| •4023                 | 0.20-0.25      | 0.70-0.90              | —         | —         | 0.20-0.30 | —                     |
| •4024                 | 0.20-0.25      | 0.70-0.90              | —         | —         | 0.20-0.30 | S .035-.050           |
| •4027                 | 0.25-0.30      | 0.70-0.90              | —         | —         | 0.20-0.30 | —                     |
| •4028                 | 0.25-0.30      | 0.70-0.90              | —         | —         | 0.20-0.30 | S .035-.050           |
| •4032 <sup>a</sup>    | 0.30-0.35      | 0.70-0.90              | —         | —         | 0.20-0.30 | —                     |
| •4037                 | 0.35-0.40      | 0.70-0.90              | —         | —         | 0.20-0.30 | —                     |
| •4042 <sup>a</sup>    | 0.40-0.45      | 0.70-0.90              | —         | —         | 0.20-0.30 | —                     |
| •4047                 | 0.45-0.50      | 0.70-0.90              | —         | —         | 0.20-0.30 | —                     |
| •4118                 | 0.18-0.23      | 0.70-0.90              | —         | 0.40-0.60 | .08-0.15  | —                     |
| •4130                 | 0.28-0.33      | 0.40-0.60              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4135 <sup>a</sup>    | 0.33-0.38      | 0.70-0.90              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4137                 | 0.35-0.40      | 0.70-0.90              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4140                 | 0.38-0.43      | 0.75-1.00              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4142                 | 0.40-0.45      | 0.75-1.00              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4145                 | 0.43-0.48      | 0.75-1.00              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4147                 | 0.45-0.50      | 0.75-1.00              | —         | 0.80-1.10 | 0.15-0.25 | —                     |
| •4150                 | 0.48-0.53      | 0.75-1.00              | —         | 0.80-1.10 | 0.15-0.25 | —                     |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

<sup>b</sup> For open hearth steel the manganese is 0.40-0.60%.

