INFORMATION ON ALTERNATE METHODS

This information was provided by various sources and is not the responsibility of DSCC.

PURPOSE: The purpose of this site is to provide information that may be helpful to manufacturers who are pursuing alternate methods to MIL-PRF-38534

In some cases, the examples are manufacturers' original submission to DSCC for approval of alternate methods. Therefore, the information was used in conjunctions with other information that DSCC already had on hand, or requested from the manufacturer, about the specific process, material, quality system, etc. to approve the alternate method. **Do not assume that the same alternate method would be approved for every company. Each case must be evaluated separately**.

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Internal Water Vapor Process Guideline

What does DSCC do with alternate proposals?

Process for determining incoming material evaluation requirements

Element Evaluation Alternate Method, TG 137

Task Group: 138-198 Alternate Test methods to meet system performance of Centrifuge 'G' levels

The following wording was originally a proposed changed to MIL-PRF-38534. It was never included into the specification. However, the concept may prove valuable to some manufacturers. Note: JEDEC 13.5 is currently working to update these guidelines. Their later revisions will replace this one when they become available.

1.0 Purpose: To monitor the Internal Water Vapor Content of Hermetically Sealed Devices in-line as opposed to end-of -line Internal Water Vapor test in accordance with the applicable Specification. The intent of this guideline and the benefits are:

1. Validates qualification by extension for Internal Water Vapor for similar package / substrate attach process / seal methods.
2. Will substitute periodic qualification requirements for polymeric/adhesive systems and product Internal Water Vapor requirements that use the same baseline processes and materials.
3. Prevents use of potentially unreliable product in the field due to excessive moisture.
4. Serves as an ongoing reliability monitor to understand potential failure mechanisms and process deficiencies in assembly and materials.
5. Allows substitution of data thus eliminating redundant testing for major changes in assembly processes and materials in products.

2.0 Requirements

2.1 General

2.1.1 The in-line Internal Water Vapor Process Control shall be incorporated into the manufacturers baseline and shall be approved by either the manufacturers TRB or by the Qualifying Activity. The in-line process monitor may apply to any device type called out in the applicable specification.

2.1.2 Test samples. For the purpose of in-line Internal Water, a device within 50% in volume to the hermetic device may be used in lieu of the product to simulate the baseline assembly processes, materials and seal methods. The use of electrical rejects is permissible. (i.e. If the hermetic device is 2.0cc in volume, then a similar device from 1.0cc to 3.0cc may be tested).

2.1.3 Data traceability. Data traceability for major changes to materials, assembly processes, seal profiles, equipment, baseline process qualifications, qualified package family data and Periodic Inspection (PI)/QML summaries shall be maintained.

2.1.4 Pre Audit. An internal pre audit of the overall assembly processes and materials is an optional requirement prior to performing in-line Internal Water Vapor.

2.2 **Sampling**

2.2.1 Frequency of Sample Selection.
Sample collection shall be done among different equipment of the same seal process (as applicable) and shall be rotated periodically among the different equipment.

a. If the device type or package type has received Internal Water Vapor testing at PI/QML, then one sample per month for each baseline seal process and package type shall be tested to satisfy Internal Water Vapor process control requirements.

b. If the device type or package type has not received Internal Water Vapor testing at PI/QML or the device type or package type has not been produced for more than one year, then one to three devices (based on manufacturer Internal Water Vapor History) shall be sample tested from the first build lot. If the first build lots internal water vapor is statically acceptable (see 2.3), then one sample per month for each baseline seal process and package type shall be tested thereafter to satisfy Internal Water Vapor process control requirements.

2.2.2 Sampling points. The samples shall be collected after exposure to the screening stress conditions of the screening requirements (i.e. after burn-in). Other sampling points (e.g. after seal or temperature cycle) are allowed as an alternative provided process stability is demonstrated via procedures and data (i.e. correlation between fine leak data and Internal Water Vapor Data).

2.2.3 Reduced or modified sampling. Reduced or modified sampling will be permitted when statistical process control methods are utilized to monitor seal processes and internal water vapor data is traceable and under control.

2.3 Procedures in case of discrepant data. In case of discrepant data above the allowable moisture limit during the in-line process, investigations shall be made to understand the underlying cause or reason for the variation (e.g. loss of hermeticity due to package cracking or test escape, equipment malfunction, improper Internal Water Vapor testing, process deficiencies, operator errors, etc). Additional samples from the lot shall be tested for internal water vapor after corrective measures are taken. Lot disposition shall be based on internal water vapor of the resampled device within the specified internal water vapor limits. If the analysis reveals that the failure is due to process or material deficiencies, the offending cause and source shall be corrected to bring the process under control.

