ES 105: QUALITY ASSURANCE PROVISIONS FOR SM-3 PROGRAMS
NORTHROP GRUMMAN INNOVATION SYSTEMS
PURCHASE ORDERS WITH HONEYWELL TEMPE
REVISION: 10
NOVEMBER 30, 2018
Scope.
The purpose of this document is to provide the needed descriptions of quality flow-down requirements for the SM-3 program from Raytheon to NORTHROP GRUMMAN INNOVATION SYSTEMS (NGIS) Elkton to Honeywell. The NGIS quality assurance requirements listed below with the sub-listed items are required to meet the requirements flowed down by Raytheon and NGIS. This document is a part of every Purchase Order from NGIS Elkton to Honeywell Tempe. Additional Quality Assurance Provisions may be called out on the purchase order on a case by case basis. Articles defined in the purchase order will not be accepted if certifications, documentation, test data, or reports specified herein are not submitted.

Quality Assurance Requirements

1. GROUP 1: All purchase orders with Honeywell Tempe are classified as a Group 1 procurement by NGIS Elkton Quality Assurance (NGIS INTERNAL USE ONLY)

2. Honeywell Tempe, in the performance of this order, shall provide and maintain a Quality Management System that complies with or is equivalent to the current revision of ANSI/ASQC Q9001 and/or conforms to all requirements of SAE AS9100 (Quality Systems-Aerospace-Model for Quality Assurance in Design, Development, Production, Installation and Servicing). NGIS reserves the right to conduct a survey/audit of the supplier's facilities to determine the adequacy of the supplier's quality assurance system.

3. Honeywell is to submit an updated compliance matrix of how these Quality Assurance Requirements can be accomplished within Honeywell’s approved AS9100 Site Quality Plan and provide a Plan/Document to cover any requirements not covered by its AS9100 Quality System for NGIS Elkton's approval.

4. Government Industry Exchange Program (GIDEP). Honeywell shall participate in GIDEP in accordance with MIL-STD-1556, GIDEP Contractor Participation Requirements. Participation is required in the Failure Experience Requirements. Honeywell shall assure that substandard products are not used in valve assemblies, or other components provided by Honeywell, by taking corrective action in response to Alerts, Safe-Alerts, Problem Advisories and Product Change Notices in all instances where there is an impact on this purchase order.
   a. MDA Advisories. Honeywell shall respond to NGIS requests for information regarding MDA Advisories. Honeywell shall flow MDA Advisories to their subtiers.

5. NGIS-Furnished Material. NGIS-furnished material shall be handled and controlled so as to ensure its proper use in conformance to all requirements. Honeywell shall not in any way be relieved of the responsibility for compliance to traceability, identification and certification requirements.
6. Training & Certification. Honeywell shall establish, implement, and maintain a training and certification program to ensure sufficient program knowledge and personnel skills are developed and sustained. Honeywell personnel shall have necessary skills and knowledge to perform their assigned training activities.

7. All deliverable hardware is to be of Honeywell's "E4 or DEV" (Development) or "P" (Production) quality level. Any deviation from the E4, DEV, or P level must be approved by NGIS Elkton in advance.

8. Software and Firmware Quality Control Program. Honeywell shall have a process to control the quality of software and/or firmware to produce and/or test delivered products. Honeywell shall be able to show that the software and/or firmware process provides mechanisms for correctness verification of the software and/or firmware, as well as providing configuration control of the software and/or firmware. Honeywell shall insure that only properly approved versions of the software and/or firmware are available for testing delivered products.

9. Counterfeit Parts. When buying from distributors Honeywell shall use only distributors authorized by the manufacturer. The original manufacturer’s certification shall be obtained as well as a certification from the distributor with the following required information at a minimum:

   a. Purchase order number
   b. Part number (and revision, if applicable) of the item supplied, as specified on the purchase order
   c. Batch identifications for the item(s) such as date codes, lot codes, serial numbers, or other identification
   d. A statement that the certified part meets all drawing, specification, and/or purchase order requirements
   e. Signature or other identification of Seller’s authorized personnel approving the certificate
   f. Manufacturer’s name and address
   g. Manufacturer’s part number (and revision, if applicable), if different from part number on the purchase order
   h. A statement or other documentation that the distributor is recognized by the manufacturer as an authorized distributor.