**Table I (continued)**  
**ALLOY STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           | Others and<br>Remarks |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------------------|
|                       | C              | Mn        | Ni        | Cr        | Mo        |                       |
| •4161                 | 0.56-0.64      | 0.75-1.00 | —         | 0.70-0.90 | 0.25-0.35 | —                     |
| 4317                  | 0.15-0.20      | 0.45-0.65 | 1.65-2.00 | 0.40-0.60 | 0.20-0.30 | —                     |
| •4320                 | 0.17-0.22      | 0.45-0.65 | 1.65-2.00 | 0.40-0.60 | 0.20-0.30 | —                     |
| 4337                  | 0.35-0.40      | 0.60-0.80 | 1.65-2.00 | 0.70-0.90 | 0.20-0.30 | —                     |
| E4337                 | 0.35-0.40      | 0.65-0.85 | 1.65-2.00 | 0.70-0.90 | 0.20-0.30 | —                     |
| •4340                 | 0.38-0.43      | 0.60-0.80 | 1.65-2.00 | 0.70-0.90 | 0.20-0.30 | —                     |
| •E4340                | 0.38-0.43      | 0.65-0.85 | 1.65-2.00 | 0.70-0.90 | 0.20-0.30 | —                     |
| •4419 <sup>a</sup>    | 0.18-0.23      | 0.45-0.65 | —         | —         | 0.45-0.60 | —                     |
| •4422 <sup>a</sup>    | 0.20-0.25      | 0.70-0.90 | —         | —         | 0.35-0.45 | —                     |
| •4427 <sup>a</sup>    | 0.24-0.29      | 0.70-0.90 | —         | —         | 0.35-0.45 | —                     |
| 4608                  | .06-0.11       | 0.25-0.45 | 1.40-1.75 | —         | 0.15-0.25 | Si 0.25 max           |
| •4615                 | 0.13-0.18      | 0.45-0.65 | 1.65-2.00 | —         | 0.20-0.30 | —                     |
| •4617 <sup>a</sup>    | 0.15-0.20      | 0.45-0.65 | 1.65-2.00 | —         | 0.20-0.30 | —                     |
| •4620                 | 0.17-0.22      | 0.45-0.65 | 1.65-2.00 | —         | 0.20-0.30 | —                     |
| X4620                 | 0.18-0.23      | 0.50-0.70 | 1.65-2.00 | —         | 0.20-0.30 | —                     |
| •4621 <sup>a</sup>    | 0.18-0.23      | 0.70-0.90 | 1.65-2.00 | —         | 0.20-0.30 | —                     |
| 4640                  | 0.38-0.43      | 0.60-0.80 | 1.65-2.00 | —         | 0.20-0.30 | —                     |
| •4626                 | 0.24-0.29      | 0.45-0.65 | 0.70-1.00 | —         | 0.15-0.25 | —                     |
| •4718 <sup>a</sup>    | 0.16-0.21      | 0.70-0.90 | 0.90-1.20 | 0.35-0.55 | 0.30-0.40 | —                     |
| •4720                 | 0.17-0.22      | 0.50-0.70 | 0.90-1.20 | 0.35-0.55 | 0.15-0.25 | —                     |
| 4812                  | 0.10-0.15      | 0.40-0.60 | 3.25-3.75 | —         | 0.20-0.30 | —                     |
| •4815                 | 0.13-0.18      | 0.40-0.60 | 3.25-3.75 | —         | 0.20-0.30 | —                     |
| •4817                 | 0.15-0.20      | 0.40-0.60 | 3.25-3.75 | —         | 0.20-0.30 | —                     |
| •4820                 | 0.18-0.23      | 0.50-0.70 | 3.25-3.75 | —         | 0.20-0.30 | —                     |
| •5015                 | 0.12-0.17      | 0.30-0.50 | —         | 0.30-0.50 | —         | —                     |
| •5046 <sup>a</sup>    | 0.43-0.50      | 0.75-1.00 | —         | 0.20-0.35 | —         | —                     |
| •5060 <sup>a</sup>    | 0.56-0.64      | 0.75-1.00 | —         | 0.40-0.60 | —         | —                     |
| •5115 <sup>a</sup>    | 0.13-0.18      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| 5117                  | 0.15-0.20      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| •5120                 | 0.17-0.22      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| •5130                 | 0.28-0.33      | 0.70-0.90 | —         | 0.80-1.10 | —         | —                     |
| •5132                 | 0.30-0.35      | 0.60-0.80 | —         | 0.75-1.00 | —         | —                     |
| •5135                 | 0.33-0.38      | 0.60-0.80 | —         | 0.80-1.05 | —         | —                     |
| •5140                 | 0.38-0.43      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| •5145 <sup>a</sup>    | 0.43-0.48      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| •5147 <sup>a</sup>    | 0.46-0.51      | 0.70-0.95 | —         | 0.85-1.15 | —         | —                     |
| •5150                 | 0.48-0.53      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| •5155                 | 0.51-0.59      | 0.70-0.90 | —         | 0.70-0.90 | —         | —                     |
| •5160                 | 0.56-0.64      | 0.75-1.00 | —         | 0.70-0.90 | —         | —                     |
| •E50100 <sup>a</sup>  | 0.95-1.10      | 0.25-0.45 | —         | 0.40-0.60 | —         | —                     |
| •E51100               | 0.98-1.10      | 0.25-0.45 | —         | 0.90-1.15 | —         | —                     |
| •E52100               | 0.98-1.10      | 0.25-0.45 | —         | 1.30-1.60 | —         | —                     |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977; Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