2.4 Internal water vapor data substitution. In-line process Internal Water Vapor data can be utilized to satisfy the internal water vapor requirements in the following cases:

1. Retention of polymeric certification periodically as stipulated in MIL-STD-883, Test Method 5011.
2. Testing requirements for major product / process changes in accordance with the applicable specification for:
   a. Substitution of attached material / method or process temperature.
   b. Substitution of package configuration changes to lids, materials or plating.
   c. Substitution of seal method or changes to baseline seal process.
   d. Increase in seal perimeter or lead counts.
   e. Other changes that may affect Internal Water Vapor.

   In all these cases, Internal Water Vapor test data on a sample or SEC that contains those changes shall be included and retained in the process control database.
3. PI/QML testing requirements for products that utilize the same package family, polymeric/adhesive materials and seal methods.

3.0 Definitions

Baseline index of documents. The documents which establish the baseline for a given device manufacturer.

Baseline process flow. The manufacturer's baseline process flow is that flow of manufacturing process, inspection and test processes and material entry points into the flow that defines the manufacturer's specific technology flow. This flow begins with incoming materials, goes through all manufacturing processes including inprocesses monitors, completed device screening and final acceptance verification of the product.

Critical control parameters. Critical control parameters are parameters whose variability most affect a design, process, or material.

Device Type. Device type refers to a single specific device configuration. The device type is electrically and functionally interchangeable with each other; have the same electrical and environmental test limits; and use the same package, materials, piece parts, and assembly processes.

Package family. A package family is a group of package types, i.e. case outline, configuration, materials and baseline assembly processes (e.g. bathtub, platform, TO-can, cerdip, side braze).

Package type. Package which have the same case outline, configuration, materials (including bonding wire and die attach), piece parts (excluding preforms which differ only in size) and assembly processes.

Periodic capability certification. Periodic capability certification is the calibration and certification of equipment and/or process steps for an individual parameter(s) such that it can be used as an alternative method to detection testing.

Production lot. A production lot consists of a device type manufactured from the same basic raw materials on the same production line, processed under the same manufacturing techniques and controls using the same type of equipment.

Qualifying activity. The qualifying activity is the organizational element of the Government that grants certification and QML status.

Standard evaluation circuit (SEC). A SEC is a test coupon/device that is representative of actual product. The SEC may be actual product or may be specifically designed to evaluate a particular process. The SEC should be processed using the same processes, and type of material as a product it represents.

This article is provided by DSCC to explain the alternate method approval cycle.

What does DSCC do with Alternate Method Proposals?

Once the manufacturer has finalized their alternate method and their justification for using it, the proposal must be approved by either the manufacturer's Technology Review Board (TRB) or DSCC.

If the manufacturer has an approved TRB, this group may approve alternate methods, with appropriate justification. This is a straightforward process since the TRB is generally the group responsible for the alternate method in the first place. Since this group has been intimately involved with the generation and justification phase of the alternate method it is usually a matter of documenting the approval of the TRB and the justification. This entire process is defined by the TRB's procedures.

The regular retention reports by the TRB must include all decisions made by the TRB and their justifications for these decisions. The DSCC engineers will then evaluate the decisions and justifications and as long as the justification is reasonable and supports the decision made there is not a problem. If, on the other hand, the decision made jeopardizes the performance of the devices, or the justification is not sufficient to support the decision, the DSCC engineer will contact the manufacturer and discuss the situation.

If the manufacturer does not have an approved TRB, the alternate method must be approved by DSCC. This is accomplished by the manufacturer presenting the alternate method and their justification for using it to DSCC. This information is then discussed by a group of DSCC personnel who evaluate the information and determine if it will or will not affect the performance of the devices involved. The alternate method is also examined to make sure that the intent of the original method is still met. If the performance is not adversely affected and the intent of the original method is met, DSCC will generate an approval letter for the alternate method and the manufacturer can begin to use the alternate method. If, on the other hand, DSCC believes that the alternate method will adversely affect the performance of the part, DSCC will discuss the situation with the manufacturer.

In either case, if DSCC determines that the alternate method does adversely affect the performance of the devices many different things may happen.

If the manufacturer feels that DSCC is incorrect in their assessment, the manufacturer must restate their case, presenting any additional justification or data that they feel is pertinent. If DSCC feels that this additional information now adequately justifies the alternate method then the method may be implemented. If not, further action is necessary.

The manufacturer may change their alternate method to address DSCC's concerns. This new alternate method will then be reevaluated by DSCC as described above.

If neither of these options is acceptable, or possible, the alternate method will not be implemented. The manufacturer is, of course, free to examine the

alternate at a later date with addition justification. If, under a TRB system, the alternate method has already been implemented, the use of the alternate method must be stopped immediately, and the impact of shipped parts must be discussed with DSCC, with parts possibly being recalled and replaced with acceptable products.