   **Implementation plan:** Honeywell to continue with their standard practice.

   **Reference Attachment A which is an example of how Honeywell flows down this requirement to their subtiers.**
10. Workmanship shall be executed so that the design standard is not degraded or changed. At all points in the manufacture, production, integration, test, handling, storage, and transportation, special steps shall be taken to maintain the design standard. The skill level of personnel shall be such that all aspects of workmanship will ensure retention of high reliability standards. Workmanship guidelines are defined for guidance and information in MIL-HDBK-454, which includes as applicable:

Guideline 1 - Safety Design Criteria - Personnel Hazards
Guideline 5 - Soldering
Guideline 9 - Workmanship
Guideline 11 - Insulating Materials, Electrical
Guideline 12 - Fastener Hardware
Guideline 13 - Structural Welding
Guideline 15 - Metals, Corrosion Resistance
Guideline 16 - Dissimilar Metals
Guideline 19 - Terminations
Guideline 20 - Wire, Hookup, Internal
Guideline 23 - Adhesives
Guideline 41 - Springs
Guideline 43 - Lubricants
Guideline 47 - Encapsulation and Embedment (Potting)
Guideline 59 - Brazing
Guideline 63 - Special Tools
Guideline 67 - Marking
Guideline 69 - Internal Wiring Practices
Guideline 74 - Grounding, Bonding, and Shielding
Guideline 78 - Producibility

11. Honeywell is not granted material review board (MRB) privileges on this purchase order/subcontract. Honeywell does have preliminary review authority which includes rework, return to vendor, and scrap. All other dispositions are MRB and require NGIS.
approval. Nonconforming articles shall be withheld from subsequent manufacturing operations until written authorization for use or shipment is received from NGIS. All nonconformances, deviations and waivers shall be submitted to the resident NGIS Elkton Procurement and Quality Representatives for review, approval and/or concurrence of classification. The submittal shall include Honeywell’s written justification for recommended disposition, an explanation of the root cause, and a statement of the corrective action to be taken to prevent recurrence.

a. Honeywell shall track all MRB cause and corrective actions within its Corrective Action Board (CAB) system and report status and proof of closure to the resident NGIS Elkton Quality Representative.

b. Honeywell shall support NGIS and NGIS’s customer boards as required. Upon completion of material review board consideration, the NGIS Elkton Procurement Representative shall forward the disposition to Honeywell. If the NGIS Elkton Procurement Representative authorizes further processing of the discrepant materiel, Honeywell’s records and the certification package shall reference and include a copy of such authorization. No discrepant material shall be shipped by Honeywell, except with the NGIS Elkton Procurement Representative’s written authorization.

c. Nonconformances and waivers may be submitted on Honeywell forms.

d. NGIS shall be notified within 24 hours of any material, component, tooling, or hardware (including ATP) failure during manufacturing or testing. In addition, the supplier shall submit to NGIS written failure reports within 72 hours of any failure. Failure reports shall identify the failed item by serial number, part number and applicable revision letter. The supplier shall submit a failure analysis and corrective action report to NGIS within 15 days of any failure. The report shall include, as a minimum, the mode of failure, cause of failure, corrective action to be initiated, and a list of other parts affected. It is recognized that some failures may require more time to come resolution. In such cases, in lieu of the final failure analysis and corrective action report, the supplier shall submit an interim investigation status at 15 days, and additional status updates on a frequency that is mutually agreed upon by the supplier and NGIS, until a final resolution is obtained.

e. All articles, including associated documentation, rejected by NGIS and subsequently reworked to drawings, specifications, etc., shall bear indication of each resubmission. The accompanying documentation (discrepancy report, corrective action report, re-inspection data, etc.), as required, shall be identified in the same manner as the article.

12. All correspondence relating to particular articles shall reference the specification(s) and/or drawings(s) (including number and revision) and the purchase order number. All correspondence shall be directed to the NGIS Elkton Procurement Representative.

13. The inspections set forth in the drawings and specifications shall become part of Honeywell’s overall inspection system or quality program. The absence of any inspection requirements in the drawings or specifications shall not relieve Honeywell of the responsibility of assuring that all products or supplies submitted to NGIS for acceptance
comply with all requirements of the purchase order. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit NGIS to acceptance of such defective material.