**Table I (continued)**  
**ALLOY STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           | Others and<br>Remarks |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------------------|
|                       | C              | Mn        | Ni        | Cr        | Mo        |                       |
| •6118                 | 0.16-0.21      | 0.50-0.70 | —         | 0.50-0.70 | —         | V 0.10-0.15           |
| •6150                 | 0.48-0.53      | 0.70-0.90 | —         | 0.80-1.10 | —         | V 0.15 min            |
| •8115 <sup>a</sup>    | 0.13-0.18      | 0.70-0.90 | 0.20-0.40 | 0.30-0.50 | .08-0.15  | —                     |
| •8615                 | 0.13-0.18      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8617                 | 0.15-0.20      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8620                 | 0.18-0.23      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8622                 | 0.20-0.25      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8625                 | 0.23-0.28      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8627                 | 0.25-0.30      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8630                 | 0.28-0.33      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| 8632                  | 0.30-0.35      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| 8635                  | 0.33-0.38      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8637                 | 0.35-0.40      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8640                 | 0.38-0.43      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| 8641                  | 0.38-0.43      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | S .040-.060           |
| •8642                 | 0.40-0.45      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8645                 | 0.43-0.48      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| 8647                  | 0.45-0.50      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8650 <sup>a</sup>    | 0.48-0.53      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| 8653                  | 0.50-0.56      | 0.75-1.00 | 0.40-0.70 | 0.50-0.80 | 0.15-0.25 | —                     |
| •8655                 | 0.51-0.59      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| •8660 <sup>a</sup>    | 0.55-0.65      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | —                     |
| 8715                  | 0.13-0.18      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| 8717                  | 0.15-0.20      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| •8720                 | 0.18-0.23      | 0.70-0.90 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| 8735                  | 0.33-0.38      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| •8740                 | 0.38-0.43      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| 8742                  | 0.40-0.45      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| 8745                  | 0.43-0.48      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| 8747                  | 0.45-0.50      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | AISI only             |
| 8750                  | 0.48-0.53      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | —                     |
| •8822                 | 0.20-0.25      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.30-0.40 | —                     |
| •9254 <sup>a</sup>    | 0.50-0.60      | 0.50-0.80 | —         | —         | —         | Si 1.20-1.60          |
| •9255 <sup>a</sup>    | 0.51-0.59      | 0.70-0.95 | —         | —         | —         | Si 1.80-2.20          |
| •9260                 | 0.56-0.64      | 0.75-1.00 | —         | —         | —         | Si 1.80-2.20          |
| •E9310 <sup>a</sup>   | .08-0.13       | 0.45-0.65 | 3.00-3.50 | 1.00-1.40 | .08-0.15  | —                     |
| E9314                 | 0.11-0.17      | 0.40-0.70 | 3.00-3.50 | 1.00-1.40 | .08-0.15  | AISI only             |
| E9315                 | 0.13-0.18      | 0.45-0.65 | 3.00-3.50 | 1.00-1.40 | .08-0.15  | —                     |
| E9317                 | 0.15-0.20      | 0.45-0.65 | 3.00-3.50 | 1.00-1.40 | .08-0.15  | —                     |
| 9747                  | 0.45-0.50      | 0.50-0.80 | 0.40-0.70 | 0.10-0.25 | 0.15-0.25 | —                     |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

**Table I (continued)**  
**ALLOY STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           | Others and<br>Remarks |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------------------|
|                       | C              | Mn        | Ni        | Cr        | Mo        |                       |
| 9763                  | 0.60-0.67      | 0.50-0.80 | 0.40-0.70 | 0.10-0.25 | 0.15-0.25 | —                     |
| 9840                  | 0.38-0.43      | 0.70-0.90 | 0.85-1.15 | 0.70-0.90 | 0.20-0.30 | —                     |
| 9845                  | 0.43-0.48      | 0.70-0.90 | 0.85-1.15 | 0.70-0.90 | 0.20-0.30 | —                     |
| 9850                  | 0.48-0.53      | 0.70-0.90 | 0.85-1.15 | 0.70-0.90 | 0.20-0.30 | —                     |
| EX-10 <sup>a</sup>    | 0.19-0.24      | 0.95-1.25 | 0.20-0.40 | 0.25-0.40 | .05-0.10  | —                     |
| EX-30 <sup>a</sup>    | 0.13-0.18      | 0.70-0.90 | 0.70-1.00 | 0.45-0.65 | 0.45-0.60 | —                     |
| EX-31 <sup>a</sup>    | 0.15-0.20      | 0.70-0.90 | 0.70-1.00 | 0.45-0.65 | 0.45-0.60 | —                     |
| EX-32 <sup>a</sup>    | 0.18-0.23      | 0.70-0.90 | 0.70-1.00 | 0.45-0.65 | 0.45-0.60 | —                     |
| EX-33 <sup>a</sup>    | 0.17-0.24      | 0.85-1.25 | 0.20 min  | 0.20 min  | .05 min   | —                     |
| EX-55 <sup>a</sup>    | 0.15-0.20      | 0.70-1.00 | 1.65-2.00 | 0.45-0.65 | 0.65-0.80 | —                     |
| EX-56 <sup>a</sup>    | .08-0.13       | 0.70-1.00 | 1.65-2.00 | 0.45-0.65 | 0.65-0.80 | —                     |