This article was provided by Analog Devices to show how they approach material evaluation.

PROCESS FOR DETERMINING INCOMING MATERIAL EVALUATION REQUIREMENTS

PURPOSE

The purpose of this document is to define the process for determination of incoming evaluation requirements for materials used in the manufacture of product.

SCOPE

This process includes components and materials used for either assembled products or IC's which are processed at the ADI Greensboro site.

DEFINI-TIONS

The following terms and definitions apply.

- Incoming Evaluation Code - A code located in the Planning & Operating System, used to indicate the flow of material after receipt.
- Dock-To-Stock (DTS) - A program whereby the materials proceed directly from Receiving to the Stockroom. No inspections or tests are performed on materials with this status. This typically applies to materials originating from a certified line, or when the subcontractor's quality history is excellent, or when the subcontractor's standard material is adequate for the intended use.
- Full Element Evaluation - An incoming evaluation code where a full barrage of tests and inspections are performed on each lot of material. This material is moved from receiving into incoming inspection area prior to placement into the stockroom.
- Alternate Element Evaluation - An incoming evaluation code used to modify Full Element Evaluation, i.e. certain tests are minimized or customized as necessary, without affecting the intended use.
- Technical Review Board (TRB) - An internal governing body, who is authorized to make decisions including assignment of incoming evaluation codes as described in procedure QSY100101.
- Serial Lot Control - A code used within the Planning & Operating System which requires a serial lot number to be assigned to the quantity of materials to be stocked. This provides traceability from each lot of materials to the next assembly where it is used. This code is assigned on an individual material part number basis.
- Subcontractor Quality History - Data from a single subcontractor for an individual material part number or similar elements from the same processing methods, as reviewed and approved by the TRB.
- Serial Lot Number - The material manufacturer's lot number.
- Post Deduct - Items in which the quantity is deducted from the Planning & Operating System only after use. This applies to materials which are not broken down into smaller quantities for kitting purposes.

RESPONSIBILITIES

The responsibilities for this process are defined below.

GROUP NAME	RESPONSIBILITY
Quality Engineering	• Make recommendation to the TRB for assigning new or changing existing incoming evaluation codes or status. • Review and analyze subcontractor quality history data. • Perform subcontractor site audits and/or surveys, including requests for corrective action. • Enter the TRB-approved incoming evaluation code or status for each material on the Planning & Operating System.
Purchasing	• Act as primary liaison between ADI and the subcontractor. • Provide Quality Engineering with list of most frequently received materials. • Participate in subcontractor audits and/or surveys. • Modify purchase orders when the status for a particular material changes an active P.O.
Document Control	• Release or modify documentation such as Bill Of Materials, procurement documents, and Add-Part Forms to indicate the incoming evaluation requirements assigned by the TRB.
Incoming Inspection Area / Stockroom Supervisor	• Adjust inventory as necessary, when a particular material status is changed. • Process materials per the established incoming evaluation flows and procedures.
Product and/or Manufacturing Engineering	• Participate in subcontractor audits and/or surveys as necessary to support QA and Purchasing.
Receiving Department	• Review receiving traveler for determination of whether the material should go to incoming inspection or directly to stock. • Enter the serial lot number(s) on the Planning & Operating System.
TRB	• See a full description of responsibilities in QSY100101.

