

CATERPILLAR: CONFIDENTIAL YELLOW TECHNICAL INFORMATION - YOU SHALL OBTAIN PERMISSION FROM THE CONTENT OWNER AND ESTABLISH THAT THE PERSON RECEIVING THE INFORMATION HAS THE NEED TO KNOW PRIOR TO SHARING THIS INFORMATION WITH ANYONE INSIDE OR OUTSIDE OF CATERPILLAR.

1.0 DESCRIPTION

Steel - Alloy

2.0 APPLICATION

Carburized parts requiring extra cleanliness.

3.0 DRAWING DESIGNATIONS

3.1 This is a multiple variation specification with different restrictions on material substitutions see Figure 1.

Current Drawing Designation	Former Drawing Designation	Restrictions
1E1120A	1E1120	Permits Material Substitutions per Article 10.0
1E1120B		No Material Substitutions Allowed

Figure 1

4.0 QUALIFYING SPECIFICATIONS

- 1E0024B Wrought Steel - General Requirements
- 1E2661A Steel Cleanliness - Ladle Refining
- 1E2177 Mill Tolerances - Steel Products
- 1E2349 Materials Application - Substitute
- 1E2700C Steel Quality - Caster Class 1B
- 1E2700A Steel Quality - Caster Class 1B (For Seamless Tubing)

5.0 FORM AND QUALITY

Semifinished For Forging
Hot Rolled Bars
Cold Finished Bars
Seamless Tubing

THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMITTAL TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS LOANED, IS PROHIBITED.			
STEEL - ALLOY (4120 MODIFIED - SPECIAL CLEANLINESS)	DATE 20 AUG 2018	CHG NO 18	NUMBER 1E1120

CATERPILLAR: CONFIDENTIAL YELLOW TECHNICAL INFORMATION - YOU SHALL OBTAIN PERMISSION FROM THE CONTENT OWNER AND ESTABLISH THAT THE PERSON RECEIVING THE INFORMATION HAS THE NEED TO KNOW PRIOR TO SHARING THIS INFORMATION WITH ANYONE INSIDE OR OUTSIDE OF CATERPILLAR.

6.0 COMPOSITION (%) (HEAT ANALYSIS)

Carbon	0.19 - 0.23
Manganese	0.80 - 1.10
Phosphorus	0.020 MAX
Sulfur	0.010 - 0.025
Silicon	0.18 MAX
Chromium	0.45 - 0.70
Molybdenum	0.08 - 0.25
Aluminum	0.020 MIN

Note: If DI (calculated by 1E0038 multiplying factors) is 45.7 mm to 58.4 mm, based on ladle chemistry or 43.2 mm to 61 mm, based on product chemistry, then the heat can be exempted from the 1E0024 requirement for Jominy hardness testing.

7.0 STEEL CLEANLINESS

7.1 Ladle refining per 1E2661A is required.

7.2 Substitute materials shall meet ASTM A534 or National Standard Cleanliness Levels equivalent to 1E2661A.

8.0 AUSTENITIC GRAIN SIZE

ASTM E112 (McQuaid-Ehn) grain size 5 or finer, grain refined with Aluminum.

THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMITTAL TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS LOANED, IS PROHIBITED.

STEEL - ALLOY
(4120 MODIFIED - SPECIAL CLEANLINESS)

DATE
20 AUG 2018

CHG NO
18

NUMBER
1E1120

CATERPILLAR: CONFIDENTIAL YELLOW TECHNICAL INFORMATION - YOU SHALL OBTAIN PERMISSION FROM THE CONTENT OWNER AND ESTABLISH THAT THE PERSON RECEIVING THE INFORMATION HAS THE NEED TO KNOW PRIOR TO SHARING THIS INFORMATION WITH ANYONE INSIDE OR OUTSIDE OF CATERPILLAR.

9.0 HARDENABILITY

Normalizing Temperature 925°C
Austenitizing Temperature 925°C

Jominy Distance (mm)	1.5	5	13
MAX	48	--	29
HRC			
MIN	43	34	--
Jominy Distance (Inch)	1/16	3/16	8/16
MAX	48	--	29
HRC			
MIN	43	35	--

Jominy testing shall be performed according to 1E0024A.

10.0 SUBSTITUTE MATERIALS

10.1 1E1120B - No substitutes allowed.