<sup>a</sup> SAE Temporary Steel Number.

**Table II**  
**BORON ALLOY STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           |
|-----------------------|----------------|-----------|-----------|-----------|-----------|
|                       | C              | Mn        | Ni        | Cr        | Mo        |
| 46B12                 | 0.10-0.15      | 0.45-0.65 | 1.65-2.00 | —         | 0.20-0.30 |
| •50B40 <sup>a</sup>   | 0.38-0.43      | 0.75-1.00 | —         | 0.40-0.60 | —         |
| •50B44                | 0.43-0.48      | 0.75-1.00 | —         | 0.40-0.60 | —         |
| •50B46                | 0.44-0.49      | 0.75-1.00 | —         | 0.20-0.35 | —         |
| •50B50                | 0.48-0.53      | 0.75-1.00 | —         | 0.40-0.60 | —         |
| •50B60                | 0.56-0.64      | 0.75-1.00 | —         | 0.40-0.60 | —         |
| •51B60                | 0.56-0.64      | 0.75-1.00 | —         | 0.70-0.90 | —         |
| •81B45                | 0.43-0.48      | 0.75-1.00 | 0.20-0.40 | 0.35-0.55 | .08-0.15  |
| •86B45 <sup>a</sup>   | 0.43-0.48      | 0.75-1.00 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 |
| •94B15 <sup>a</sup>   | 0.13-0.18      | 0.75-1.00 | 0.30-0.60 | 0.30-0.50 | .08-0.15  |
| •94B17                | 0.15-0.20      | 0.75-1.00 | 0.30-0.60 | 0.30-0.50 | .08-0.15  |
| •94B30                | 0.28-0.33      | 0.75-1.00 | 0.30-0.60 | 0.30-0.50 | .08-0.15  |
| 94B40                 | 0.38-0.43      | 0.75-1.00 | 0.30-0.60 | 0.30-0.50 | .08-0.15  |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

