

Cast Tool Steels: ASTM A 597 Equivalents-ACI, AISI, MIL, AMS, IN, QQ, SAE

| Alloy | Specification | C | Mn | Si | P | S | Ni | Cr | Mo | W | Co | V | Fe | Optional |
|-------------|---|-------------------------------------|----------------------|----------------------|------------------------|------------------------|-----------|-------------------------------------|-------------------------------|----------------------------------|----------------|----------------------------------|-------------------------------|---------------------------------------|
| A-2 | ASTM A 597 Gr CA-2 IC CA-2 | 0.95-1.05 0.95-1.05 | 0.75 0.75 | 1.5 1.5 | 0.03 0.025 | 0.03 0.025 | - - | 4.75-5.50 4.75-5.50 | 0.9-1.4 0.9-1.4 | - - | | Optional Optional | Balance Balance | V 0.2-0.5 V 0.2-0.5 |
| A-6 | IC CA-6 | 0.65-0.75 | 1.8-2.2 | 1.0 | 0.025 | 0.025 | - | 0.8-1.2 | 0.8-1.3 | - | | | Balance | |
| D-2 | ASTM A 597 Gr CD-2 IC CD-2 | 1.40-1.60 1.40-1.60 | 1.00 1.00 | 1.5 1.5 | 0.03 0.025 | 0.03 0.025 | - - | 11.0-13.0 11.0-13.0 | 0.7-1.2 0.7-1.2 | - - | Optional | Optional | Balance | V 0.4-1.0 Co 0.7-1.0/ V 0.4-1.0 |
| D-3 | IC CD-3 | 2.1-2.3 | 0.75 | 1.0 | 0.025 | 0.025 | - | 11.5-13.0 | 0.40 | - | - | - | Balance | |
| D-5 | ASTM A 597 Gr CD-5 | 1.34-1.60 | 0.75 | 1.5 | 0.025 | 0.025 | Optional | 11.0-13.0 | 0.7-1.2 | - | 2.5-3.5 | - | Balance | Ni 0.4-0.6 |
| D-6 | IC CD-6 | 2.1-2.35 | 0.75 | 0.8-1.2 | 0.025 | 0.025 | - | 11.5-13.0 | 0.40 | 0.8-1.2 | - | - | Balance | |
| D-7 | IC CD-7 | 2.15-2.45 | 0.75 | 1.0 | 0.025 | 0.025 | - | 11.5-13.0 | 0.8-1.2 | - | - | 3.5-4.5 | Balance | |
| H-11 | IC CH-11 | 0.30-0.40 | 0.75 | 0.95-1.15 | 0.025 | 0.025 | - | 4.6-5.4 | 1.2-1.6 | - | - | 0.3-0.5 | Balance | |
| H-12 | ASTM A 597 Gr CH-12 IC CH-12 | 0.30-.040 0.30-0.40 | 0.75 0.75 | 1.5 1.5 | 0.03 0.025 | 0.03 0.025 | - - | 4.75-5.75 4.75-5.75 | 1.25-1.75 1.25-1.75 | 1.0-1.7 1.0-1.7 | - - | 0.2-0.5 0.2-0.5 | Balance Balance | |
| H-13 | ASTM A 597 Gr CH-13 IC CH-13 | 0.30-.042 0.30-0.42 | 0.75 0.75 | 1.5 1.5 | 0.03 0.025 | 0.03 0.025 | - - | 4.75-5.75 4.75-5.75 | 1.25-1.75 1.25-1.75 | - - | - - | 0.75-1.2 0.75-1.2 | Balance Balance | |
| L-6 | IC CL-6 | 0.65-0.75 | 0.75 | 1.00 | 0.03 | 0.03 | 1.50-1.90 | 0.80-1.00 | - | - | - | - | Balance | |
| M-2 | ASTM A 597 Gr CM-2 IC CM-2 IC C1-M-2 | 0.78-0.88 0.78-0.88 0.95-1.05 | 0.75 0.75 0.75 | 1.00 1.00 1.00 | 0.03 0.025 0.025 | 0.03 0.025 0.025 | Optional | 3.75-4.50 3.75-4.50 3.75-4.50 | 4.5-5.5 4.5-5.5 4.5-5.5 | 5.5-6.75 5.5-6.75 5.5-6.75 | 0.25 - - | 1.25-2.2 1.25-2.2 1.75-2.2 | Balance Balance Balance | 0.25 max 0.25 max 0.25 max |
| M-4 | IC CM-4 | 1.25-1.35 | 0.75 | 1.00 | 0.025 | 0.025 | - | 3.75-4.50 | 4.5-5.5 | 5.2-6.2 | - | 3.6-4.4 | Balance | |
| M-42 | IC CM-42 | 1.00-1.20 | 0.75 | 1.00 | 0.025 | 0.025 | - | 3.5-4.25 | 9.0-10.0 | 1.25-1.75 | 7.50-8.50 | 0.95-1.35 | Balance | |

