

APPLICATION		REVISIONS				
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WRITER	M. GILMARTIN	11/21/17	<i>CARLETON</i> <i>Life Support Systems</i>
CHK	E. POLTON	12/20/17	
ENGR	M. GILMARTIN	11/21/17	
APPROVED	M. DOWDAL	11/21/17	DIVE PRODUCTS MANUFACTURING QUALITY STANDARD FOR
CONTRACT NO.			
APPROVAL			

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1.0 PURPOSE AND SCOPE

The purpose of this Manufacturing Quality Standard is to define the minimum requirements and acceptable quality for parts and assemblies manufactured by or for Carleton Life Support Systems Inc. (CLSS) when the engineering drawing or applicable documents do not otherwise indicate specific requirements. In case of uncertain or conflicting requirements, the engineering department of CLSS shall be consulted for interpretation or drawing revision before proceeding with any manufacture. In cases where this standard is more restrictive than the applicable government or military specifications, the requirements of this document shall prevail.

CLSS, as used herein, refers to Carleton Life Support Systems doing business as Cobham Mission Systems.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this procedure to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposals shall apply. When a specific document issue is indicated below, references to the document in subsequent sections of this procedure shall consist of the basic document number without repetition of the pertinent issue designation.

2.1 Government documents.

SPECIFICATIONS

Military

- FED-STD-H28A Screw-thread Standards for Federal Services
- MIL-A-8625 Anodic Coatings for Aluminum and Aluminum Alloys

2.2 Non-Government documents.

STANDARDS

American Society of Mechanical Engineers (ASME)

- ASME B46.1 Surface Texture
- ASME Y14.5 Dimensions and Tolerancing for Engineering Drawings

American National Standards Institute (ANSI)

- J-STD-001 Requirements for Soldered Electrical and Electronic Assemblies

CLSS

- ST1637815 Engineering Change Notice, Configuration Control Standard
- ST1637819 Electrostatic Discharge Sensitivity, Standard For
- ST1637822 Printed Circuit Boards, Manufacturing Storage Standard for

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Society of Automotive Engineers (SAE)

AS478-30	Identification Marking Methods
AS8879	Screw Threads – UNJ Profile, Inch Controlled Radius Root with Increased Minor Diameter

OTHER PUBLICATIONS

CLSS

QSP-7.4.2.2.1	Supplemental Purchase Order Conditions (SPOC)
QSP-830	Control of Nonconforming Material
SCSP-741.02.01	Supplier Deviation Request Form

(Copies of specifications, standards, drawings, and publications required by suppliers should be obtained by the supplier, except CLSS-controlled documents, which will be furnished by CLSS. If a supplier is unable to obtain any document listed herein, he should immediately contact CLSS for assistance.)

3.0 DEFINITIONS

3.1 Finished surfaces

A finished surface is a surface produced by bringing a tool in contact with a workpiece and then moving or removing material on the workpiece by motion either of the workpiece, the tool, or both. All surfaces shown on drawings will be considered as finished surfaces unless evidence to the contrary is contained on the drawing; e.g., by specification or reference to a process or by symbology which differentiates finished and unfinished surfaces.

When the drawing does not require a specific process, any method of manufacture may be used that will produce a product that meets the requirements of the drawing and this document.

3.2 Arithmetic average (Ra)

The definition of Ra in Paragraph 1.4.1.1 of ASME B46.1M, or Paragraph 3.8.1 of ANSI B46.1 shall apply, as applicable.

3.3 Drawing format tolerance standards

These are the tolerance standards, which are listed on drawings as a part of the preprinted format.

3.4 General dimensioning

All definitions listed in ASME Y14.5M or ANSI Y14.5, as applicable, issue noted on the face of the drawing, apply to this document.

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4.0 GENERAL REQUIREMENTS

4.1 Temperature

All dimensions and tolerance stated herein apply at 68 ±8 °F. Measurements can be made at other temperatures if proper compensation is made for differences in temperature of the part and measuring tools.

4.2 Reference dimensions

Drawing dimensions and notes identified as "reference" (REF) are intended as information for processing and manufacturing and do not require verification for acceptance of the part or assembly.

5.0 DETAILED REQUIREMENTS

5.1 Surface roughness quality

Surface roughness is related to size tolerances according to the following table:

<u>Size Tolerance</u>	<u>Maximum Surface Roughness in Microinches (Ra)</u>
To and including 0.001 inch	32
Greater than 0.001 inch, but not greater than 0.002 inch	63
Greater than 0.002 inch on any machined surface	125

For size tolerances over 0.002 inch on surfaces not produced by machining, the roughness produced by the process is satisfactory.

5.1.1 Surface roughness

The surface roughness of areas of transition such as fillets, chamfers, etc., shall conform to the roughest adjacent area.

