1.0 DESCRIPTION

This is a multiple variation specification (different properties, materials, and processing, see Articles 6.0 and 7.0) which establishes standard classes of pins and dowels, and provides for optional materials and processing to accommodate economical procurement.

2.0 APPLICATION

This specification is applicable to both heat-treated and non heat-treated steel pins and dowels primarily in sizes through 32 mm nominal diameter.

3.0 QUALIFYING SPECIFICATIONS

1E2349 Material Application - Substitute
1E2700B Strand Cast Steel - Caster Class 1 (For 1E1042F)
1E2700B Strand Cast Steel - Caster Class 3 (For 1E1042 B&C)
1E2700B Strand Cast Steel - Caster Class 5 (For 1E1042 A, D&E)

4.0 AUSTENITIC GRAIN SIZE

1E1042B, 1E1042C, and 1E1042F require 5 or finer (grain refinement with Al is not required).

5.0 DRAWING DESIGNATIONS

5.1 Drawings showing former designations, Figure 1, shall have parts manufactured in accordance with current designations now shown in this specification.

Current Designation	Former Designation
1E1042A MATL & PROC	1E1042 MATL & PROC TYPE A
1E1042B MATL & PROC	1E1042 MATL & PROC TYPE B
1E1042C MATL & PROC	1E1042 MATL & PROC TYPE C
1E1042D MATL & PROC	1E1042 MATL & PROC TYPE D
1E1042E MATL & PROC	1E1042 MATL & PROC TYPE E
1E1042F MATL & PROC	1E1042 MATL & PROC TYPE F

Figure 1

6.0 CLASSIFICATION OF PROPERTIES (FOR CATERPILLAR INC. GUIDANCE ONLY)

1E1042A Low strength non-hardened steel pins and dowels not intended for wear resistance. Unless restricted on the drawing to specific steel, this class will provide 200 MPa MIN shear strength.

1E1042B Moderate strength direct hardened steel pins and dowels that provide high impact resistance with moderate wear resistance. Unless restricted on the drawing to a hardness range other than covered by this class, it will provide 480 MPa MIN shear strength in sizes through 32 mm. Where this class is specified on larger sizes, shear strength will be proportionally less.

1E1042C High strength direct hardened steel pins and dowels that provide good impact resistance and good wear resistance. Unless restricted on the drawing to a hardness range other than covered by this class, it will provide 650 MPa typical shear strength.

1E1042D Shallow case hardened low strength steel pins and dowels with high wear resistance but low impact resistance due to the highly resulfurized steel allowed by this class. MIN shear strength of the case is 1000 MPa and the base core material is 200 MPa. See **Note*** below for determining average shear strength of the cross section.

1E1042E Shallow case hardened low strength steel pins and dowels with high wear resistance and moderate impact resistance due to restriction to using lower resulfurized steels. MIN shear strength of the case and core material is the same as for 1E1042D. See **Note*** below for determining average shear strength of the cross section.

1E1042F Deeper case hardened moderate strength steel pins and dowels with maximum wear resistance and fair impact resistance. MIN shear strength of the case is 1000 MPa and the core is 500 MPa. See **Note*** below for determining average shear strength of the cross section.

Note*: Average shear strength is the shear strength of the base (core) material increased by the shear strength of the case in accordance with the ratio of the case area to the cross sectional area.

7.0 MATERIAL AND PROCESSING

7.1 Unless otherwise specified on the drawing, material and processing options shall be in accordance with the following chart for the classification specified. The heat treat requirements apply to the finished piece part dimensions. Parts may be machine processed after heat treatment, providing:

7.1.1 All other requirements of the part number drawing and this specification are fulfilled.

7.1.2 The heat treat process case depth is increased to compensate for finish stock removal to assure that minimum case depth requirements for the classification specified are fulfilled.

7.2 Through hardening materials and heat treatments require no adjustments for finished stock removed after heat treatment (see Figure 2).