Continued on next page

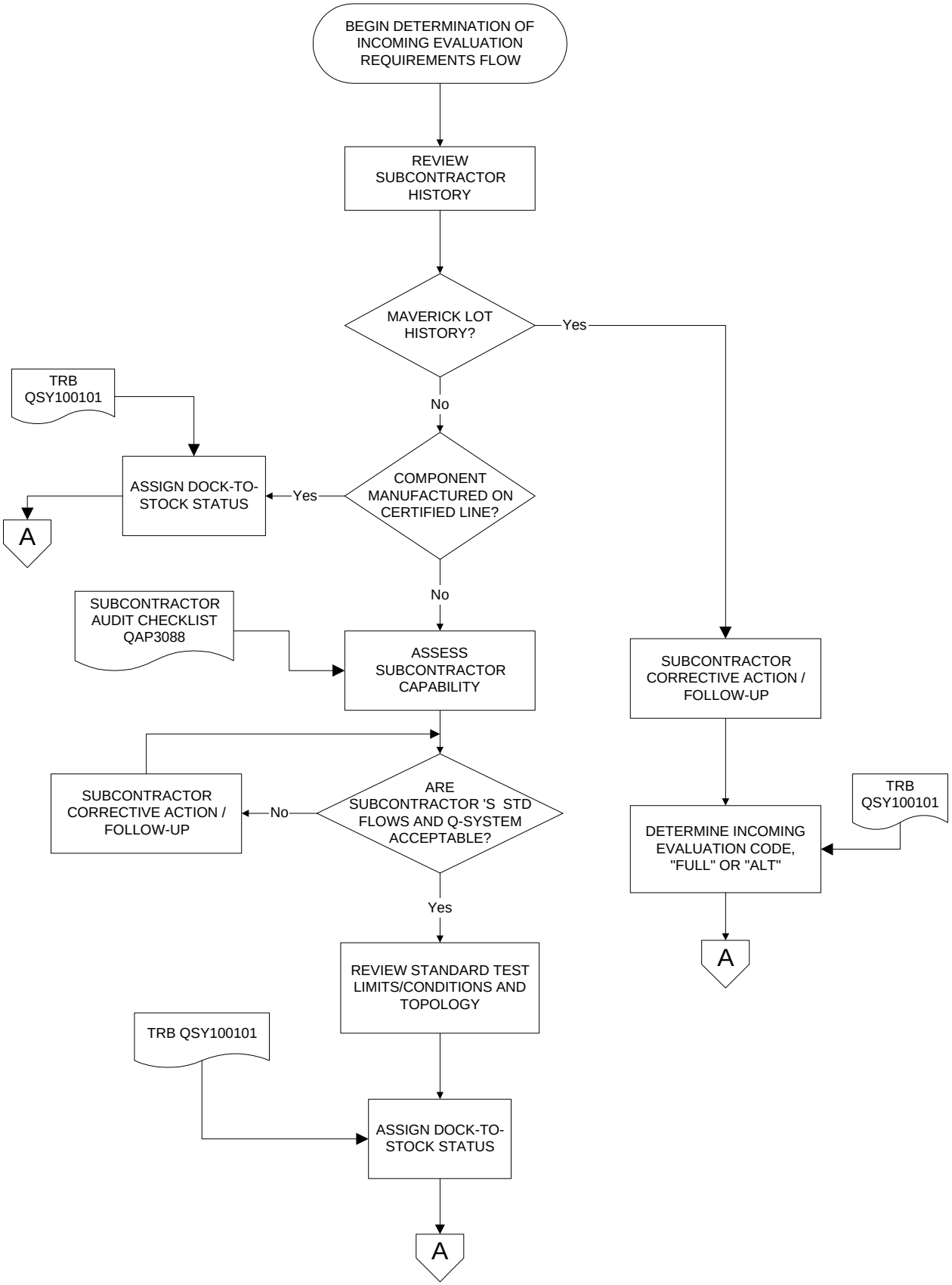
POLICIES

The following policies are applicable to this procedure.

