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Superseding AS7211

Pins, Cotter, Steel, Corrosion and Heat Resistant
UNS S32100
Procurement Specification

FSC 5315

RATIONALE

AS7211A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Type:

This procurement specification covers split cotter pins with optional ends (see Figure 1), made from a corrosion and heat resistant steel of the type identified under the Unified Numbering System as UNS S32100.

1.2 Application:

Primarily for use where a corrosion and heat resistant cotter pin is required for locking parts in applications up to 1500 °F.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be the issue in effect on the date of the purchase order.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2248 Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys

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on this Technical Report, please visit
<http://www.sae.org/technical/standards/AS7211A>

2.1.2 ASTM Publications: Available from ASTM, 100 Barr Harbor, West Conshohocken, PA 19428-2959.

ASTM A 262 Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels

ASTM E 353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

ASTM D 3951 Commercial Packaging

2.2 Definitions:

DEFECT: Any nonconformance of the unit of product with specified requirements.

DEFECTIVE: A unit of product which contains one or more defects.

PRODUCTION INSPECTION LOT: Shall be all finished parts of the same part number, made from a single heat of alloy, heat treated at the same time to the same specified condition, produced as one continuous run, and submitted for vendor's inspection at the same time.

2.3 Unit Symbols:

% - percent (1% = 1/100)

°F - degree Fahrenheit

3. TECHNICAL REQUIREMENTS:

3.1 Material:

The cotter pins shall be made from half-round wire conforming to the following requirements:

3.1.1 Composition: Shall conform to the percentages by weight specified in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Material Composition

Element	% by Weight	
	Min	Max
Carbon	--	0.08
Manganese	--	2.00
Silicon	0.40	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	8.00	12.00
Titanium	5x(C+N)	0.70
Molybdenum	--	0.75
Copper	--	0.75
Nitrogen	--	0.10
Iron	remainder	

3.1.2 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2248.

3.1.3 Condition: Wire shall be solution heat treated free from continuous carbide network (determined in accordance with ASTM A 262, Practice E) and cold finished.

3.1.4 Tolerances: Permissible variations in cross-sectional dimensions of the half-round wire for manufacture of cotter pins shall be ± 0.002 inch for major axis and ± 0.001 inch for the minor axis.

3.2 Design:

Unless otherwise specified on the part drawing, cotter pins furnished to this specification shall conform to the design (see Figure 1), dimensions (see Tables 2A and 2B), and other requirements specified herein, having ends slightly rounded, beveled, or pointed with one end slightly extended beyond the other to permit easy assembly (see Figure 1).

3.3 Properties:

Cotter pins shall conform to the following requirement:

3.3.1 Bending: Either prong of any cotter pin shall withstand bending flat on itself, without cracking; the flat of the prong shall form the outside of the bend.

3.4 Quality:

Cotter pins, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the parts. The ends of the prongs shall not be spread open.

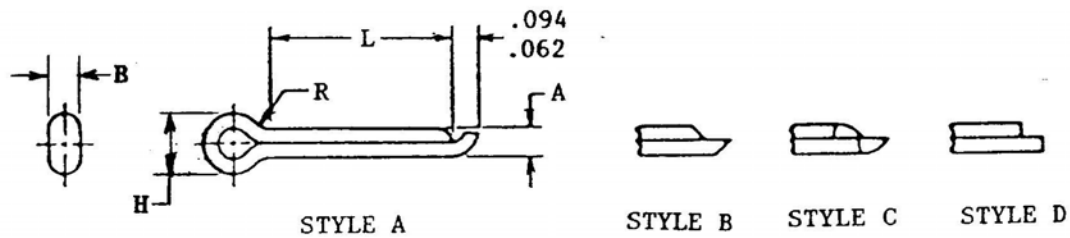


FIGURE 1 - Cotter Pin Dimensions and Optional Ends

TABLE 2A - Cotter Pin Dimensions in Inches

Nom Dia	A Dia	B Width	H Dia Min
.031	.028 - .032	.022 - .032	.06
.062	.056 - .060	.044 - .060	.12
.094	.086 - .090	.069 - .090	.19
.125	.116 - .120	.093 - .120	.25
.156	.146 - .150	.116 - .150	.31
.188	.172 - .176	.137 - .176	.38

TABLE 2B - Cotter Pin Preferred Lengths

L ± .030 inch	Preferred Lengths for Nom Dia .031	Preferred Lengths for Nom Dia .062	Preferred Lengths for Nom Dia .094	Preferred Lengths for Nom Dia .125	Preferred Lengths for Nom Dia .156	Preferred Lengths for Nom Dia .188
.250	X	X				
.312	X	X				
.375	X	X	X			
.438	X	X	X	X	X	
.500	X	X	X	X	X	
.562	X	X	X	X	X	
.625	X	X	X	X	X	
.750	X	X	X	X	X	
.875	X	X	X	X	X	
1.000	X	X	X	X	X	
1.125		X	X	X	X	
1.250		X	X	X	X	X
1.375		X	X	X	X	X
1.500		X	X	X	X	X
1.625		X	X	X	X	X
1.750		X	X	X	X	X
2.000		X	X	X	X	X

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of parts shall supply all samples for vendor's test and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the parts conform to the requirements of this specification.

4.2 Responsibility for Compliance:

The manufacturer's system for parts production shall be based on preventing product defects, rather than detecting the defects at final inspection and then requiring corrective action to be invoked. An effective manufacturing in-process control system shall be established, subject to the approval of the purchaser, and used during production of parts.

4.3 Production Acceptance Tests:

The purpose of production acceptance tests is to check, as simply as possible, using a method which is inexpensive and representative of the part usage, with the uncertainty inherent in random sampling, that the parts comprising a production inspection lot satisfy the requirements of this specification.

4.3.1 Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each production inspection lot. A summary of acceptance tests is specified in Table 3.

4.4 Acceptance Tests Sampling:

4.4.1 Material: One sample of wire, from which cotter pins were made, for material composition from each heat of alloy.

TABLE 3 - Summary of Acceptance Tests

Characteristic	Req. Para.	Sample Size	Test Method
Nondestructive Tests			
Design & Dimensions	3.2	Table 4	Conventional measuring method
Quality	3.4	Table 4	Visual
Destructive Tests			
Material Composition	3.1	4.4.1	ASTM E 353
Bending	3.3.1	4.4.3	Per 3.3.1