**Table III**  
**H - STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           |                       |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------------------|
|                       | C              | Mn        | Ni        | Cr        | Mo        | Others and<br>Remarks |
| •1330H                | 0.27-0.33      | 1.45-2.05 | —         | —         | —         | —                     |
| •1335H                | 0.32-0.38      | 1.45-2.05 | —         | —         | —         | —                     |
| •1340H                | 0.37-0.44      | 1.45-2.05 | —         | —         | —         | —                     |
| •1345H                | 0.42-0.49      | 1.45-2.05 | —         | —         | —         | —                     |
| 2330H                 | 0.27-0.34      | 0.55-0.85 | 3.20-3.80 | —         | —         | —                     |
| 2512H                 | .08-0.15       | 0.35-0.65 | 4.70-5.30 | —         | —         | —                     |
| 2515H                 | 0.12-0.18      | 0.30-0.70 | 4.70-5.30 | —         | —         | —                     |
| 2517H                 | 0.14-0.20      | 0.30-0.70 | 4.70-5.30 | —         | —         | —                     |
| 3120H                 | 0.17-0.23      | 0.50-0.90 | 1.00-1.45 | 0.45-0.85 | —         | —                     |
| 3130H                 | 0.27-0.33      | 0.50-0.90 | 1.00-1.45 | 0.45-0.85 | —         | —                     |
| 3135H                 | 0.32-0.38      | 0.50-0.90 | 1.00-1.45 | 0.45-0.85 | —         | —                     |
| 3140H                 | 0.37-0.44      | 0.60-1.00 | 1.00-1.45 | 0.45-0.85 | —         | —                     |
| 3310H                 | .07-0.13       | 0.30-0.70 | 3.20-3.80 | 1.30-1.80 | —         | —                     |
| 3316H                 | 0.13-0.19      | 0.30-0.70 | 3.20-3.80 | 1.30-1.80 | —         | —                     |
| •4027H                | 0.24-0.30      | 0.60-1.00 | —         | —         | 0.20-0.30 | —                     |
| •4028H                | 0.24-0.30      | 0.60-1.00 | —         | —         | 0.20-0.30 | S .035-.050           |
| •4032H                | 0.29-0.35      | 0.60-1.00 | —         | —         | 0.20-0.30 | —                     |
| •4037H                | 0.34-0.41      | 0.60-1.00 | —         | —         | 0.20-0.30 | —                     |
| •4042H                | 0.39-0.46      | 0.60-1.00 | —         | —         | 0.20-0.30 | —                     |
| •4047H                | 0.44-0.51      | 0.60-1.00 | —         | —         | 0.20-0.30 | —                     |
| •4118H                | 0.17-0.23      | 0.60-1.00 | —         | 0.30-0.70 | .08-0.15  | —                     |
| •4130H                | 0.27-0.33      | 0.30-0.70 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4135H                | 0.32-0.38      | 0.60-1.00 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4137H                | 0.34-0.41      | 0.60-1.00 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4140H                | 0.37-0.44      | 0.65-1.10 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4142H                | 0.39-0.46      | 0.65-1.10 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4145H                | 0.42-0.49      | 0.65-1.10 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4147H                | 0.44-0.51      | 0.65-1.10 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4150H                | 0.47-0.54      | 0.65-1.10 | —         | 0.75-1.20 | 0.15-0.25 | —                     |
| •4161H                | 0.55-0.65      | 0.65-1.10 | —         | 0.65-0.95 | 0.25-0.35 | —                     |
| 4317H                 | 0.14-0.21      | 0.40-0.70 | 1.50-2.00 | 0.35-0.65 | 0.20-0.30 | —                     |
| •4320H                | 0.17-0.23      | 0.40-0.70 | 1.55-2.00 | 0.35-0.65 | 0.20-0.30 | —                     |
| 4337H                 | 0.34-0.41      | 0.55-0.90 | 1.55-2.00 | 0.65-0.95 | 0.20-0.30 | —                     |
| •4340H                | 0.37-0.44      | 0.55-0.90 | 1.55-2.00 | 0.65-0.95 | 0.20-0.30 | —                     |
| •E4340H               | 0.37-0.44      | 0.60-0.95 | 1.55-2.00 | 0.65-0.95 | 0.20-0.30 | —                     |
| •4419H <sup>a</sup>   | 0.17-0.23      | 0.35-0.75 | —         | —         | 0.45-0.60 | —                     |
| •4620H                | 0.17-0.23      | 0.35-0.75 | 1.55-2.00 | —         | 0.20-0.30 | —                     |
| X4620H                | 0.17-0.23      | 0.40-0.80 | 1.55-2.00 | —         | 0.20-0.30 | —                     |
| •4621H                | 0.17-0.23      | 0.60-1.00 | 1.55-2.00 | —         | 0.20-0.30 | —                     |
| 4640H                 | 0.37-0.44      | 0.50-0.90 | 1.55-2.00 | —         | 0.20-0.30 | —                     |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."



