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Manufacturing Specification for Inserts, Imperial, Thinwall, Screw Locking, (Inconel 718), Silver Coated

NOTE: The issue status of this document remains unchanged as there have been no changes to the technical content.

SAE INDUSTRY TECHNOLOGIES CONSORTIA AEROSPACE STANDARDS AND PART QUALIFICATION PROGRAM

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TECHNICAL SPECIFICATION

No. 138

MANUFACTURING SPECIFICATION

FOR

INSERTS, IMPERIAL, THINWALL, SCREW LOCKING, (INCONEL 718), SILVER COATED

Issued by: Technical Standards Group
The Society of British Aerospace Companies Ltd
Registered in England and Wales no. 143447

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S.B.A.C. MANUFACTURING SPECIFICATION TS138

FOR INSERTS, IMPERIAL, THINWALL SCREW LOCKING, (INCONEL 718) SILVER COATED

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(Prepared by the Technical Standards Group)
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S.B.A.C. MANUFACTURING SPECIFICATION TS138 FOR INSERTS, IMPERIAL, THINWALL SCREW LOCKING, (INCONEL 718) SILVER COATED

1. Scope

1.1 This specification covers the requirements for thinwall self-locking inserts in material DTD5638 or EN2404 NI P100HT (INCO 718) of tensile strength class 1275 MPa at room temperature, maximum test temperature of parts 550°C. Primarily for aerospace applications, it is applicable to such thinwall self-locking inserts when referenced on the product standard or definition document.

2. Associated Specifications

AMS4117	- Aluminium alloy, rolled or cold finished bars, rods and wire and flash welded rings
AMS-QQ-A-225/8	- Aluminium alloy 6061, bar, rod, wire and special shapes, rolled, drawn or cold finished
AS8879	- Screw threads, controlled root radius with increased minor diameter. General specification.
BS4084	- UNJ threads, with controlled root radius, for aerospace. Inch series.
DTD5638	- Heat resisting nickel base alloy vacuum melted.
EN2002-8	- Test methods for metallic materials - Part 8 - Micrographic determination of grain size.
EN2404	- Heat resisting nickel base alloy NI-P100HT solution treated and precipitation treated bars – Aerospace series.
ISO2859	- Sampling procedures for inspection by attributes: Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot by lot inspection (Revision of ISO2859-1974).
ISO3452	- Non-destructive testing – Penetrant inspection – general principles.
ISO3453	- Non-destructive testing – Liquid penetrant inspection – Means of verification.
ISO9002	- Quality systems – Model for quality assurance in production
RS746	- Aerospace series, tapped hole and counterbore details for inch threaded thinwall inserts, long and short series.
TS152	- Installation and removal of inch threaded thinwall inserts, long and short series.
TS 200	- Qualified manufacturers for SBAC aerospace industry standard parts.
TS 201	- Method change approval for qualified parts.
TS 202	- Qualification test requirements and procedures for aerospace industry standard parts.

3. Definitions

3.1 Authorities

3.1.1 Design Authority

The design authority is the SBAC Technical Standards Group (TSG).

3.1.2 Qualification Testing Authority

The qualification testing authority shall be the SBAC Technical Standards Group or other body nominated by the TSG to carry out the testing.

3.1.3 Quality Assurance Authority

The quality assurance authority will be as agreed by the TSG. Generally the quality assurance authority will be that of the design activity.

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3.2 Production Batch

A batch shall consist of inserts, fabricated by the same process from material of the same cast (single heat of alloy), having the same basic part number and diameter, heat-treated together to the same specified condition and produced as one continuous run.

3.3 Inspection Lot

An inspection lot consists of inserts from a single production batch of the same part number which completely defines the lot.

3.4 Discontinuities

3.4.1 Crack: Rupture in the material which may extend in any direction and which may be intercrystalline or transcrystalline in character.

3.4.2 Seam: Longitudinal surface defect in the form of an unwelded open fold in the material.

3.4.3 Lap: Surface defect caused by folding over metal fins or sharp corners and then rolling or forging them into the surface.

3.4.4 Inclusion: Non-metallic particles originating from the material making process. They may exist as discrete particles or strings of particles extending longitudinally.

3.5 Test temperature: Ambient temperature, unless otherwise specified.

3.6 Simple random sampling: The taking of n items from a population of N items in such a way that all possible combinations of n items have the same probability of being chosen.

3.7 Critical defect: A defect that according to judgement and experience, is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the considered product, or that is likely to prevent performance of the function of a major end item.

3.8 Major defect: A defect other than critical, that is likely to result in a failure or to reduce materially the useability of the considered product for its intended purpose.

3.9 Minor defect: A defect that is not likely to reduce materially the usability of the considered product for its intended purpose, or that is a departure from established specification having little bearing on the effective use or operation of this product.

