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Draughting and Part Numbering Procedures for Drawings		

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 FOREWORD

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TECHNICAL SPECIFICATION

No. TS66

DRAUGHTING & PART NUMBERING PROCEDURES

FOR

A|D|S DRAWINGS

RATIONALE

Sixth issue of specification.
Line weight & text point heights as used to create the drawing view described.
Drawing Status types reviewed.
Reformatted to reflect corporate change from SBAC to A|D|S.
For full details of changes, refer to supplementary A|D|S Amendment Record document TS66-AR.

DOCUMENT REPRODUCTION

This document relies partially upon different coloured texts & therefore for best use should be viewed / printed in colour.

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A|D|S Technical Specification No. TS66
DRAUGHTING & PART NUMBERING PROCEDURES
FOR A|D|S DRAWINGS

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Continuation sheet (C4) inclusive of Standard Notes
- D. Example of Drawing Layout
- E. Combined Example of a Cancelled & an Inactive Drawing (with comments)

1. **SCOPE**

- 1.1 This document covers the draughting & part numbering procedures to be used in the compilation of A|D|S standards, which includes the series of drawings : -

AGS (Common hardware for which proprietary rights are claimed).
 AS (Hardware for which no proprietary rights are claimed).
 ESC (High temperature electrical connectors).

2. **PURPOSE**

- 2.1 This Technical Specification has been written to : -
- 2.1.1 Provide a consistent layout & draughting procedure.
- 2.1.2 Provide a disciplined part numbering structure.

3. **REFERENCED DOCUMENTS**

- 3.1 This Technical Specification makes reference to the latest issues of the following specifications : -

3.1.1 **ADS Group Ltd (A|D|S)**

TS200 Qualified Manufacturers for A|D|S Aerospace Industry Standard Parts.
 TS202 Qualification Test Requirements & Procedures for Aerospace Industry Standard parts.
 RS610 Identification Marking of Parts & Assemblies.
 RS743 Connector Specification Identification System.

3.1.2 **British Standards Institution (BSi)**

BS.308 Engineering Drawing Practice (Parts 1-3) – Withdrawn (ref only).
 BS.1134 Method of Assessment of Surface Texture.
 BS.4500A ISO Limits & Fits. Data sheet : Selected ISO fits – Hole basis.
 BS.4500B ISO Limits & Fits. Data sheet : Selected ISO fits – Shaft basis.
 BS.8888 Technical Product Spec (TPS) - Engineering Drawing Practice (ref only).
 BS.A346 UNJ Threads : General Requirements & Limit Dimensions.
 BS.A358 MJ Threads : General Requirements & Limit Dimensions (Parts 1-3).
 BS.M48 Dimensions of Elastomeric Toroidal Seals (O-Rings) for Aerospace Use - Inch series.
 BS.ISO 1000 SI Units & Recommendations for the use of their Multiples & Certain other Units.

BS.ISO 1101 Geometrical Product Spec (GPS). Geometrical Tolerancing of Form, Orientation, Location & Run-out.

BS.EN ISO 1302 Geometrical Product Spec (GPS). Indication of Surface Texture.

3.1.3 International Standards Organisation (ISO)

ISO.370 Toleranced dimensions : Conversion from Inches to Millimetres & Vice Versa.

ISO.3161 UNJ Threads : General Requirements & Limit Dimensions.

ISO.5855 MJ Threads : General Requirements & Limit Dimensions (Parts 1-3).

3.1.4 British Defence Standards (DSTAN)

Def Stan 05-10 Product Definition Information (Parts 0-3).

3.1.5 NATO Defence Logistics Information Service (DLIS)

H6 Approved Item Name Directory. This is an active web search page at www.dlis.dla.mil/h6/ Note - this webpage supersedes the UK NCB Handbook 99-H6-1 as referred to in Def Stan 05-10 above.

3.1.6 American National Standards Institute (ANSI)

Y14.5M (1994) Dimensioning & Tolerancing.

4. DRAWING FORMAT SHEET & ITS REVISION

4.1 New or redrawn documents shall be prepared on A4 drawing frame format sheets (form) provided by the A|D|S's Technical Standards Dept. This form is named *A|D|S A4 Drg Frame iss.x*.

4.2 The A4 drawing frame form set has been created in Microsoft Word® computer format for Word® input. Manual (pen / pencil) creation of drawings is non-preferred.

4.3 The A4 drawing frame form set shall comprise of a Front sheet, an A|D|S Foreword sheet, a drawing frame Sheet 1 & one drawing frame Continuation sheet. See Appendices-C1 to C4. Extra continuation sheets can be created by copying from the original Microsoft Word® document as required.