Table III (continued)

**H-STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           | Others and<br>Remarks |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------------------|
|                       | C              | Mn        | Ni        | Cr        | Mo        |                       |
| •4626H                | 0.23-0.29      | 0.40-0.70 | 0.65-1.05 | —         | 0.15-0.25 | AISI only             |
| •4718H <sup>a</sup>   | 0.15-0.21      | 0.60-0.95 | 0.85-1.25 | 0.30-0.60 | 0.30-0.40 | —                     |
| •4720H                | 0.17-0.23      | 0.45-0.75 | 0.85-1.25 | 0.30-0.60 | 0.15-0.25 | —                     |
| 4812H                 | 0.09-0.15      | 0.30-0.70 | 3.20-3.80 | —         | 0.20-0.30 | —                     |
| •4815H                | 0.12-0.18      | 0.30-0.70 | 3.20-3.80 | —         | 0.20-0.30 | —                     |
| •4817H                | 0.14-0.20      | 0.30-0.70 | 3.20-3.80 | —         | 0.20-0.30 | —                     |
| •4820H                | 0.17-0.23      | 0.40-0.80 | 3.20-3.80 | —         | 0.20-0.30 | —                     |
| •5046H                | 0.43-0.50      | 0.65-1.10 | —         | 0.13-0.43 | —         | —                     |
| •5120H                | 0.17-0.23      | 0.60-1.00 | —         | 0.60-1.00 | —         | —                     |
| •5130H                | 0.27-0.33      | 0.60-1.00 | —         | 0.75-1.20 | —         | —                     |
| •5132H                | 0.29-0.35      | 0.50-0.90 | —         | 0.65-1.10 | —         | —                     |
| •5135H                | 0.32-0.38      | 0.50-0.90 | —         | 0.70-1.15 | —         | —                     |
| •5140H                | 0.37-0.44      | 0.60-1.00 | —         | 0.60-1.00 | —         | —                     |
| •5145H                | 0.42-0.49      | 0.60-1.00 | —         | 0.60-1.00 | —         | —                     |
| •5147H <sup>a</sup>   | 0.45-0.52      | 0.60-1.05 | —         | 0.80-1.25 | —         | —                     |
| •5150H                | 0.47-0.54      | 0.60-1.00 | —         | 0.60-1.00 | —         | —                     |
| •5155H                | 0.50-0.60      | 0.65-1.10 | —         | 0.60-1.00 | —         | —                     |
| •5160H                | 0.55-0.65      | 0.65-1.10 | —         | 0.60-1.00 | —         | —                     |
| •6118H                | 0.15-0.21      | 0.40-0.80 | —         | 0.40-0.80 | —         | V 0.10-0.15           |
| •6150H                | 0.47-0.54      | 0.60-1.00 | —         | 0.75-1.20 | —         | V 0.15 min            |
| •8617H                | 0.14-0.20      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8620H                | 0.17-0.23      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8622H                | 0.19-0.25      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8625H                | 0.22-0.28      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8627H                | 0.24-0.30      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8630H                | 0.27-0.33      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| 8632H                 | 0.30-0.37      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| 8635H                 | 0.32-0.38      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8637H                | 0.34-0.41      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8640H                | 0.37-0.44      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| 8641H                 | 0.37-0.44      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | S .040-.060           |
| •8642H                | 0.39-0.46      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8645H                | 0.42-0.49      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| 8647H                 | 0.44-0.52      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8650H <sup>a</sup>   | 0.47-0.54      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| 8653H                 | 0.49-0.56      | 0.70-1.05 | 0.35-0.75 | 0.50-0.85 | 0.15-0.25 | —                     |
| •8655H                | 0.50-0.60      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8660H <sup>a</sup>   | 0.55-0.65      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 | —                     |
| •8720H                | 0.17-0.23      | 0.60-0.95 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |
| 8735H                 | 0.32-0.39      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

Table III (continued)