14. Upon NGIS acceptance of first article inspection or first piece(s) inspection (as required), Honeywell is restricted to use only those suppliers of materials, components and services (i.e., sublet machining, molding, forming, etc.) that participated in the initial contract qualification. Supplier's quality program shall maintain a listing of these suppliers, corresponding to the product or service they provide, including the associated drawing or specification by which the material or service is controlled. At time of purchase, Honeywell’s quality program shall assure that only those suppliers who are qualified and contained in the listing are used for follow-on purchase.

Any change in supplier participation that deviates from these qualified suppliers shall be requested in writing from NGIS.

15. Honeywell shall maintain records necessary to show conformance with all requirements of the purchase order/subcontract. These records include, dimensional inspection records, process control charts, temperature recorder charts, x-ray film, nondestructive testing records, personnel certification documentation, nonconformance reports, process qualification data, pressure test records, and certifications of materials and special processes. The records shall be maintained for a minimum of 10 years after the date of completion of the hardware purchase order.

16. Honeywell shall be responsible for meeting all drawing/specification and approved fabrication process requirements. Any changes are expressly prohibited in processes, method, procedure, material formulation relating to times, temperatures, pressures, ingredients, equipment, manufacturing, testing, inspection or subtier suppliers without prior written notice to and approval by NGIS Quality Engineering in writing.

Honeywell shall immediately notify NGIS of any change to Honeywell’s facility location(s) for the production of the material herein.

a. Honeywell shall submit changes (Honeywell’s and Honeywell’s first tier suppliers) to NGIS for approval as defined in EIA 649, which will include the following:

   i. Changes that affect interchangeability
   ii. Changes that affect safety
   iii. Changes that affect producibility
   iv. Changes in first tier suppliers and special process suppliers
   v. Changes in processes and drawings
   vi. Changes in test and assembly tooling, and software
b. Honeywell shall require first tier suppliers to control their subtier suppliers, which shall include ensuring changes, as defined above, and included in Honeywell’s flow down, are submitted to Honeywell for approval. This requirement shall be verified by Honeywell by appropriate means and records of that verification maintained. Honeywell shall inform NGIS of their sub-tiers’ suppliers’ changes. NGIS’s review of those changes may be conducted, either on site at Honeywell, or at the sub-tier's facility, when accompanied by a Honeywell representative.

c. Engineering Changes

   i. A change that affects specified and approved requirements for product attributes including safety, reliability, and supportability.

   ii. A change that, after establishment of the baseline for the product design or implementation of the product design, that affects compatibility with interfacing products, including such products as test equipment, support equipment and associated software, programmable logic devices and/or firmware and products, or that affects one of the following:

      1. Delivered operation or servicing instructions
      2. Required calibration to the extent that product identification should be changed
      3. Interchangeability or substitutability of replaceable products, assemblies, or components
      4. Change to add a previously non-qualified supplier, where supplier selection is specified
      5. User skills or physical attributes
      6. Operator or maintenance training
      7. Changes which requires retrofit of delivered products; e.g., by product recall, modification kit installation, attrition, replacement during maintenance using modified spares
      8. A change that does not impact the above criteria and does impact cost/price including incentives and fees, guarantees, warranties, and contracted deliveries or milestones

 d. Process Changes

   i. Examples of process changes include but are not necessarily limited to:

      1. Material used to manage the process

      a. Chemical or physical properties
b. Optional material

c. Any change to subtier supplier (Ex. New subtier supplier)

d. The source of a material, sub-component, or outsourced operation

2. Procedure (routers, work instructions, etc.)

3. Acceptance test procedure

4. Test equipment

5. Use of any tooling that has not been in production for a period of one year or more

6. Rework, refurbishment or replacement of any portion of the tooling used to produce the item on the Purchase Order (this does not include consumable tooling). Any change in the manufacturing process that changes or alters the configuration, composition, or physical properties of the item produced.

7. Location of the internal or external site where some or all of the work is being performed, including movement of the production line equipment.

