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GENERAL REQUIREMENTS

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Abstract:

This document describes general manufacturing and interpretation requirements.

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1. SCOPE

This document describes general requirements and methods of interpreting engineering requirements specified in specifications and/or drawings.

2. THEORY

The space available on product drawings sometimes limits the opportunity for a clear description of engineering requirements. Details that the engineer would like to include on the drawing are sometimes left off with the assumption that the User will understand what is meant within the notation(s). These assumptions are valid only when the User is the engineer; otherwise, [REDACTED]

3. REFERENCES

[REDACTED]

4. REQUIREMENTS

4.1 Order of Precedence

In the event of conflicting requirements the following order of precedence governs:

The Customer's requirements always [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

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4.2 Significant Digits

Calculations may be performed with a greater number of significant digits than shown on the applicable drawing; however, [redacted] must be [redacted] by the applicable drawing. For instance, [redacted]

4.3 Determining Conformance; Absolute Method or Rounding Method (ASTM E 29)

Unless otherwise specified by the CCB, the 'rounding method' is used for determining compliance of test data to product specifications according to [redacted]

Rounding is performed as follows:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

Example — 0.021"±0.001"

0.0211" to 0.0214" *must* be rounded down to 0.021" for 2 significant digit specifications; 0.0215" to 0.0219" *must* be rounded [redacted] for 2 significant digit specifications; (unless the last retained digit from the rounding method is even, e.g., 0.0225" is rounded [redacted] while 0.0226" is rounded [redacted] ")

Example — 0.0215"±0.0015"

0.0211" to 0.0219" must be applied as observed - no rounding is possible if [redacted] If the equipment is capable of reading [redacted] paying particular attention to whether the retained digit is [redacted]

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Example — 550±50

499.1 to 499.4 *must* be rounded
 499.5 to 499.9 *must* be rounded
 600.1 to 600.5 *must* be rounded
 600.6 to 600.9 *must* be rounded

4.3.1 Decision Rule for Considering Measurement Uncertainty in Determining Conformance to Specifications

ASME B 89.7.3.1 specifically addresses the issue of applying measurement uncertainty in industrial settings. A decision rule is

For workpieces, the permissible variation is commonly called the tolerance; for instruments it is often given by the specification limits or a maximum permissible error (MPE). The permitted variation of a product’s characteristic is known as the “specification zone”.

Figure 1 defines the Company’s decision rule with stringent acceptance, simple rejection, and a transition zone where the product is likely to be

The outcome of a measurement result in the transition zone is dependent upon the rule stated below for Figure 1. For example, stringent acceptance implies both a decrease in the acceptance zone width and an increase in confidence that a measurement result in this zone is associated with an in-specification product. Similarly, stringent rejection results in a

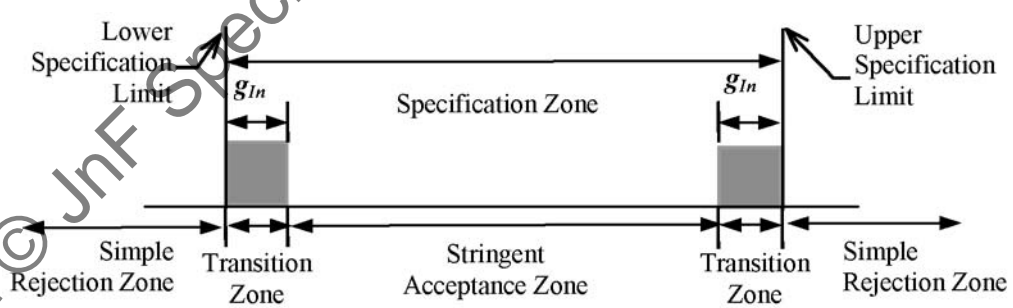


Figure 1 - Stringent acceptance, simple rejection and a transition zone using symmetric two-sided guard-banding. Products are accepted if

Decision Rule for Measurements within the 10:1 Transition Zone in Figure 1:

The calibration tolerance for a measurement device can be used to the instrument’s calibration

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tag or record. If the GR&R range is known for the measurement instrument, the value shall [REDACTED]

Example: A measurement result is 1.445 against a specification of 1.45 maximum and the calibration tolerance of the measurement device is ± 0.010 . In this example, the value falls within the transition zone shown in Figure 1 (10% guard-band). The Operator may subtract

[REDACTED] Reject outlier(s) from a set of data if $Q_{exp} > Q_{crit}$, where $Q_{exp} = [xq - xn]/w$, and Q_{crit} is 0.41 for 90% confidence, 0.48 for 96% confidence or 0.57 for 99% confidence. [xq is [REDACTED] xn is [REDACTED] w is [REDACTED] (from W.J. Dixon, Ann. Math. Stat. 1951 - 22, 68).

4.4 Target, Goal and Should-Be Specification

Target, Goal and Should-Be specifications are suggested specifications, they are [REDACTED]

4.4.1 Application of the Drawing or Procedure Specification

Monitor data for compliance to the target value. When the product or process does not match the target value specified by the product drawing or process procedure, [REDACTED]

4.4.2 Target and Range Specification

When Range values are specified in addition to a Target value then product compliance to the Range values is [REDACTED]

The product must exactly comply with [REDACTED] described herein.

4.5 Potting and Encapsulation

4.5.1 Engineering Drawing Note(s)

Potting and encapsulation operations may or may not be defined by a drawing note that references a manufacturing procedure that defines the lot formation and use of an epoxy log book for every mix.