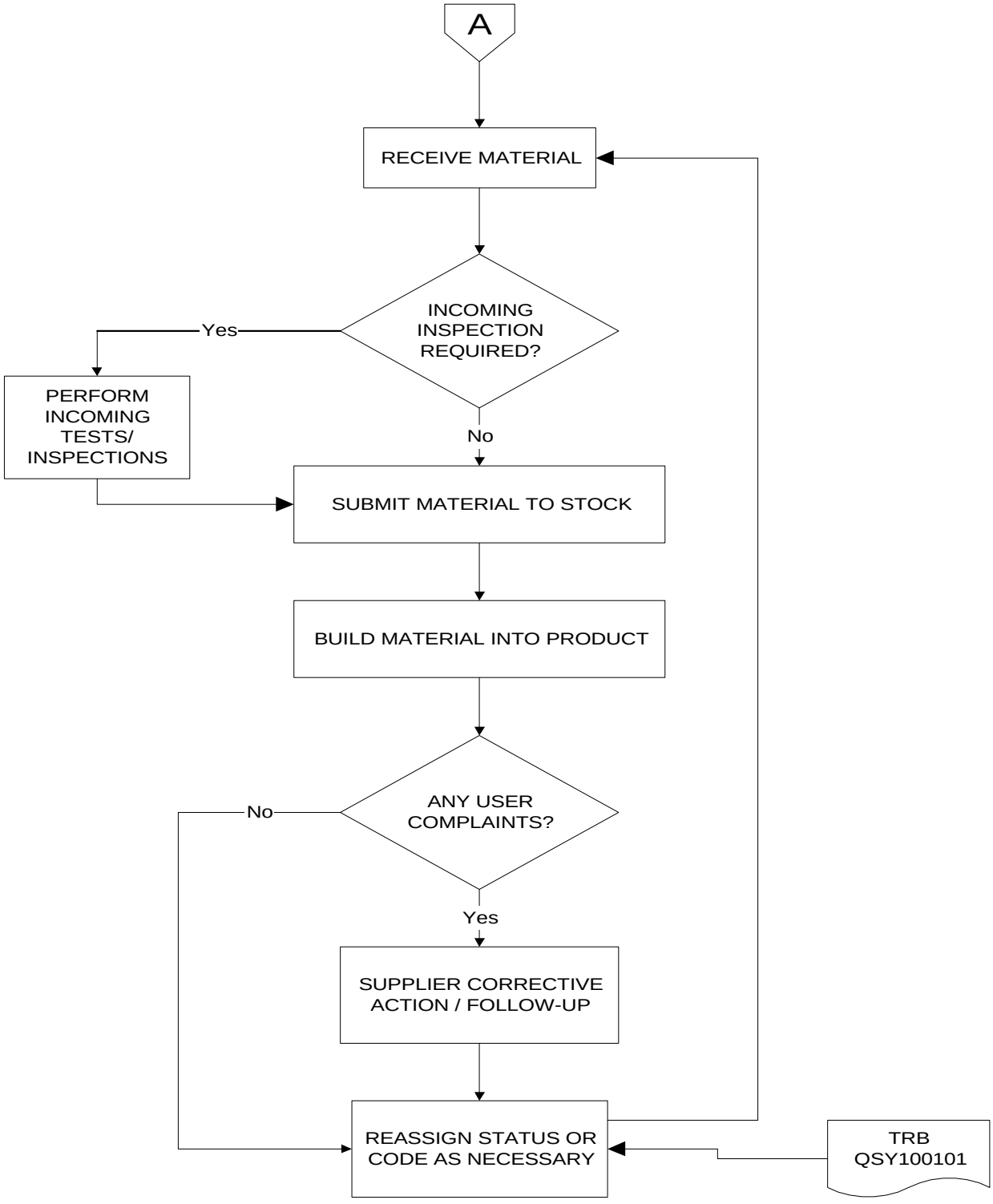
- The listing of the most frequently received materials is to be submitted and reviewed on a quarterly basis.
- The priority for subcontractor audits is determined based on criticality and volume of the particular material and past quality history.
- All DTS materials (with the exception of post-deduct items) are required to carry the Serial Lot Control code within the Planning & Operating System.
- Quality complaints from internal customers for any material on DTS will be submitted to Quality Engineering for possible TRB action.
- Materials which are manufactured on either a MIL-S-19500, MIL-PRF-38534, or MIL-PRF-38535 certified line do not require incoming evaluation.
- Full element evaluation is not required for materials that have been reviewed and dispositioned as such by the TRB.
- Modifications of the assigned incoming evaluation code or status are made through the review and approval of the TRB.
- Materials which require non-standard incoming evaluation requirements will be handled through the contract review process, see CRV100200.
- For meterials requiring incoming inspection full element evaluation requirement shall be required if no code letter appears in the special handling field of the receiving traveler.
- Materials requiring an alternate evaluation flow shall be identified by an "A" in the special handling field of the receiving traveler.

PROCESS

The process for determining incoming evaluation requirements is described as follows:


BEGIN DETERMINATION OF INCOMING EVALUATION REQUIREMENTS FLOW
REVIEW SUBCONTRACTOR HISTORY
MAVERICK LOT HISTORY?
Yes
No
TRB QSY100101
ASSIGN DOCK-TO-STOCK STATUS
Yes
COMPONENT MANUFACTURED ON CERTIFIED LINE?
A
No
SUBCONTRACTOR AUDIT CHECKLIST QAP3088
ASSESS SUBCONTRACTOR CAPABILITY
SUBCONTRACTOR CORRECTIVE ACTION / FOLLOW-UP
SUBCONTRACTOR CORRECTIVE ACTION / FOLLOW-UP
No
ARE SUBCONTRACTOR 'S STD FLOWS AND Q-SYSTEM ACCEPTABLE?
TRB QSY100101
DETERMINE INCOMING EVALUATION CODE, "FULL" OR "ALT"
A
Yes
REVIEW STANDARD TEST LIMITS/CONDITIONS AND TOPOLOGY
TRB QSY100101
ASSIGN DOCK-TO-STOCK STATUS
A

PROCESS CONTINUED.



APPLICABLE DOCUMENTS

Other applicable documents are as follows:

- Referenced documents -
  MIL-PRF-38534 Hybrid Microcircuits, General Specification For
  MIL-PRF-38535 Monolithic Microcircuits, General Specification For
  MIL-S-19500 Semiconductors, General Specification For

- Next level documents -
  QSY100101 Procedure For Technical Review Board
  QAP3046 General Incoming Material Handling Procedure
  CRV100200 Process For Contract Review
  QAP3088 Subcontractor Audit Procedure

This article was presented by M.S. Kennedy to demonstrate their experience with alternate methods to element evaluation.