8. Ownership

9. Inspection techniques
   a. Reduction, increase, and etc.

10. Production line machine/equipment changes

11. Any change in the sub-supplier’s process, tooling or engineering

12. Process changes
   a. Sequence of an operation
   b. Method of an operation
   c. Adding or deleting an operation
   d. A change that does not impact the above criteria and does impact cost/price, including incentives and fees, guarantees, warranties, and contracted deliveries or milestones.

17. NGIS reserves the right to place quality assurance representatives (QARs) in Honeywell’s facilities, as deemed necessary, to ensure conformance with contractual requirements in any phase of design, processing, fabrication, testing, and inspection of the article(s) being
produced. Honeywell shall provide all reasonable facilities and assistance for the safety and convenience of such personnel in the performance of their duties. Such representatives shall be allowed full access to witness all operations involved in the fulfillment of this contract.

Honeywell shall grant the same access to representatives of the NGIS’s customer, when accompanied by NGIS personnel.

The supplier shall secure the same privileges from lower-tier subcontractors.

Honeywell reserves the right to escort NGIS or NGIS’s customers at Honeywell’s facilities and Honeywell’s supplier’s facilities

18. Inspection of designated dimensional characteristics or processes is mandatory and must be witnessed and/or verified by the NGIS QAR servicing the supplier’s facility. The QAR shall be given at least 24 hours’ notice (one business day) prior to the inspection, and 48 hours’ notice if the QAR is not in residence at the supplier’s facility. Any weekend work notification will be given by 1500 on the preceding Wednesday. Mandatory inspection characteristics may be waived at the discretion of the QAR or quality assurance engineer. When inspection or verification is waived, the supplier shall record “waived” on the inspection documentation adjacent to the waived characteristics and note the date of the waiver and the name of the NGIS representative granting the waiver. Mandatory inspection points are ATP, welding operations, and outline inspection.

19. Government inspection is required prior to shipment from your plant. Honeywell shall, upon receipt of a hardware purchase order, promptly notify the Government representative who normally services the Tempe plant so that appropriate planning for Government inspection can be accomplished. This requirement may be flowed down from the NGIS Elkton DCMA office.

20. All first tier special process suppliers used in the performance of this purchase order shall be approved by NGIS. If Honeywell elects to utilize special process sources other than those on NGIS’s approved supplier list, Honeywell shall provide evidence of approval by another NGIS aerospace facility or perform a survey using a survey questionnaire acceptable to NGIS and forward it to NGIS for approval. Honeywell shall have required approval(s) in place at the time of hardware processing.

The supplier is encouraged to submit the name(s) of intended special process suppliers to the buyer for consideration at the earliest practicable time. Honeywell prefers to use only Nadcap and AS9100 certified suppliers of special processes. In lieu of AS9100 certification, it is recognized that special process suppliers are permitted approval via demonstrated audit to Nadcap checklist AC7004. Honeywell shall perform annual surveys on all of their suppliers for the SM-3 program. Honeywell shall notify NGIS of its suppliers for key processes. Honeywell shall maintain survey results of all of its SM-3 vendors on site for NGIS review. NGIS will periodically review the list and request access to survey data as appropriate.

Special processes include but are not limited to: heat-treating; plating, passivation, and application of surface finishes; NDT (radiographic, magnetic particle, penetrant, and ultrasonic inspection); welding, soldering, and brazing.
Implementation plan: Reference example Attachment B with Honeywell provided listing of first tier special process suppliers. Any updates or changes to this listing shall require resubmission by Honeywell. The approval of this document indicates NGIS’s approval of Honeywell’s first tier special process suppliers for use on the SM-3 program.

21. Honeywell shall be responsible for compliance with all quality and technical requirements imposed by NGIS even when they subcontract part of the work. Honeywell’s responsibilities with respect to subcontracted work include:

- Transmission (flow down) of applicable quality and technical requirements to subtier suppliers
- Flow down of this provision to their subtier suppliers and verification that this provision has been properly implemented.
- Selection and control of subtier suppliers, unless otherwise specified in the purchase document.
- Assuring traceability of items processed through subtier suppliers

Honeywell’s shall assure that the purchase order to the subtier supplier requires sufficient acceptance data to clearly fulfill the requirements imposed by the NGIS purchase order to Honeywell.