4.5.1.1 Application of Drawing Specification

Unless otherwise specified, potting and encapsulation materials whose shelf-life has expired must not [REDACTED]

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The expiration date is sometimes modified by an annotation that applies an additional expiration date after the container is opened, e.g., 6 month shelf-life while un-opened and properly stored and then a 3 month shelf-life after opening the container. Prior to using any potting or encapsulation material, [REDACTED]

4.6 Dimensional Requirements and Allowances

4.6.1 Surface Flaws

Surface flaws include [REDACTED]
 [REDACTED] Acceptance of parts having surface flaws shall [REDACTED]

4.6.2 Free State Variation

If material flexibility or normal stresses can be expected to cause parts to be out of tolerance, appropriate inspection procedures [REDACTED]

4.6.3 Blind Holes

The drill point shall not [REDACTED]

4.6.4 Gaging Hole Diameters

The diameter of a hole is within required limits when [REDACTED]
 [REDACTED] the hole is out-of-round [REDACTED]
 Bell-mouthed holes are acceptable if [REDACTED]

4.6.5 Hole Quality

The walls of holes shall be clean cut and shall present a [REDACTED]
 Hole edges shall be free from [REDACTED]
 These requirements are subject to [REDACTED]

4.6.6 Removing Burrs and Sharp Edges

All burrs and sharp edges shall be removed to the extent that material fragments are not visible and sharpness cannot [REDACTED] If it is necessary to break sharp

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edges or to deburr after application of chemical surface treatment, the bared metal [REDACTED]

[REDACTED]

These requirements do not apply to [REDACTED]

4.6.7 Correction of Manufacturing Defects

4.6.7.1 Permissible Corrections

Correction is permissible if the method used is [REDACTED]

[REDACTED]

4.6.7.2 Non-permissible Corrections

Corrective methods that add material to the product or that employ techniques abnormal to the production process are [REDACTED] Examples are [REDACTED]

[REDACTED]

4.6.8 Correcting Defects in Coating

Defects in chemical organic and metallic coatings may be corrected by [REDACTED]

conforming to [REDACTED]

The corrective method shall not [REDACTED]

[REDACTED]

Cosmetic defects in areas of chemical, electrochemical and organic coatings that do not perform an electrical or mechanical function may [REDACTED]

[REDACTED]

Touch-up of non-organic painted finishes shall be by use of the same preparation, sequence, number of coatings and materials as specified for the original finish. Paint touch-up must [REDACTED]

[REDACTED]

4.6.9 Flat Surfaces

Where no parallelism tolerance is specified, flat surfaces of a part shown as parallel on a drawing shall [REDACTED] Flat surfaces of a part shown as

perpendicular on a drawing shall be [REDACTED] [REDACTED] The perpendicularity requirement for a flat surface and an axis or an axis and another axis shown perpendicular on a

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drawing is that they shall be [REDACTED] Discontinuities on the flat surface shall be [REDACTED]

4.6.10 Thread Form

All threads shall be free from [REDACTED]

[REDACTED] Thread form shall comply with the requirements specified by the applicable drawing. Where no thread form is specified, threads shall comply with [REDACTED]

Cold forming thread tools such as Besly "X-Press" may be used in lieu of metal cutting tools. A slight groove may appear along the thread crest as a result of the metal flowing action of a Besly tool and is acceptable if [REDACTED]

4.6.11 Thread Gaging

Thread wires and measurement indicators may be used to accept thread dimensions. When "GO" gages are used, the product shall allow the "GO" gage to enter or to be entered [REDACTED]

[REDACTED] however, the thread must [REDACTED]

When "NOT GO" plug or ring gages are used, the product is [REDACTED] or before [REDACTED]

For threads having three or fewer turns, the drag shall occur on or before [REDACTED]

4.6.12 Surface Roughness

When the surface roughness specified is less than 32 microinches, measurement shall be performed [REDACTED] using [REDACTED] When the surface roughness specified is 32 microinches or greater, [REDACTED]

4.7 Requirements for Cleaning, Protection and Identification of Raw Material, Parts and Assemblies

4.7.1 Protection

All parts and assemblies shall be adequately protected from [REDACTED] [REDACTED] These requirements shall apply to all manufacturing operations from receipt of raw material to completion of a finished product and [REDACTED]

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to product held in any storage area and product prepared for shipment. Protective measures used during processing, fabricating and packaging must not only guard against obvious damage and deterioration but also against [REDACTED]

[REDACTED]

4.7.2 Cleanup of Parts and Assemblies

All finished parts and subassemblies shall be adequately cleaned before final assembly. Final assembly and necessary subassembly shall be performed in an environment appropriate to the type of product. All parts and assemblies shall be [REDACTED]

[REDACTED] such as:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

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DEFINITION OF TERMS

Accuracy:	[REDACTED]
CCB	Configuration Control Board
Goal Posts	[REDACTED]
GR&R	Gage Reproducibility and Repeatability
IAW:	In accordance with
Independent Test Results:	[REDACTED]
MRB:	Material Review Board
Precision:	[REDACTED]
REA:	Responsible Engineering Authority
Repeatability Conditions:	[REDACTED]
Repeatability:	[REDACTED]
Reproducibility Conditions:	[REDACTED]
Reproducibility:	[REDACTED]
S:	Population standard deviation is known
s:	Population standard deviation is estimated
Trueness:	[REDACTED]

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