

1.0 DESCRIPTION

Steel - Carbon

2.0 APPLICATION

For general-purpose applications requiring good weldability and 140 MPa minimum yield strength. 1E0357 may also be used for parts that call for steel and are unqualified as to specification number, composition, or properties (e.g., mild steel, manufacturer's standard steel, etc.). However, 1E0357 is not to be used for parts requiring 1E1821 surface quality. If 1E1821 is required, 1E0065C shall be used.

3.0 QUALIFYING SPECIFICATIONS

1E2177 Mill Tolerances - Steel Products
1E2349A Materials Application - Substitute
1E2700B Strand Cast Steel - Caster Class 5

4.0 COMPOSITION (%)

4.1 This material shall be a carbon steel with the following heat analysis:

| | |
|--------------------|-----------|
| Carbon | 0.03-0.29 |
| Manganese | 0.30-1.20 |
| Phosphorus | 0.045 MAX |
| Sulfur | 0.055 MAX |
| Aluminum | 0.08 MAX |
| Carbon Equivalent* | 0.50 MAX |

Note*: Carbon Equivalent = $C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

5.0 TESTING METHODS

Methods of analysis, test and inspection shall conform to ASTM A370 or other applicable national standard.

6.0 TOLERANCES

Unless otherwise specified, tolerances for all products except tubing shall be per 1E2177 and those published in the latest issue of the AISI steel products manual. Tolerances for tubing shall be per 1E2177 or the tubing specification where it is more restrictive.

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STEEL - CARBON (MANUFACTURER'S
STANDARD)

DATE
02 SEP 2008

CHG NO
32

NUMBER
1E0357

7.0 MATERIAL SELECTION

7.1 Many commonly available national standard grades of carbon steel fulfill the requirements of this specification. Any carbon steel meeting the composition and 1E2700 strand cast requirements can be used. Examples of suitable national standard carbon steels include, but are not limited to BS 4360, Grade 40B; ASTM A36; SAE Grades 1008 through 1025; DIN 17100, Grade St 37-2; AFNOR A35-501Q, Grade E24-2; JIS G4051, Grade S20C; JIS G3505, SWRM10; JIS G3505, SWRM15 through 22; GB700, Grade Q235; GB699, Grade 20; and GB1591, Grade Q345A. For bar, GB699, Grades 08 through 25, can be used too. Such standard grades may be used for any part specifying 1E0357 steel, including Caterpillar Inc. worked parts. In addition to national standard grades, the following Caterpillar 1E materials may also be used for parts that require 1E0357 steel.

| | |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cold Finished Bars | 1E0042, 1E0320 |
| Hot Rolled Bars | 1E0042, 1E0065, 1E0166, 1E0170, 1E0320 |
| Tubing (For Machining) | 1E0320, 1E1702, 1E0526, 1E0551 (For Non-Heat Treated Bushings, Spacers, etc.), 1E0606, 1E0715 (1E0715 May be Applied when 1E0357 Seamless is Specified on the Drawing), 1E0694, 1E1241 |
| Tubing (For Forming) | 1E0347 Soft Annealed, 1E0526, 1E0606 Soft Annealed |
| Tubing (Square and Rectangular) | 1E0709 |
| Plate | 1E0065, 1E0166, 1E0170, 1E0320 |
| Sheet and Strip | 1E0048, 1E0166, 1E0170, 1E0382 Hot Rolled, 1E0382 Cold Rolled No. 4 or No. 5 Temper |
| Bar and Structural Shapes | 1E0042, 1E0065, 1E0166, 1E0170, 1E0320 |
| Forgings | 1E0042 |

Figure 1

7.2 Additional substitute materials for the 1E material specifications in Paragraph 7.1 are listed in those specifications.

7.3 The above materials are acceptable for case hardening with the following limitations:

7.3.1 The minimum case depth may not exceed 0.5 mm with oil quenching.

7.3.2 For case depths over 0.5 mm minimum in sections through 18 mm, the use of 1E0769 (with oil quenching) is permitted.

| | | | |
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7.3.3 For case depths over 0.5 mm minimum in sections greater than 18 mm, the use of 1E0426 (with oil quenching) is permitted. 1E0426 is not permitted with 1E0439 carbonitride heat treatment.

7.3.4 1E0170 may be used with 1E0439 heat treatment only when the heat treatment is done by Caterpillar and only with 1E2349 Type B approval of the heat-treat source plant.

7.4 When parts are manufactured by Caterpillar, the material selected from Paragraphs 7.1 and 7.2 shall be documented on appropriate purchasing and planning documents (e.g., Purchase Order, Station List, Part Number Work Order, Heat Treat Set-Up, etc.)

8.0 SUBSIDIARY SPECIFICATIONS (FOR CATERPILLAR INC. REFERENCE ONLY)

8.1 At the time of release of 1E0357, Change 32, the following subsidiary versions of 1E0357 were in use by caterpillar facilities outside of the United States.

| | |
|--------------------------------------------------------|-------------|
| Caterpillar Brazil Ltda. (Piracicaba) | "G" Version |
| Caterpillar Belgium S.A. (Gosselies) | "H" Version |
| Caterpillar France S.A. (Grenoble) | "H" Version |
| Caterpillar Materials Routiers S.A. (Rantigny, France) | "H" Version |
| Shin Caterpillar Mitsubishi Ltd. (Sagami) | "X" Version |
| Shin Caterpillar Mitsubishi (Akashi) | "X" Version |

Figure 2

8.2 Subsidiary versions may be changed, released, or canceled without a change to this version of 1E0357. The Engineering Data System (EDS) provides information on the status of subsidiary version specifications and should be referenced for current information.

9.0 REFERENCES

| | |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Caterpillar Specifications | 1E0042, 1E0048, 1E0065, 1E0166, 1E0170, 1E0320, 1E0347, 1E0382, 1E0426, 1E0439, 1E0526, 1E0551, 1E0606, 1E0694, 1E0709, 1E0715, 1E0769, 1E1241, 1E1702, 1E2349B, 1E2700 |
| ASTM | A36, A370 |
| SAE | Grades 1008 through 1025 |
| BS | 4360 |
| DIN | 17100 |
| JIS | G3505, G4051 |
| AFNOR | A35-501Q |
| GB | 699, 700, 1591 |

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