Implementation plan: Reference Attachment A which is an example of how Honeywell meets this requirement to their subtiers.

22. Prior to fabrication of any deliverable item, Honeywell shall provide, for NGIS approval, the planned manufacturing, testing, and inspection procedures to be used in the fulfillment of this purchase order/subcontract. These procedures shall include, as applicable, drawings of special tooling that may be used for dimensional acceptance and plans for performing tests on raw, semi-finished, and/or finished materials, including special process techniques to be approved by a NDT Level III at NGIS. If Honeywell ASNT NDT Level III has approved special process techniques then NGIS approval is not required. These procedures shall document all operations that will be performed in conjunction with the fulfillment of this contract. If procedures have been previously submitted, a list of the previously approved documents that will be used, including the document title, name, revision, and approval reference, shall be submitted to the QAR, and to the NGIS buyer prior to use.

NOTE: “All assembly and test processes are controlled by the Honeywell Assembly drawing. Changes to assembly processes are allowed after NGIS approval of the Honeywell assembly drawing. Honeywell processes shall be available on-site for NGIS review. NGIS will review, at its discretion, the Manufacturing Work Instructions (MWI) after the assembly drawing change has been flowed to the MWI. Honeywell will provide the list of its MWIs to NGIS.”
Honeywell shall notify NGIS of changes to proprietary processes such as diffusion bonding. Upon NGIS request and with Honeywell in attendance, NGIS may visit and review vendor processes at the vendor

Honeywell is responsible for meeting all drawing/specification and approved fabrication process requirements. Honeywell shall immediately notify the buyer of any change to Honeywell's or its subtier's facility location(s) for the production of the material herein.

a. Prior to implementation, NGIS shall approve all Class I and Class II changes (see section 16) to drawings, planning, Acceptance Test Plans (ATP's), test plans, and processes at Honeywell and its first tier suppliers. At the beginning of the contract a baseline list of documents and revisions shall be established. Proposed changes to these documents shall be submitted to NGIS with full justification for the change. Honeywell shall support NGIS and NGIS's customer boards as required.

b. In addition, Honeywell's ATP's shall contain, as a minimum:
   
i. A list of all instrumentation, points of measurement, and accuracy of measuring system.

   ii. Test conditions.

   iii. Test sequence.

   iv. Test methods including a detailed step-by-step procedure of each test using instruments listed according to Item i. above. Supporting data for critical parameters or special equipment, such as: error analysis, schematic diagrams and panel layouts, which are not necessarily part of the procedure, but are required to adequately evaluate the procedure, shall be available at Honeywell for review.

NGIS's on-site quality representative may review and approve Honeywell’s standard sampling plan for inspection as required.

**Implementation plan:** Reference Attachment C for example of baseline spreadsheet. All changes to the Honeywell MWIs and TIs to the current revisions shall be submitted through Honeywell contracts to NGIS. Changes shall have the “is/was conditions” – NGIS will send formal approvals in a reasonable amount of time.

23. First Article Inspection is required on this purchase order. One-hundred-percent inspection of all dimensions, including tool-controlled dimensions, drawing notes, material callouts, and specification requirements, shall be performed on the first part produced. A first article inspection, meeting the requirements of AS9102, is required to establish; compliance with governing drawings, specifications, processes, and procedures to be employed, and specific program requirements for the control of quality that will assure the acceptability of the articles. FAI shall be performed to the NGIS Elkton-approved Honeywell outline and assembly drawings and provided as part of the Acceptance Data Package for those end item units. Subcomponent part First Articles shall be reviewed by NGIS’s resident Quality
Engineer as part of the certification review for those parts. Results of those FAIs shall remain as part of the certification record at Honeywell. For First Article Inspection of the Outline requirements, the resident NGIS Quality Representative may specify units for initial FAI.

**A new first article inspection shall be required when:**

- A significant design or process change has been made that affects the original first article and is applicable only to those characteristics affected by the change. An incremental first article will be performed, which will be applicable only to those characteristics affected by the change.

- The item has not been produced for a period of 12 months or longer.
- A change in facilities utilized to produce the article has taken place.
- New, damaged, reworked or revised special tools, gages or equipment, when dimensional control of manufactured articles is affected.