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|-------------|---|------------------------|----------------------|------------------------|----------------|----------------|--------|------------------------|------------------------|--------------------|-------------|--------------|--------------------|----------|
| M-43 | IC CM-43 | 1.15-1.35 | 0.75 | 1.00 | 0.025 | 0.025 | - | 3.50-4.25 | 8.25-9.25 | 1.50-2.0 | 7.75-8.75 | 1.50-2.00 | Balance | |
| O-1 | CO-1 IC CO-1 | 0.85-1.00 0.85-1.00 | 1.0-1.3 1.0-1.3 | 1.50 1.50 | 0.03 0.025 | 0.03 0.025 | - | 0.40-1.00 0.40-1.00 | - | 0.4-0.6 0.4-0.6 | - | 0.30 0.30 | Balance Balance | |
| O-2 | IC CO-2 | 0.85-0.95 | 1.5-1.80 | 1.00 | 0.025 | 0.025 | - | 0.40 | 0.30 | - | - | 0.30 | Balance | |
| O-7 | IC CO-7 | 1.10-1.20 | 0.75 | 1.00 | 0.025 | 0.025 | - | 0.50-0.70 | - | 1.65-1.85 | - | 0.30 | Balance | |
| S-1 | IC CS-1 | 0.45-0.55 | 0.75 | 1.00 | 0.025 | 0.025 | - | 1.35-1.65 | - | 2.35-2.65 | - | - | Balance | |
| S-2 | IC CS-2 | 0.45-0.55 | 0.75 | 0.90-1.2 | 0.025 | 0.025 | - | - | 0.40-0.60 | - | - | - | Balance | |
| S-4 | IC CS-4 | 0.50-0.60 | 0.7-0.9 | 1.8-1.2 | 0.025 | 0.025 | - | 0.30 | - | - | - | 0.30 | Balance | |
| S-5 | ASTM A 597 Gr CS-5 IC CS-5 | 0.50-0.65 0.50-0.65 | 0.6-1.00 0.6-1.00 | 1.75-2.25 1.75-2.25 | 0.025 0.025 | 0.025 0.025 | - - | 0.35 0.35 | 0.20-0.80 0.20-0.80 | - - | - - | 0.35 0.35 | Balance Balance | |
| S-7 | ASTM A 597 Gr CS-7 IC CS-7 | 0.45-0.55 0.50-0.60 | 0.40-0.8 0.50-0.8 | 0.60-1.00 1.00 | 0.03 0.025 | 0.03 0.025 | - - | 3.00-3.50 3.00-3.50 | 1.20-1.60 1.20-1.60 | - - | - - | - - | Balance Balance | |
| T-1 | IC CT-1 | 0.65-0.75 | 0.75 | 1.00 | 0.025 | 0.025 | - | 3.75-4.50 | - | 17.25-18.75 | - | 0.90-1.3 | Balance | |
| T-2 | IC CT-2 | 0.80-0.90 | 0.75 | 1.00 | 0.025 | 0.025 | - | 3.75-4.50 | 1.00 | 17.50-19.00 | - | 1.80-2.40 | Balance | |
| T-6 | IC CT-6 | 0.75-0.85 | 0.75 | 1.00 | 0.025 | 0.025 | - | 4.00-4.75 | 0.70-1.00 | 18-50-21.25 | 10.00-13.70 | 1.50-2.10 | Balance | |

***Optional Element.** Tool steels have found satisfactory application either with or without element present. If desired, it should be specified on the order or mutually agreed.

ASTM A 597 USA Standard Specification for Cast Tool Steels

% minimum-maximum range

This specification covers tool steel composition for usable shapes cast by pouring directly into suitable moulds and for master heats for re-melting and casting. Nine Grades, CA-2, CD-2, CD-5, CM-2, CS-5, CS-7, CH-12, CH-13 and CO-1 are covered in this specification.

- ASTM** American Society of Testing Materials
- AISI** American Iron and Steel Institute
- MIL** Military Specification
- ACI** Alloy Casting Institute
- AMS** Aerospace Material Specification
- IC** Investment Casting Institute
- SAE** Society of Automotive Engineers
- IN** International Nickel
- QQ** Federal Specifications