M.S. Kennedy
TG 137 – Alternate Methods

Element Evaluation Alternate Method

Introduction: With the release of MIL-PRF-38534 and the allowance to reduce non-value added testing and reduce cost, M.S. Kennedy has revised its internal element evaluation documentation for semiconductors, microcircuits and passive elements. The reduced testing is allowed in accordance with MIL-PRF-38534 paragraph 3.3.1 with DSCC approval.

The decision to reduce the element evaluation testing was based on the fact that M.S. Kennedy is a custom hybrid manufacturer with a relatively large inventory of many low volume elements and a very low reject rate at element evaluation (97% to 100% rating since 1988). Based on the low reject rate, the intent was to reduce the number of test samples; eliminate temperature testing of semiconductors / microcircuits where history shows it to be non-critical and eliminate non-critical testing of passive elements.

Element Evaluation Alternate Method for Class H

Microcircuits

1. 100% electrical by supplier.
2. 100% visual inspection by supplier.
3. Internal visual 10(0) minimum.
4. Microcircuits (10 minimum) mounted into hybrids. Electrical test performed as part of the hybrid and tested at 25=C only with data recorded (subgroups 1, 4, 7, 9) and reviewed by engineering. Temperature testing performed as required.
5. Microcircuit(s) are mounted into a package such that a minimum of 10 bond pads can be wired and destructively pull tested. (More than one microcircuit may be required).

NOTE: wirebond data from the hybrid production lot may support the element evaluation data.

Semiconductors

1. 100% electrical by supplier.
2. 100% visual inspection by supplier.
3. Internal visual 10(0) minimum.
4. Semiconductors (10 minimum) mounted onto test coupons or into hybrids (determined
   by die mounting technique, power dissipation/size/wirebond type).
   Electrical evaluation performed using approved test equipment or tested as part of the hybrid at 25=C only with recorded data and reviewed by engineering. Temperature testing performed as required.
5. Semiconductor(s) mounted onto test coupons are bond pull tested after electrical test.
   Ten (10) wires pulled. Additional semiconductor(s) (if built in the hybrid) are built into simulated packages such that a minimum of 10 bond pads can be wired and
   destructively pull tested.

Passives

1. 100% electrical by supplier.
2. 100% visual inspection by supplier.
3. Internal visual 22(0) minimum.
4. If wirebond is required:
   Passive elements mounted into test coupons, wired, tested as 25=C, data recorded and reviewed by engineering. Temperature testing performed as required.
   If wirebond is not required:
   Passive elements are tested in a fixture or probe tested with data recorded/engineering reviewed. (mounting techniques are QML)
   Testing requirements:
   Ceramic caps – capacitance / tolerance
   Tantalum caps – capacitance / tolerance / leakage
   Inductors – Inductance / tolerance
5. Passive elements mounted into test coupons are bond pull tested after electrical test.
   Minimum of 10(0).

DSCC Response:

Your request to reduce element evaluation testing, as allowed by paragraph 3.3.1 of MIL-PRF-38534, has been reviewed by this office. The reduce samples for wirebond evaluation, the sampling plan for internal visual and the reduced electrical testing on active and passive components as specified in you April 29, 1996 letter and M.S. Kennedy procedures RIP002 Rev P, RIP005 Rev O and RIP009 Rev N are acceptable for use on compliant products.

This material was part of a JEDEC task group. The task group was working on wording to into MIL-PRF-38534. The task group is closed and there are no plans to add alternate criteria for centrifuge to MIL-PRF-38534 at this time.

Task Group: 138-198
Task Title: Alternate Test methods to meet system performance of Centrifuge 'G' levels
Task Chairman: Dan Miller
Task Report by: Dan Miller
Ballot No: ----------
Ballot Responses: ----------

TG 138 MIL-PRF-38534 Alternate Methods for Centrifuge and mechanical Shock

Charter: To develop Alternate methods (i.e. Process Control) to reduce or eliminate Temperature Cycle / Thermal Sock and Centrifuge / Mechanical Shock screening requirements of MIL-PRF-38534.

Nine members from industry, one guest and representatives from DSCC were present. With several new members present, the group reviewed the charter, objective, background, benefits, disadvantages and comments from the previous meeting which included review of TG130 performance matrix for Temp. Cycle and Centrifuge.

Three proposals were reviewed:

- Change to Para. C.4 Process Control of 38534.
- Use of Para. 3.8.1 Implementation of this Specification and Table II Implementation Summary of 38534.
- Change to Para. C.5 Device Screening where substrate and die attach process control testing was added to the section and to the device screening table (XII).