24. Honeywell shall establish procedures to implement a Foreign Object Damage (FOD) Prevention program using NAS412 as a guideline. The program shall be proportional to the sensitivity of the product(s) design to FOD, as well as, to the FOD generating potential of the manufacturing methods. Existing Honeywell practices and procedures that meet specific requirements shall be documented and submitted to the NGIS’s resident Quality Engineer for review and concurrence.

The procedures shall include the following elements as a minimum:

- Guidance on practices that, when followed, will eliminate damage caused by foreign objects during manufacturing, rework, and assembly and test, including but not limited to:
  - Inspection of materials and components on receipt at the work station for cleanliness and damage, and ensuring that they are clearly and properly identified;
  - Continual cleaning of finished and in-process materials and the surrounding work area as part of the normal in-process work effort;
  - Steps in shop documentation to check for the presence of FOD.
  - Wearing attire that is appropriate for the specific work area – by both operators and transients – including removal of all personal items, including jewelry (e.g., rings, watches, necklaces, earrings, badges), and restraining of all eyewear and ear protection;
  - Elimination or limiting FOD-causing processes;
  - A program to prevent tools, accompanying documents, and other items necessary to the manufacture of the item from becoming foreign objects; and

- Ensuring that items not necessary to the manufacture of the item are not introduced into the work area

- Establishment and maintenance of a training program for the FOD program.

- Identification of those categories of employees who require FOD training.
25. Honeywell is responsible for assigning serial numbers as specified on the hardware drawings. Non-critical parts such as nuts, bolts, washers, and AN fittings shall be bought to commercial or military standards.

26. Honeywell shall control all inspection and test equipment used for acceptance of deliverable items covered by the PO in accordance with ANSI-Z540-1 or comparable standard. Honeywell’s calibration system is subject to review and approval by NGIS Quality Assurance at all times during the performance of the PO.

Special tools and special gages and equipment which are used for dimensional control and acceptance in lieu of inspection by standard methods or standard gages and equipment shall be designed and maintained to assure repetitive compliance to governing drawings within the specified tolerance zone(s) of the dimension(s) being controlled or accepted.

Non-standard instrumentation calibration procedures shall be kept at Honeywell for NGIS review.

27. Honeywell shall signify conformance to requirements of drawings and specifications by submitting a certification package (logbook) containing, as a minimum, the information described below. Initialed data corrections are permitted. NGIS Elkton cannot accept material unless the certifications are complete and correctly executed.

a. The logbook shall be prepared and made available sufficiently in advance of NGIS Quality’s final inspection of the hardware to allow proper evaluation of its contents. The submittal target should be at least 48 hours prior to shipment and the logbook shall be shipped with the deliverable item. Hardware shall not to be shipped until all necessary certifications have been reviewed and approved.

b. A Certification of Conformance. The certification shall include, for each item covered by the certification, the following minimum information:
   i. Purchase order number
   ii. Part number and revision and serial number of the item supplied, as specified on the purchase order
   iii. A statement that the certified item meets all drawing, specification, and/or purchase order requirements Certificate for “No Pure Tin Finishes”: Electronic, electrical, electromechanical and mechanical piece parts and assemblies, including the internal fabrication of hardware, delivered to NGIS under the provisions of this Purchase Order shall not have pure tin finishes. Additionally, any tin-lead (Sn-Pb) plating or solder process/processing shall result in a finish of no less than 3% lead composition.

Note: This applies to component leads and terminations, carriers, bodies, cages, brackets, housings, mechanical items, hardware (nuts, screws, and bolts), etc. This does not apply to MIL-SPEC parts, or non-metallic parts (e.g., heat shrinkable tubing, ceramic balls, elastomeric seals, etc.).
Seller shall provide a Certificate of Conformance (C of C) with each shipment. The C of C shall mean that the Seller or Seller’s agent has verified that delivered product meets the above listed composition requirements, or the material meets at least one of the following provisions

a. Seller or Seller’s agent has contacted the Original Equipment Manufacturer (OEM) and verified that the specific Mfr / Lot Date Code of delivered product meets the specified minimum lead (Pb) requirement if Tin (Sn) is present in the product.

b. Seller or Seller’s Subcontractor has verified by actual sample testing (X-ray Fluorescence testing is preferred) or other industry acceptable method that a minimum of 3% lead (Pb) is present in any process that uses Tin (Sn).