**H-STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No.  | Composition, % |           |           |           |           | Others and<br>Remarks |
|------------------------|----------------|-----------|-----------|-----------|-----------|-----------------------|
|                        | C              | Mn        | Ni        | Cr        | Mo        |                       |
| •8740H                 | 0.37-0.44      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |
| 8742H                  | 0.39-0.46      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |
| 8745H                  | 0.42-0.50      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |
| 8747H                  | 0.44-0.52      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |
| 8750H                  | 0.47-0.54      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.20-0.30 | —                     |
| •8822H                 | 0.19-0.25      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.30-0.40 | —                     |
| •9260H                 | 0.55-0.65      | 0.65-1.10 | —         | —         | —         | Si 1.70-2.20          |
| •9310H <sup>a, b</sup> | .07-0.13       | 0.40-0.70 | 2.95-3.55 | 1.00-1.45 | .08-0.15  | —                     |
| 9437H                  | 0.35-0.43      | 0.85-1.25 | 0.25-0.65 | 0.25-0.55 | .08-0.15  | —                     |
| 9440H                  | 0.37-0.45      | 0.85-1.25 | 0.25-0.65 | 0.25-0.55 | .08-0.15  | —                     |
| 9442H                  | 0.40-0.48      | 0.95-1.35 | 0.25-0.65 | 0.25-0.55 | .08-0.15  | —                     |
| 9445H                  | 0.42-0.50      | 0.95-1.35 | 0.25-0.65 | 0.25-0.55 | .08-0.15  | —                     |
| 9840H                  | 0.37-0.44      | 0.60-0.95 | 0.80-1.20 | 0.65-0.95 | 0.20-0.30 | —                     |
| 9850H                  | 0.47-0.54      | 0.60-0.95 | 0.80-1.20 | 0.65-0.95 | 0.20-0.30 | —                     |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

<sup>b</sup> Electric furnace steel.

Table IV

**BORON H-STEELS**  
**Ladle Chemical Ranges and Limits**  
**Bars, Billets, Blooms and Slabs**

| AISI<br>or SAE<br>No. | Composition, % |           |           |           |           |
|-----------------------|----------------|-----------|-----------|-----------|-----------|
|                       | C              | Mn        | Ni        | Cr        | Mo        |
| •50B40H               | 0.37-0.44      | 0.65-1.10 | —         | 0.30-0.70 | —         |
| •50B44H               | 0.42-0.49      | 0.65-1.10 | —         | 0.30-0.70 | —         |
| •50B46H               | 0.43-0.50      | 0.65-1.10 | —         | 0.13-0.43 | —         |
| •50B50H               | 0.47-0.54      | 0.65-1.10 | —         | 0.30-0.70 | —         |
| •50B60H               | 0.55-0.65      | 0.65-1.10 | —         | 0.30-0.70 | —         |
| •51B60H               | 0.55-0.65      | 0.65-1.10 | —         | 0.60-1.00 | —         |
| •81B45H               | 0.42-0.49      | 0.70-1.05 | 0.15-0.45 | 0.30-0.60 | .08-0.15  |
| •86B45H               | 0.42-0.49      | 0.70-1.05 | 0.35-0.75 | 0.35-0.65 | 0.15-0.25 |
| •94B15H               | 0.12-0.18      | 0.70-1.05 | 0.25-0.65 | 0.25-0.55 | .08-0.15  |
| •94B17H               | 0.14-0.20      | 0.70-1.05 | 0.25-0.65 | 0.25-0.55 | .08-0.15  |
| •94B30H               | 0.27-0.33      | 0.70-1.05 | 0.25-0.65 | 0.25-0.55 | .08-0.15  |
| 94B40H                | 0.37-0.44      | 0.70-1.05 | 0.25-0.65 | 0.25-0.55 | .08-0.15  |

<sup>a</sup> Listed in "1978 SAE Handbook," but not by AISI in 1977: Steel Products Manual, "Alloy, Carbon and High Strength Low Alloy Steels: Semifinished for Forging; Hot Rolled Bars, Cold Finished Bars; Hot Rolled Deformed and Plain Concrete Reinforcing Bars."

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