4.4 The Foreword sheet shall carry standard A|D|S wording, common to that used in A|D|S Technical Specifications (TS).

4.5 At the footer of Sheet 1 & each Continuation sheet is the Form's name & its issue. Any visible change to the basic format or the standard notes therein, shall incur a raise of issue to the form.

4.6 Any raise of issue to the Form shall then be reflected back into this Technical Specification (TS) & shall incur a raise of issue to this TS.

5. **NUMBERING**

5.1 **Drawing Numbers.**

5.1.1 Drawing numbers shall be sequentially assigned by the A/D|S, from the relevant range of A/D|S standards.

5.1.2 For economy of drawing numbers & drawings, standard type items having a constant overall design characteristic, varying from each other only by size characteristics, shall be shown on one drawing in tabular form such that only one range of drawing numbers need be allocated. This is subject to the following conditions : -

5.1.2.1 Data shall not be condensed to such an extent that the technical details become obscure or de-emphasised. Care shall be taken to avoid misinterpretation or delays in reading of the drawing by design, manufacturing & inspection personnel.

5.1.2.2 Items having non-interchangeable design characteristics such as differences in geometry, materials, finishes, treatments, thread form etc, shall be shown on different drawings under different drawing numbers.

5.2 **Basic Rules for Part Numbering.**

5.2.1 Each separate physical item on a drawing shall be identified by a unique part number.

5.2.2 The number of characters in each part number shall be as small as possible to allow them & any other markings to be shown wherever possible on small size components such as in the case of .190" (No.10) bolt heads. The shorter the number, the less chance there is of error in part number read across.

5.2.3 Wherever possible, the total length of the part number shall not exceed twelve (12) characters (including any hyphen) but in exceptional circumstances where the technical definition cannot be achieved under this limitation, the total number of characters may be extended to a maximum of fifteen (15).

5.2.4 The basic part number shall consist of : -
The drawing number : or
The drawing number plus the identification suffix (numeric or alphabetic). See para 5.2.12.

5.2.5 When an identification suffix is used, it shall be separated from the basic drawing number by a hyphen (-). It is however permitted to replace the hyphen with an alpha character where an extra identification code is required, without increasing the length of the part number. See para 5.2.12.

5.2.6 Alpha characters (alphas) shall **not** be used at the end of complete part numbers because : -

5.2.6.1 They will cause confusion with requirements regarding revision change alphas e.g. as required by US Military Contracts.

5.2.6.2 They can be confused with alpha code letters allocated to identify suppliers.

- 5.2.7 The alphas I, O, Q and Z shall **not** be used in order to avoid confusion with numerals of similar form i.e. 1, 0, 0 and 2.
- 5.2.8 Alphas shall be upper case (capital) & their usage shall be kept to a minimum.
- 5.2.9 Numbers shall be Arabic numerals. Vulgar fractions & Roman numerals shall **not** be used as they are not compatible with certain computer systems.
- 5.2.10 Hyphens shall **not** be used between alphas & alpha / numeric combinations.
- 5.2.11 Blank spaces between alphas or numerics are **not** permitted as they are not compatible with certain computer systems. Those shown in Appendices-A & B are only included to show the different field components.
- 5.2.12 The identification suffix may consist of alphas, numerics or both, to denote e.g. size variables, materials etc.
- 5.2.13 Code alphas are non-preferred for denoting different finishes, coatings etc on dimensionally identical parts. It is also preferable for a different standard drawing to be created to cover a similar outline part in different material / finish variants. However, for exceptions, refer to Appendix-A.
- 5.2.14 The significance of the identification suffix shall be clearly described on the drawing. Refer to Appendix-A.
- 5.2.15 The number of digits allocated, signifying each variant on the same drawing shall be consistent to ensure an ordered tabular computer print out.

6. **PART NUMBER STRUCTURES**

- 6.1 Preferred part number structures are covered in Appendix-A.
- 6.2 Examples of exceptions to preferred part number structures are given in Appendix-B.

7. **DRAUGHTING PRACTICE**

- 7.1 This shall be based on ANSI Y14.5M (1994) with differences as listed below. Y14.5M covers most drawing practices to latest European ISO specifications in a single document.
- 7.2 **Drawing Views.**
 - 7.2.1 ***Data Input Method.***
 - 7.2.1.1 New & redrawn Part Standard Drawings shall be created using the Microsoft Word® software package, common to the majority of computers (PCs etc), as used by A|D|S TSC members & Sponsors. This will allow the documents to be revised & edited by any of the said people as future changes require. Specialised CAD systems shall not be used to create A|D|S Standards.