Seller shall be responsible for managing the compliance with this requirement with subcontractors or sub-tier suppliers, and provide evidence of the appropriate flow-down and management of this requirement to the satisfaction of the Buyer or designate.

Unless otherwise specified in the quality attachment, all exceptions must be authorized in writing by the NGIS Buyer.

iv. Signature of the Quality Assurance Manager or other responsible member of the supplier’s company (a typed name with title on a computer generated document is an acceptable substitute for signature).

**Note:** Test reports or other supporting documents generated from a computer system with a statement of validity without additional signatures will be accepted providing the certificate portion of the data packet is signed or stamped as outlined above.

c. **As Built Configuration Identification Record** containing, as a minimum for each required part: the find number, description, part number, revision, traceability information, and MRB information. (It is recognized that Honeywell’s system does not automatically trace to the drawing revision level, and that the data provided will be extracted manually.) (See attachment D for list of required parts and recommended table format.)

d. **As-Built vs. As-Designed Configuration Summary** containing, as a minimum for each required part: the assembly level, as-designed part number and current revision, description, as-built part number and revision for the current unit, and comments reflecting the change from the as-built to the as-designed. (It is recognized that Honeywell’s system does not automatically trace to the drawing revision level, and that the data provided will be extracted manually.) (See attachment D for list of required parts and recommended table format.)
e. A copy of the SAP As-Built BOMs and corresponding Nameplate and Configuration Index (NDCs) for 3269656-12, 3255314-11, 3255315-12, 3255315-13, and 3255316-5, including TECOs,

f. A listing of applicable Honeywell Process Documents, those listed in Attachment C, and their respective revision levels shall be included with the Logbook. The listing shall include reference to the NGIS document approving each listed Process Document. The term Process Document includes Work Instructions, Travelers, Planning Documents, Routings, and Test Procedures. When the Supplier utilizes NGIS approved subcontracted first tier special process suppliers in the performance of this purchase order, a listing of those Process Documents with revision level shall be included with that Logbook listing.

g. Acceptance Test Procedure (ATP) data
   i. In addition, for the TSRM ACS Cold Gas Regulator, the Certification Package from the Honeywell sub tier supplier.

h. Interface Control Document (ICD) compliance inspection, as approved by NGIS and per the requirements on the Honeywell Outline drawing. Objective evidence of successful completion of this inspection shall be presented and maintained in the SAP inspection report for the item.

i. Material Review Board (MRB) activity – This section of the logbook shall present clear relationships between the presented nonconformance documents (QN or RMRA), any associated corrective action request forms (CARFs), and NGIS approval letters. (See Attachment E for recommended MRB index format.)

j. Special issues and/or testing data including, if applicable, PET testing with results

In addition Materials and Process Certifications shall be submitted to the NGIS quality representative for review and approval prior to shipment. This review and approval will not in any way reduce the supplier’s responsibility for complete conformance to contractual requirements.

**Final Acceptance will be based on inspections and tests, including ATP-2. NGIS reserves the right to reject shipments that are found defective as a result of NGIS Receiving Inspection.**

**For example of logbook contents list see Attachment F.**

28. **Traceability.** Parts, components and materials included in the deliverable product will be traceable to their source and to all available objective evidence of acceptability. Parts will be marked with the part number (including dash number), revision, and serial number and/or lot number.

29. **Statistical Process Control (SPC).** Honeywell is encouraged to develop, document and implement a process control and improvement plan for material supplied on this purchase order. Applicable processes should be evaluated using SPC techniques (capability studies) in order to ensure that problems are detected early and that the quality and reliability of physical and functional attributes at all levels of assembly are maintained. NGIS on-site representatives will be allowed to review at their discretion.
30. Risk Management and Metrics. Honeywell shall establish and maintain a risk management program to continuously identify, analyze, mitigate, monitor, and report systems engineering, process, product, technology, schedule and other program risks. Risks may also include cost impacts. Metrics shall be developed to document the effectiveness of the risk management program. Results of the risk management process shall be used for continuous improvement and risk reduction. NGIS on-site representatives shall be allowed to review at their discretion in case of events where schedule and delivery are critically impacted. Otherwise, risk management status shall be presented as part of regular program management review meetings.