All 3 options were discussed and with para. 3.8.1 and Table II already an option for process control and alternate methods, it was decided not to propose any changes to 38534. Rational for this decision:

- Companies are set up for temp. cycle / centrifuge.
- History is very low for custom hybrids.
- Many processes associated with complex hybrids and one set process control method is not applicable for the variety of custom and standard hybrids manufactured.

It was recommended (during 13.5 general meeting discussion) that the alternate methods shared by companies be placed either in a new appendix to MIL-PRF-38534, on the DSCC web page, on the JEDEC web site or archive in the meeting minutes.

Until a policy has been determined by 13.5, the background information of the task group is as follows:

Objective: To determine what process control methods can be performed In-Line to assure that substrate(s) and elements are adhering to the attach surface(s).

Background Information:

- The current centrifuge and mechanical shock levels will continue to constrain higher-level system integration and act as a barrier to technology advancement in MCM's and hybrids. This constraint is due to package weight resulting in over design to the current and proposed G-Levels (3,000G for screening and 6,000G for QML) even though other system components are designed to less stringent system shock and acceleration performance limits.
- The current and proposed centrifuge and mechanical shock in screening and QML would be considered destructive for certain classes of large MCM's as this higher G-level reduces the safety margin (stressing the device to the plastic range of typical materials).
- Typical customer information from system level manufactures indicates that the system performance requirement for centrifuge is less than 300G. The exact system level performance requirement is classified information, however, typical military customers have confirmed that their requirement is less that 300G's.
- Industry norms for centrifuge performance are Aircraft (<100G's) and Space Shuttle

- The proposed limits to be specified in MIL-PRF-38534 (3,000G for screening and 6,000G for QML) far exceed most system level requirements (with the exception of Artillery) and are not performance based.
- Crystal oscillators are used in the same systems as MCM's and hybrids, although the oscillators are shock tested to only 100G's.
- Lower levels have been allowed by DSCC as exceptions for certified manufacturers. Input from DSCC survey ballot indicated that waivers are often taken from the current levels.
- Changing the levels for all hybrids will ensure a level playing field (i.e. simple approach). The task group did not find it appropriate to lower the screen for larger area hybrids. To do this would mean sacrificing the component attachment screen to prevent "oil canning" or glass seal cracking. If a hybrid design cannot meet these lowered requirements, there is a paragraph in MIL-PRF-38534 that allows a manufacturer to present alternate screens for DSCC approval.
- The original constant acceleration screen was to address wire bond attachment. This is not a valid screen for wire bonds. The mass of wire is so small that in order to achieve a force equivalent to that wire bond pull test, 2 grams, a g-level of 50,000 or more would have to be used, f = ma.
- The most severe (except for cannon shot applications) application environment (e.g. 500G's) is 6 times less than the screening level. The screen will demonstrate adequate margin for the design.

What are the benefits of completing the objective?

- Process Control / In Process Evaluations can eliminate temperature cycle, centrifuge and mechanical shock screening.
- Screening alone (Temperature Cycle, Centrifuge, Mechanical Shock) does not guarantee a MCM or Hybrid to be in full compliance with the intended manufacturing process.

i.e. Substrate attach may have air pockets.
Solder Substrate attach may have voids.
Die attach may have voids.
Epoxy bond line may have too much or to little epoxy.
Delamination may be present.

Process Control will identify potential manufacturing defects

- Process Control / In Process Testing will improve construction techniques of MCM's and Hybrids as QML testing has improved process controls.
- Lower cost in development / Engineering of MCM's and Hybrids.

i.e. thinner package base.
One substrate vs. multiple substrates
Thinner lids
Thinner Substrates
Eliminate standoffs
Package materials

- Use past history into Process Control road map.
  - Process control could spur new technology advancement.
  - Development of Internal Design Requirements to improve Process Control.
  - Integrate Design Analysis with the System Requirements.

What are the disadvantages of completing the objective?

- If processes are QML listed, then why is Process Control necessary?
- Temperature Cycle, Centrifuge and Mechanical Shock may find process escapes
- Companies are set up to perform Temperature Cycle and Centrifuge (equipment is already purchased).
- New equipment or Outside lab testing may be part of the process control testing.
- Change in mind set.
- Processes are QML listed so why develop process controls?
- MIL-PRF-38534 allows exceptions for special types of devices with limitations.
- Educating the Customers of the advantages.
- Customers have a mindset and will not want to change.
- Hermiticity process controls must also be in place (Temperature Cycle / Centrifuge will affect hermiticity).

When should the process control testing be performed?