- 7.2.1.2 Text input for drawing Notes etc is achieved in the normal Microsoft Word® manner. Most notes are preformatted within the A4 Format sheets & only need editing as instructed within this Technical Specification.
- 7.2.1.3 Use the Microsoft Word® Drawing toolbar to create a Part's views e.g. lines, arrowheads, special shapes & Text Boxes (used for dimension values & label texts) etc as further described below.
- 7.2.1.4 To gain location stability of the View's component parts e.g. lines, arrowheads etc (known as AutoShapes) & Text Boxes, then refine each part.

Method – Select parts. Use command menu : Format AutoShape or Format Text Box.
Set to : Layout – In front of text, Advanced – Picture Position – Move Objects With Text off (i.e. a blank square, no tick).

Also the default Text Box has an overly large blank border area that inconveniently overlaps other component parts & hinders their selection. Reduce border.

Method - Select parts. Use command menu : Format Text Box.
Set to : Text Box – Internal margin Left Right Top Bottom all reduced to 0cm.

7.2.2 **View Scales.**

- 7.2.2.1 The Microsoft Word® drawing package does not provide a full scaling capability, so cannot draw to any measurable size. All drawing views shall be a diagrammatic representation of the component, proportionally presented & adequately sized to suit the room available but not necessarily to scale.
- 7.2.2.2 Any enlarged detail views drawn to clarify a small feature shall be titled e.g.

“DETAIL-X” or “DETAIL-X”
(SCALE 5:1) (ENLARGED)

7.2.3 **Line Parameters.**

- 7.2.3.1 Line weights (thickness) & arrowheads shall if necessary be refined using the Microsoft Word® Format AutoShape menu to give the parameters described below.
- 7.2.3.2 Solid thin lines shall be set at 0,25pt thick. Typical uses – centrelines, crosshatching, thread internal dia lines, dimension & label leader lines, part view cut-off wavy lines etc.
- 7.2.3.3 Solid thick lines shall be set at 1,5pt thick. Typical uses – general component outlines. When 1.5pt is considered too thick, use 1pt. Typical uses – where component outlines are too close together & risk blurring into one another. Use locally, not for the whole component outline.
- 7.2.3.4 Centrelines shall be thin, set at 0,25pt thick with line dashed style Long Dash Dot
- . - . - . - .
- 7.2.3.5 Dashed lines shall be thin, set at 0,25pt thick with line dashed style Long Dash
- - - - -
- 7.2.3.6 Arrowheads are end of line Styles. Use a small slim fully blacked-out triangle of size 2.



7.2.4 **Text Parameters.**

7.2.4.1 Dimension & label texts are created using the Microsoft Word® Insert Text Box icon.

7.2.4.2 Format & align the Text Box over the dimension lines as reqd. To achieve vertical text (at 90° reading bottom to top) for the vertical dimensions, use the Change Text Direction icon which can be found in either the Tables & Borders toolbar or the Text Box toolbar.

7.2.4.3 The text font used shall be Arial.

7.2.4.4 Dimension size value & general descriptive texts shall be set at 8pt high e.g. 2-HOLES Ø5,6±0,25 with the ± & Ø symbols & many others being found within the Microsoft Word® Insert Symbol menu.

7.2.4.5 Dimension size values that are variable are mainly shown as an alpha Designator. The size variables are then shown in an accompanying table. The designator shall be larger than that already stated above. Set at 10pt & bold. This is to help remove any confusion between the designator & any other text, especially the radius R prefix.

Typical examples : R**F** Ø**A** MAX

7.2.4.6 Any chosen alpha Designator shall not be the same alpha character as that shown in any Datum flag box on the drawing.

7.3 **Units.**

7.3.1 All units shall be in accordance with the SI metric system as recommended in BS.ISO 1000. Where considered necessary, Imperial conversions may be added in parentheses ().

7.4 **Unit Conversions.**

7.4.1 Conversion of Imperial to metric shall be in accordance with Table-1 of ISO.370.

7.4.2 Conversion of metric to Imperial shall be in accordance with Table-2 of ISO.370.

7.5 **Dimensions, Tolerances & Tabular Sizes.**

7.5.1 Features shall be dimensioned in millimetres (mm) with no imperial inch conversions. The exceptions to this rule are Imperial inch designed features e.g. : -

7.5.1.1 Primary inch features like Unified threads shall be dimensioned in decimal inches with no mm conversions e.g. Thread .190"-32 UNF or .250"-28 UNJF or .5625"-24 UNEF.

7.5.1.2 Secondary inch design features like the hex or bi-hex AF of a bolt head shall be dimensioned in mm with the fractional inch nom spanner (wrench) size appended in parenthesis for reference e.g. (3/8") AF. This will aid spanner selection by the fitter.

7.5.1.3 Secondary inch design features like the tube size on various hydraulic pipe union devices e.g. AS15800 series. The various pipe interface features shall be dimensioned in mm but the referenced Tube ODs shall be stated in inches for pipe system consistency.