3.10 Sampling plan: A plan according to which one or more samples are taken in order to obtain information and possibly to reach a decision.

3.11 Limiting Quality LQ_{10}: In a sampling plan, a quality level which corresponds to a specified and relatively low probability of acceptance - in this case 10% probability of acceptance. It is the limiting lot quality characteristic that a lot of this quality would occur.

When expressed as a percent defective, it may be referred to as a lot tolerance percent defective.

3.12 Acceptable quality level: A quality level which in a sampling plan corresponds to a specified but relatively high probability of acceptance.

It is the maximum percent defective (or the maximum number of defects per hundred units) that, for purposes of sampling inspection, can be considered satisfactory as a process average.

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3.13 Finished insert: An insert ready for use, inclusive of any possible treatments and/or surface coatings, as specified on the insert standard or definition document.

3.14 Definition document: Document specifying all the requirements for inserts, i.e., metallurgical, geometrical, dimensional and functional (strength and temperature classes).

3.15 Self-locking torque: The torque to be applied to the bolt to maintain movement of rotation in relation to the insert, the assembly being under no axial load and the insert locking system being completely engaged with the bolt thread.

3.16 Seating torque: The tightening torque to be applied to the bolt to introduce or to increase the axial load in the assembly.

3.17 Unseating torque: The untightening torque to be applied to the bolt to reduce or to remove the axial load in the assembly.

3.18 Breakaway torque: The torque required to start unscrewing the bolt with respect to the insert, with the insert locking device still fully engaged on the bolt, but after the axial load in the assembly has been removed by unscrewing the bolt half a turn followed by a halt in rotational movement.

3.19 Installation torque: The torque required to screw the insert into the test block, in order to overcome the resistance of the tapped hole to the external thread of the insert.

4. Quality Assurance

4.1 Qualification

4.1.1 The purpose of qualification tests is to ensure that the insert design and insert manufacturing conditions allow the insert to comply with the requirements of this standard.

4.1.2 The qualification tests summarised in Table 2 shall be performed on each type and diameter of insert.

4.1.3 36 finished inserts of each diameter for which qualification is required, manufactured in accordance with the requirements of this specification and by a technique which is to be used for future deliveries, shall be supplied by the insert manufacturer for evaluation in accordance with TS202 " SBAC qualification test requirements and procedures for aerospace industry standard parts ". The test programme may possibly be reduced, this decision will be based on the comparison of results obtained from parts of similar design, size and manufacturing conditions.

4.1.4 The qualification inspections and tests (requirements, methods, numbers of bolts) are specified in Table 1.

4.1.5 Table 2 indicates the allocation of insert specimens for the inspections and tests.

4.1.6 Re-qualification may be called for from time to time at the discretion of the design authority.

4.1.7 If there is any proposed change in manufacturing source or method, the procedures specified in TS201 "Method change approval for qualified parts" shall be initiated.

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4.2 Acceptance

4.2.1 The purpose of acceptance inspections and tests is to check, as simply as possible, using a method representative of actual conditions of use, with the uncertainty inherent in statistical sampling, that the inserts constituting the batch, satisfy the requirements of TS138.

4.2.2 Acceptance inspections and tests are specified in Table 1. They shall be carried out on each production batch or inspection lot. Sampling shall meet the requirements of Tables 3,4 and 5 unless more stringent requirements are agreed between the manufacturer and the purchaser. Inserts from the batch to be tested shall be selected by simple random sampling.

4.2.3 Each insert may be submitted to several inspections or tests, and the bolts to be subjected to destructive inspections or tests may be those on which non-destructive inspections or tests have been carried out.

4.2.4 If a more stringent inspection (see 4.2.2) is deemed necessary, all or part of the qualification inspections or tests may be performed during the acceptance inspection and testing. In this case, the number of bolts submitted to these inspections or tests is the same as that submitted for qualification inspections and tests.

4.2.5 Acceptance inspections and tests shall be carried out by the manufacturer, or under his responsibility.

4.3 Quality System Certification

4.3.1 The purpose of quality system certification is to ensure that the manufacturer has demonstrated the acceptability of his quality system and his ability for continuing production of parts to this standard, to the required level of quality.

4.3.2 Requirements and procedure: The requirements and procedures for quality system certification shall be as required by the Design Authority.

4.4 Inspection and Test Report

4.4.1 A test report showing actual numerical values for the mechanical test results shall be provided.

4.4.2 The test report shall include a statement that dimensional inspection has been carried out to the latest issue of TS138, and that all results conform to the drawing.

4.5 Qualified Manufacturers of Inch Threaded Thinwall Inserts in INCO 718 Material

4.5.1 A list of qualified manufacturers of inch threaded thinwall inserts in INCO 718 material is contained in TS200.

5. Manufacturing and Test Requirements

See Table 1.

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