

TECHNICAL SPECIFICATION

No. TS41™

**MANUFACTURING SPECIFICATION FOR INSERTS, SCREW
THREAD, UNIFIED, SCREW LOCKING, HELICAL COIL,
BS HR503 (NIMONIC®90), SILVER COATED**



Aerospace Standards Part Qualification Program

A Program of SAE ITC

RATIONALE

Seventh issue of Technical Spec.
AQL sampling replaced by AS9138 sampling
For full details of changes, refer to supplementary SAE ITC Amendment Record document TS41-AR.

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**SAE INDUSTRY TECHNOLOGIES CONSORTIA
AEROSPACE STANDARDS AND PART QUALIFICATION PROGRAM**

FOREWORD

On the 1st January 2015 the SAE Industry Technologies Consortia (SAE ITC) acquired the ADS Aerospace Standards, previously known as the Society of British Aerospace Companies (SBAC) Aerospace Standards. The SAE ITC established in 2003 operates as a trade association as part of the SAE International Enterprise, providing a unique framework serving the automotive, aerospace and commercial vehicle sectors. Clients include private companies, government agencies, individuals and trade associations. Building consensus and breakthrough barriers to achieve solutions, and the ways by which those solutions take shape are tailored to each client's individual needs.

The legal obligations and copyright authority of all Aerospace Standards that were issued by the ADS Group Limited are therefore assigned / transferred to the SAE ITC.

These Standards are produced by the SAE ITC with the assistance of, and for the benefit of the Aerospace Industry, as part of a continuous programme of Standardisation for Aerospace application under the control of the Technical Standards Committee (TSC) of the SAE ITC.

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It is recommended that Technical Specification TS260, Metallic Materials List of Alternative Material Standards, be consulted prior to manufacture of SAE ITC products.

Each Standard is a facsimile or electronic reproduction of a master drawing, and therefore, any outline view scales stated are not necessarily reproduced accurately. A Master Index of all SAE ITC Aerospace Standards is published separately on the SAE ITC website.

All references to Standards include reference to RS and TS publications.

Details of this and any further information can be obtained from the SAE ITC.

CONTENTS

Title Page

Foreword

Contents

SECTIONS

1. Scope
2. Normative References
3. Definitions
4. Quality Requirements
5. Technical Requirements And Test Methods

APPENDIX A – MANDRELS FOR PERMANENT SET TEST

APPENDIX B – DISTANCE PIECES FOR HEAT SOAK REUSABILITY TEST

APPENDIX C – MANDREL FOR ENDURANCE TEST

APPENDIX D - IMPLEMENTATION PERIOD FOR AS9138 SAMPLING

1. SCOPE

- 1.1 This specification covers the requirements for helical coil screw-locking inserts in material BS HR503 (NIMONIC®90). Primarily for aerospace applications, it is applicable to such helical coil screw-locking inserts when referenced on the product standard or definition document.

2. NORMATIVE REFERENCES

- 2.1 The following documents, in whole or in part, are normatively referenced in this Technical Specification & are indispensable for its application. For dated / revision listed references, only the issue cited applies. For undated / revision listed references, the latest issue of the referenced document (including any amendments) applies.

2.1.1 SAE Industry Technologies Consortia (ITC)

RS678	Fasteners, Rolled Threads, Chamfers, Lead Threads and Runouts
TS55	Installation Specification for Inserts, Screw Thread, Unified Screw Locking, Helical Coil, BS HR 503.
TS200	Qualified Manufacturers for SAE ITC Aerospace Industry Standard Parts.
TS201	Method Change Approval for Qualified Parts.
TS202	Qualification Test Requirements & Procedures for Aerospace Industry Standard Parts.

2.1.2 British Standards Institution (bsi.)

BS1134	Surface Texture
BS1580	Specification for Unified Screw Threads
BS3409	Specification for the Tapping of Holes to receive Wire Thread Inserts (UNC and UNF threads)
BS HR503	Specification for Nickel-Chromium-Titanium-Aluminium Heat Resisting Alloy Bar and Wire for Wire Thread Inserts
BS HR601	Specification for Nickel-Chromium-Cobalt-Titanium-Aluminium Heat Resisting Alloy Wire for the manufacture of fasteners
BS HR650	Specification for High Expansion Heat Resisting Steel Bar and Wire for the manufacture of Bolts, Studs, Set Screws and Nuts
BS L168	Specification for Bars and Extruded Sections of Aluminium-Copper-Magnesium-Silicon-Manganese Alloy

2.1.3 European Standards (CEN)

EN 2786	Electrolytic Silver Plating of Fasteners.
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2.1.4 SAE International Standards

AMS 2411	Plating, Silver for High temperature Applications.
AS8879	UNJ Threads : General Requirements and Limit Dimensions
AS9138	Statistical Product Acceptance Requirements

2.1.5 UK Ministry of Defence Standards

DEF STAN 91-98	Lubricating oil, Gas Turbine Engine, : Synthetic Grade 7.5 cSt NATO Code : O-149 Joint Service Designation OX-38 (DERD 2487).
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DTD939 Silver Plating of Heat Resisting Threaded Parts for Anti-Seize Purposes

3. DEFINITIONS

For the purposes of this specification, the following definitions apply : -

3.1 Authorities**3.1.1 Design Authority**

The Design Authority is the SAE ITC Technical Standards Committee (TSC).

3.1.2 Qualification Testing Authority

In accordance with SAE ITC specification TS202 the qualification testing authority shall be the TSC or other body nominated by the TSC to carry out the testing.

3.1.3 Quality Assurance Authority

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

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 Maximum Rated Temperature

Although 500°C is the maximum temperature at which the specified number of re-uses can be achieved, for design purposes 650°C is the maximum temperature. Use at temperatures above 500°C results in a progressive decrease in reusability to one use at 650°C.

3.6 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.

3.7 Definition Document

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

3.8 Self-locking Torque (also referred to as Prevailing 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.

3.9 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.

3.10 Permanent Set Test

A measure of the performance of the screw locking insert on a minimum mandrel after application to a maximum mandrel when installed in a test piece.

3.11 Assembly

A test piece and insert are considered assembled on a bolt when one and a half male threads (including the chamfer) extend beyond the end of the insert.

3.12 Removal

For the purposes of the tests in this specification, removal shall be considered complete when the insert friction element is disengaged from the bolt or mandrel.

3.13 Seating Torque

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

4. QUALITY REQUIREMENTS

4.1 Qualification

A supplier seeking qualification shall submit to the Qualification Testing Authority a minimum of 33 samples of each diameter of insert for which qualification is required. Inserts shall be selected from a single selection lot by a method defined in AS9138. The number of inserts to be subjected to each test as well as the methods to be used are given in Table 1. These tests are summarised in Table 2. The procedure to be followed is defined in SAE ITC specification TS202. The requirements of sample selection for qualification tests are defined in Table 3.