10.2 1E1120A - Substitute materials allow the chemical compositions of certain National Standard grade steels to be used in place of 1E specification chemistries, per the guidelines of 1E0024 and 1E2349 - Substitute Materials Application. **When procuring any of the following substitute grades, all other quality requirements of the original 1E Specification shall be met, such as approved mill, reduction ratio, caster class, DI, grain size, etc.**

10.2.1 If steel purchasers do not understand these issues, they shall buy materials to the 1E material specification or employ the services of Caterpillar Global Purchasing to assist in material acquisition.

10.2.2 1E2349 governs approval requirements and procedures. This specification shall be read and understood before using any of the substitute materials listed below.

THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMITTAL TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS LOANED, IS PROHIBITED.			
STEEL - ALLOY (4120 MODIFIED - SPECIAL CLEANLINESS)	DATE 20 AUG 2018	CHG NO 18	NUMBER 1E1120

CATERPILLAR: CONFIDENTIAL YELLOW TECHNICAL INFORMATION - YOU SHALL OBTAIN PERMISSION FROM THE CONTENT OWNER AND ESTABLISH THAT THE PERSON RECEIVING THE INFORMATION HAS THE NEED TO KNOW PRIOR TO SHARING THIS INFORMATION WITH ANYONE INSIDE OR OUTSIDE OF CATERPILLAR.

Specification	Grade or 1E Spec	Approval Type
Caterpillar	1E0778, 1E2743, 1E2766, 1E4180	1E2349B
ASTM A304	Grades 8720H, 8620H, or 4620H	1E2349B
ASTM A914	Grades 4620RH, 8622RH	1E2349B
SAE J1868	Grades 4120RH, 8620RH, or 8720RH	1E2349B
BS 970	Grade 805H20	1E2349B
	Grade 805H22	1E2349B
EN 10084	Grade 20MoCr4	1E2349B
	Grade 20MnCr5	1E2349B
	Grade 18CrMo4+H	1E2349B
	Grade 20MoCr3+H	1E2349B
	Grade 16MnCr5+H	1E2349B
AFNOR A35-551	Grade 20NCD2	1E2349B
JIS G4052	Grade SCM418H	1E2349B
	Grade SCM420H	1E2349B
	Grade SNCM220H	1E2349B
UNI 8550	Grade 18N1CrMo5	1E2349B
GB/T 5216	Grade 20CrMnTiH*	1E2349B
	Grade 20CrMnHH	1E2349B
	Grade 16CrMnHH	1E2349B
	Grade 20CrMoH	1E2349B
	Grade 20CrNiMoHH	1E2349B

Figure 2 - Substitute Materials

Note: Material may only be used if it can be determined that the material meets the minimum D.I. requirements per Article 6.0 or the minimum hardenability requirements in Article 9.0.

Note: Use of these substitute materials may require manufacturing process changes due to differences in heat treat response.

Note*: GB/T 5216 Grade 20CrMnTiH is not allowed for gears and planet shafts. It is a 1E2349A substitute for 1E1120 on non-rotating shafts that are used to locate engine gears (i.e. stub shafts).

10.2.3 Material procured by Morton Parts for non-current parts are exempt from the hardenability requirements stated above. Hardenability limits for the respective national

THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMITTAL TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS LOANED, IS PROHIBITED.			
STEEL - ALLOY (4120 MODIFIED - SPECIAL CLEANLINESS)	DATE 20 AUG 2018	CHG NO 18	NUMBER 1E1120

CATERPILLAR: CONFIDENTIAL YELLOW TECHNICAL INFORMATION - YOU SHALL OBTAIN PERMISSION FROM THE CONTENT OWNER AND ESTABLISH THAT THE PERSON RECEIVING THE INFORMATION HAS THE NEED TO KNOW PRIOR TO SHARING THIS INFORMATION WITH ANYONE INSIDE OR OUTSIDE OF CATERPILLAR.

standards will apply.

11.0 REFERENCES

Abbreviations

Caterpillar Specifications	1E0011 1E0024, 1E0038, 1E0392, 1E0778, 1E2057, 1E2349, 1E2743, 1E2766, 1E4157, 1E4180
ASTM	A304, E112, A914
SAE	J1868
BS	970
EN	10084
AFNOR	A35-551
JIS	G4052
UNI	8550
GB/T	5216

THE INFORMATION HEREON IS THE PROPERTY OF CATERPILLAR INC. AND/OR ITS SUBSIDIARIES. WITHOUT WRITTEN PERMISSION, ANY COPYING, TRANSMITTAL TO OTHERS, AND ANY USE EXCEPT THAT FOR WHICH IT IS LOANED, IS PROHIBITED.

STEEL - ALLOY
(4120 MODIFIED - SPECIAL CLEANLINESS)

DATE
20 AUG 2018

CHG NO
18

NUMBER
1E1120