- On the initial build for QCI/PI/QML such that the process control testing results can be compared to the end - of - line QCI/PI/QML test results.

- On any Class I change where materials or processes are changed.
  i.e. epoxy change
  Package plating
  Package material
  Substrate material
  Process control change
  Both process control testing and end - of - line testing shall be performed and compared
- For continuous monitoring of Substrate Attach and Die Attach.

What Process Control testing can be performed to assure Substrate and Die Attach construction techniques?

- In-Line die shear of elements.
- X-Ray of element and substrate attach.
- Ultrasonic Insp. of substrate attach.
- Ultrasonic Insp. of die attach.
- Pull test.
- 3rd party construction analysis.
- Thermal analysis.
- Automation
- Proof of design robustness based on PI/QML results.
- Epoxy dispense controls
- Failure Mode Risk Analysis.
- Production Readiness Review.

Performance Matrix from Task Group 130

MIL-PRF-38534 Requirement ("How")	**Required Results ("What")**	**Deficiency**
Temperature Cycle or Thermal Shock MIL-STD-883, M1010 or M1011	-Validate component attachment (i.e., component sticks) -Accelerate die defects (e.g., latent cracks, material degradation) -Monitor die attach process (i.e., epoxy die thickness) -Verify thick-film resistor stabilization -Verify thick-film material adhesion -Expose CTE mismatch between housing and components -Insure wire bond attachment -Expose latent hermiticity issues (e.g., glass seals, weld)	-Stresses bond joints -Increase schedule (i.e., cycle time) -Environment may not match customers end use
Centrifuge or Mech. Shock MIL-STD-883, M2002 or	-Validate component attachment (i.e., component sticks)	-Over stresses large components while not

M2001	-Monitor die attach process (i.e., epoxy die thickness) -Insure wire bond attachment	adequately stressing very small components -Fixture cost

MIL-PRF-38534 Change Proposals:

 # 1 Proposal

C.4 Process Control

From: C.4.1 Description of process control. Process control is a methodology used to detect defective processes prior to completion of assembly. This section outlines the requirements for process control on two processes through process control may be applied to other areas. The indicated processes will be controlled in accordance with table XI and C.4.2 and C.4.3

To: C.4.1 Description of process control. Process control is a methodology used to detect defective processes prior to completion of assembly. This section outlines the requirements for process control on two processes, provides optional control to other areas and may be applied to other areas. The required indicated processes will be controlled in accordance with table XI and C.4.2 and C.4.3. The optional processes may be controlled in accordance with C.4.4.

Add: C.4.4. Substrate and Die Attach testing. When substrate and die attach process control testing is performed in lieu of 100% temperature cycle/thermal shock, centrifuge/mechanical shock and approved by the qualifying activity, then qualification testing shall be performed concurrently with screening and QML testing specified in Appendix C. The process control testing may include the following MIL-STD-883 test methods as determined by the manufacturer:

Method 1012, Thermal Characteristics
Method 2012, Radiography
Method 2019, Die Shear
Method 2027, Substrate Attach Strength
Method 2030, Ultrasonic inspection of die attach
Method 2031, Flip Chip pull-off test

Reference Paragraph 3.8.1 for other alternate method options

 # 2 Proposal

Reference MIL-PRF-38534D Paragraph 3.8.1, Implementation of this Specification and Table II, Implementation Summary that describes the requirements for incorporation of process control and alternate methods.
The manufacturer shall determine its own verification program to meet the requirements.

 # 3 Proposal

C.5 Device Screening

C.5.1 Description of device screening

C.5.2 General

C.5.3 Substrate and die attach process control testing

When substrate and die attach process control testing is performed in lieu of 100% temperature cycle / thermal shock, centrifuge / mechanical shock and approved by the qualifying activity, then qualification testing shall be performed concurrently with screening and QML testing specified in Appendix C. When qualified, the process control testing shall remain in effect. Major changes to processes or new processes shall be qualified. The process control testing may include the following MIL-STD-883 test methods as determined by the manufacturer:

Method 1012, Thermal Characteristics
Method 2012, Radiography
Method 2019, Die Shear
Method 2027, Substrate Attach Strength
Method 2030, Ultrasonic inspection of die attach
Method 2031, Flip Chip pull-off test

Reference Paragraph 3.8.1 for other alternate method options.

C.5.4 Pre Seal Burn-In Test

TABLE XII Device Screening

Test or Inspection	**MIL-STD-883**		**Requirement**		**Reference Paragraph**
	Method	**Condition**	**Class K**	**Class H**	
Substrate and die attach Process Control	In accordance with manufacturers Process Control		Optional	Optional	C.5.3
Pre Seal Burn-In	1030		Optional	Optional	C.5.4