5.2 Surface coating

5.2.1 Effect on dimensions and finish

All dimensional limits and surface roughness specifications apply after surfaces are coated by plating, painting, chemical films, etc., with the following exceptions:

- a. Drawing dimensions apply prior to the application of solid film lubricants.
- b. When paint and/or primer are used and the drawing specifies "dimensions apply before application of the coatings", comply with drawing.

5.2.2 Masking of internal and external threads

Internal and external threads shall not be painted unless specifically required by the drawing. Internal flow paths shall not be painted.

5.2.3 Anodic coating

The following restrictions apply to all aluminum parts which are anodized per MIL-A-8625 and supersede any conflicting allowances in that document:

NOTE

Section 7.0 of this document outlines acceptable touchup procedures for anodized parts.

- a. The preferred location for racking is in holes with a tolerance greater than 0.002 inch and no surface finish requirement.
- b. Racking is not permissible on any internal or external surface that has a surface finish callout or a tolerance of 0.002 inch or less.
- c. Racking is not permissible on any exterior surface of parts that are dyed.
- d. Small contact marks from the racks are permissible on the allowable racking surfaces. Scratches created by dragging the part off the rack without removing the contact pressure are not permissible on any surface.

5.3 Parallelism

When a parallelism condition exists between two surfaces less than 12 inches in length, a tolerance of 0.006 inch per linear inch of length will be allowed, not to exceed a total of 0.030 inches or the tolerance of the locating dimension, whichever is less. Surfaces greater than 12 inches in length are required to be produced within the prescribed dimensional boundaries.

5.4 Perpendicularity

When a perpendicular condition exists between two surfaces less than 12 inches in length, a tolerance of 0.006 inch per linear inch will be allowed, not to exceed a total of 0.030 inch or the tolerance of the locating dimension, whichever is less. Surfaces greater than 12 inches in length are required to be produced within the prescribed dimensional boundaries.

5.5 Flatness

All machined flat surfaces less than 12 inches in length (or diameter) must be flat within 0.006 inch per linear inch, not to exceed 0.030 inch total, or the tolerance of the locating dimension, whichever is less. This applies with the part unrestrained. Surfaces greater than 12 inches in length (or diameter) are required to be produced within the prescribed dimensional boundaries.

5.6 True position

All machined circular features shown about a common axis, and not subject to feature position control by the drawing, shall be produced with a mutual true position of not more than 0.014 inch, regardless of feature size.

5.7 Corner breaks, chamfers, countersinks, and radii

5.7.1 Chamfers and countersinks

All chamfers and countersinks of less than 0.040 inch width are allowed a tolerance on the angle of ± 5 degrees.

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5.7.2 Outside corners

Unless otherwise specified on the drawing, all outside corners must be broken with a chamfer or radius of 0.001 inch minimum to 0.010 inch maximum. On thin flanges, short hubs, shallow counterbores, or other applicable situations, the corner break cannot reduce the length or width of the remaining surface to less than 1/2 of the minimum allowable dimension.

5.7.3 Inside corners

Unless otherwise specified on the drawing, all inside corners shall have a radius of 0.010 inch maximum. On short hubs, shallow counterbores, or other applicable situations, the inside corner radius cannot reduce the length or width of the remaining surface to less than 3/4 of the minimum allowable dimension.

5.8 Hole locations

5.8.1 Undimensioned centerlines

When a hole is shown on a drawing as located on the intersection of two centerlines, but is dimensioned on only one of the centerlines, the tolerance on the location of the undimensioned centerline shall be the same as the tolerance on the location of the dimensioned centerline.

5.8.2 Bolt circles

When holes are specified as being equally spaced on a bolt circle diameter, the spacing shall be within a true position diameter equal to the total (diametral) tolerance of the bolt circle.

5.9 Threads

5.9.1 Inspection of threads

Threads may be accepted if all complete threads can enter in or be entered by the "not go" gauge, provided that a definite drag results from metal to metal contact on or before the third turn of entry.

5.9.2 Threads in thin materials

Where material thickness or length will not allow more than four full threads, the "not go" gauge shall not enter the threads more than 1/3 the total thread length.

5.9.3 Inspection of UNF and UNC

Gauging of unified (UNF and UNC) threads shall be accomplished in accordance with FED-STD-H28.

5.9.4 Inspection of UNJ threads

Gauging of unified (UNJ) threads shall be accomplished in accordance with AS8879.