CLASSIFICATION	MATERIAL OPTIONS	HEAT TREATMENT REQUIREMENTS
1E1042A	1E0303, 1E0353, 1E0357, SAE 1018, SAE 1019, SAE 1113, SAE 1117, SAE 1211, SAE 1213, SAE 1215, OR STANDARD PLAIN LOW CARBON STEEL (0.30% C MAX- 1.65% Mn MAX)	NO HEAT TREATMENT REQUIRED
	MAY BE FULFILLED BY 1E1042B MATERIALS WITH OR WITHOUT HEAT TREATMENT REQUIREMENTS.	
1E1042B	1E0001, 1E0360, 1E0509, 1E1058, 1E1239C, SAE 1037, SAE 1040, SAE 4130, SAE 4140, OR STANDARD MEDIUM CARBON STEEL, MEDIUM CARBON-MANGANESE-BORON STEEL, MEDIUM CARBON ALLOY STEEL PROCESSED TO HEAT TREAT REQUIREMENTS	1E0106 OR 1E0107 HARDNESS ROCKWELL C23-32 THROUGHOUT CROSS SECTION AS TEMPERED (ROCKWELL C42 MINIMUM AS QUENCHED) MUST MEET 480 MPa MINIMUM SHEAR YIELD STRENGTH
	MAY BE FULFILLED BY 1E1042C MATERIALS AND HEAT TREATMENT REQUIREMENTS.	
1E1042C	1E0028, 1E0509, 1E0830, 1E0873, 1E0963, 1E1058, 1E1287, SAE 8630, SAE 8640, SAE 8642, SAE 8645, SAE 4140, SAE 4145, SAE 4340, OR STANDARD MEDIUM CARBON STEEL, MEDIUM CARBON-MANGANESE-BORON STEEL OR MEDIUM CARBON ALLOY STEEL	1E0106 OR 1E0107 HARDNESS ROCKWELL C35-45, HARDNESS AT MID RADIUS ROCKWELL C35 MINIMUM
	MAY BE FULFILLED BY 1E1042F MATERIALS AND HEAT TREATMENT REQUIREMENTS FOR DIAMETERS 10 mm AND UNDER.	
1E1042D	1E0303, 1E0353, 1E0357	1E0439A DEPTH 0.15-0.6 mm HARDNESS ROCKWELL 15N 85 MINIMUM
	WHERE SECTION SIZE OF THE FINISHED PART IS GREATER THAN 3.66 mm, MAY BE FULFILLED BY 1E1042E MATERIALS AND HEAT TREATMENT REQUIREMENTS. WHERE SECTION SIZE OF THE FINISHED PART IS GREATER THAN 7.14 mm, MAY BE FULFILLED BY 1E1042E OR F MATERIAL OPTIONS AND HEAT TREATMENT REQUIREMENTS.	
1E1042E	1E0353, 1E0357	1E0439A DEPTH 0.3-0.9 mm HARDNESS ROCKWELL 30N 73 MINIMUM. ALTERNATE HEAT TREATMENTS 1E0101A OR 1E2318A
	WHERE THE SECTION SIZE OF THE FINISHED PART IS GREATER THAN 7.14mm, MAY BE FULFILLED BY 1E1042F MATERIALS AND HEAT TREATMENT REQUIREMENTS.	
1E1042F	1E1120, 1E2743, SAE 8620, SAE 4118	1E2318A CARB DEPTH 0.4-1.2 mm HARDNESS ROCKWELL 30N 77 MINIMUM
	OPTION MATERIAL AND HEAT TREATMENT COMBINATIONS:	
	SAE 51100 OR SAE 52100	1E0106 OR 1E0107 HARDNESS ROCKWELL 30N 77 MINIMUM. HARDNESS AT MID RADIUS ROCKWELL C59 MINIMUM

Figure 2

8.0 QUALITY REQUIREMENTS

8.1 Parts supplied shall conform to all requirements of this specification for the classification specified on the part number drawing or to the material options and heat treat requirements allowed by the type classification specified. These requirements may be altered or restricted only to the extent qualified by the part number drawing.

8.2 Additional substitute materials for the 1E material specifications in Article 7.0 are listed in those specifications.

8.3 When parts are manufactured by Caterpillar, the material selected from Article 7.0 or Paragraph 8.2 shall be documented on appropriate purchasing and planning documents (e.g., purchase order, station list, part number work order, heat treat set-up, etc.).

9.0 SUBSIDIARY SPECIFICATIONS (FOR CATERPILLAR REFERENCE ONLY)

9.1 At the time of release of 1E1042, Change 10, the following subsidiary versions of 1E1042 were in use by Caterpillar facilities outside of the United States.

Caterpillar Materiels Routiers S.A. (Rantigny)	“H” Version
Caterpillar Brazil S.A. (Piracicaba)	“G” Version
Caterpillar Belgium S.A. (Gosselies)	“H” Version
Caterpillar France S.A. (Grenoble)	“H” Version
Caterpillar Japan Ltd. (Sagami)	“X” Version
Caterpillar Japan Ltd. (Akashi)	“X” Version

Figure 3

9.2 Subsidiary versions may be changed, released, or canceled without a change to this version of 1E1042. The Engineering Data System (EDS) provides information on the status of subsidiary version specifications and should be referenced for current information.

10.0 REFERENCES

Caterpillar Specifications	1E0001, 1E0028, 1E0101A, 1E0106, 1E0107, 1E0303, 1E0353, 1E0357, 1E0360, 1E0439A, 1E0509, 1E0830, 1E0873, 1E0963, 1E1058, 1E1120, 1E1239C, 1E1287, 1E2743, 1E2318A
SAE	1018, 1019, 1037, 1040, 1113, 1117, 1211, 1213, 1215, 3140, 4118, 4130, 4140, 4145, 4340, 51100, 52100, 8620, 8630, 8640, 8642, 8645