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5.10 Tapped hole chamfers

When a tapped hole must be chamfered and no size is specified, the maximum diameter chamfer shown in the following table shall apply:

<u>Thread size</u>	<u>Maximum Chamfer Diameter (inches)</u>	<u>Thread size</u>	<u>Maximum Chamfer Diameter (inches)</u>
00	0.067	8	0.184
0	0.080	10	0.210
1	0.093	12	0.236
2	0.106	1/4	0.270
3	0.119	5/16	0.333
4	0.132	3/8	0.395
5	0.145	over 3/8	0.030 larger than
6	0.158		O.D. of thread

5.11 Stiches per inch

When measuring a sewn part for stitches per inch, the preferred method of measurement should be taken for a length of several inches and/or in multiple places, if possible, and the average stitches per inch used for the value. Use the longest measurements that are easily possible. If such an averaging method cannot be used, a single measurement can be used.

5.12 Sew pattern size

When measuring a sewn pattern on a sewn part, the measurements should be taken in multiple locations on the sew pattern and the average value used.

5.13 Sewing glue/adhesive

Hot melt adhesive and fabric glue are acceptable to be used to hold webbing/fabric together during sewing operations. Excess glue that is visible after sewing should be removed to the maximum extent possible without damaging the webbing/fabric. Suggested hot melt is AD-TECH Formula 2030. Suggested fabric glue is DRITZ/PRYM Fabric Glue Stick.

6.0 SURFACE TOUCH-UP PROCEDURES

The following paragraphs pertain to the surface rework required to ensure corrosion protection and piece-part aesthetics.

6.1 Surface preparation

Chemicals used to solvent clean surfaces shall be compatible with all materials in the assembly.

6.2 Anodic coatings

6.2.1 Approval for rework and touch-up coatings

In order to ensure oxygen compatibility of parts exposed to high pressure oxygen, anodic coatings shall not be reworked without prior written approval from CLSS. This includes any touchup described in MIL-A-8625. If color matching is to be performed, it shall be per the approved rework procedure.

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6.2.2 Touch-up and rework procedure for anodic coatings

Once written approval has been granted for rework of anodic coatings, the touch up or rework procedure shall be in accordance with MIL-A-8625.

6.3 Touch-up of organic finishes

Touch up of organic finishes, such as primer and paint, shall meet the engineering drawing requirements of the original finish. Substitution of materials for touchup is not permitted without prior written approval.

6.4 Touch-up of metallic plating or other finishes

Touchup of metallic plating or other finishes is not permitted without prior written approval.

7.0 OBLITERATE PART MARKING

7.1 Meaningless numbers

Meaningless numbers do not have to be removed. If there is an MS, AN, or AS with no number after it, the MS, AN, or AS does not have to be removed. Care must be taken to not damage the face of the fitting or "X" too close to the edge that may cause burrs.

7.1.1 Plastic or electronic components

For plastic parts or electronic components that could be damaged by the "X"-ing method in paragraph 7.1, a vibrating engraver may be used to only scratch out enough to make the markings unreadable.

7.1.2 Vendor markings

When the print says "obliterate the vendor markings," part marks and any other markings that identify the vendor must be removed. Meaningless numbers do not have to be removed.

7.1.3 Bare metal

Bare metal created by the operations previously mentioned shall be touched up per an approved rework procedure.

7.2 Painted surfaces

Painted surfaces shall only be reworked with original surface treatment, primer, and paint used.

8.0 ELECTRICAL AND ELECTRONIC ASSEMBLIES

8.1 Soldering of electrical and electronic assemblies

Unless otherwise specified on the drawing, soldered electrical and electronic assemblies shall meet the requirements of IPC J-STD-001, Class 3 (High Performance Electronic Products).

8.2 Marking of electrical and electronic assemblies

Prior to Conformal Coating, printed wiring assemblies shall be marked with the assembly dash number and the revision of the assembly drawing per AS478-30. When necessary a label may be used. On assemblies where marking is not possible, the assembly shall be put in an anti-static bag and labeled with the assembly number including the dash number and the revision.

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8.3 Fabrication of printed wiring boards

Legacy prints released prior to July 31, 2012, shall conform to ST1637822 when obsolete specifications are listed on the print. Copper weight and all other specific call outs on the print shall prevail.

8.4 Handling of electrical and electronic assemblies

8.4.1 Printed wiring assemblies

Printed wiring assemblies shall be handled in accordance with ST1637819.

8.4.2 Handling of printed circuit boards

Printed circuit boards shall be stored and handled in accordance with ST1637822.

9.0 DEVIATION REQUESTS AND NON-CONFORMANCES

9.1 Process of submitting deviation requests

Supplier deviation requests shall be submitted per QSP-7.4.2.2.1 500 using Form SCSP-741.02.01.

9.2 Process for submitting non-conformances

Non-conformances shall be processed per QSP-830.

10.0 NOTES

Changes to this document shall be made using the application practices described in ST1637815.

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