31. Soldering. Soldered devices shall comply with the requirements of IPC/EIA J-STD-001E Class 3, as modified below, unless otherwise specified on the Purchase Order:

- Solder alloys Sn60Pb40, Sn62Pb36Ag2, and Sn63Pb37, shall be in accordance with J-STD-006.
- Solder alloys other than Sn60Pb40, Sn62Pb36Ag2, and Sn63Pb37 shall not be used for electrical and electronic assembly soldering unless otherwise specified on the drawing or purchase order.
- 100% X-Ray inspection shall be performed on Ball Grid Arrays (BGAs) and Bottom Terminated Components (BTCs) and components with Bottom Thermal Plane Terminations (D-Paks) unless they are part of a documented process control program approved by NGIS and noted on the purchase order.
- When NiPdAu (nickel / palladium / gold) is used as a surface finish where the gold is applied either through electroless or electrolytic processes resulting in over 8 micro inches of gold, there shall be objective evidence, made available for review, that there are no gold related solder embrittlement issues.
Honeywell Aerospace flows down AS9100 standard requirement such as FAIRs, Quality system requirements, MRB, certification of compliance, counterfeit parts control and foreign object damage (FOD) control in the Honeywell Supplemental Purchase Order Conditions (SPOC) Manual. SPOC 419 specifically describes to the sub tier the Counterfeit Parts Control and Prevention requirements the suppliers are required to comply to. Unique Customer Contractual requirements are contained in unique flow-downs created by the program Customer Quality Engineer for that particular program. The following is an example of a flow-down for the SM-3 program.

SM-3 STD

GENERAL REQUIREMENTS

AS STATED IN GENERAL SECTION 1.0 OF THE HONEYWELL SPOC MANUAL; SPECIFICALLY 1.2.1 AS FOLLOWS

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ALL SUPPLIERS ARE REQUIRED TO FLOW THE FOLLOWING SM-3 PROGRAM SPECIFIC REQUIREMENTS TO THEIR SUB TIER SUPPLIERS. IN ADDITION, THE SUPPLIER SHALL BE RESPONSIBLE FOR VERIFYING THE SUB-TEIR SUPPLIERS ARE COMPLIANT TO THESE REQUIREMENTS AND THEIR SUB TIER SUPPLIERS ARE RECEIVING THESE REQUIREMENTS AND ARE ALSO COMPLIANT TO THESE REQUIREMENTS. THESE REQUIREMENT MUST BE FLOWED TO THE LOWEST LEVEL SUPPLIERS. COMPLIANCE TO THIS REQUIREMENT WILL BE AUDITED BY HONEYWELL AND HONEYWELL’S CUSTOMERS

====

ALL QUALITY RECORDS TO BE RETAINED INDEFINITELY, INCLUDING BUT NOT LIMITED TO, MATERIAL AND PHYSICAL CERTIFICATIONS, BUILD RECORDS/BOMs, C of Cs, NDT RECORDS/CERTIFICATIONS, TEST DATA, CHART DATA DURING FURNACE RUNS

====

IF A GAP IN PRODUCTION OF THIS HARDWARE LONGER THAN A YEAR HAS OCCURRED, THEN A FULL FAIR MUST BE COMPLETED PRIOR TO SHIPPMENT OF NEW LOT.

====

MDA ALERTS;

THE SUPPLIER SHALL RESPOND FORMALLY TO ANY MDA ALERTS PROVIDED BY HONEYWELL WITHIN FIVE DAYS. RESPONSES WILL BE SENT TO THE HONEYWELL BUYER AND THE SM-3 TEAM. IF THE SUPPLIER RECEIVES MDA ALERTS FROM OTHER SOURCES WHICH IMPACTS HONEYWELL SM-3 HARDWARE THE SUPPLIER MUST ALSO INFORM THE HONEYWELL BUYER AND THE SM-3 TEAM.

====

ELECTRONIC, ELECTRICAL, ELECTROMECHANICAL, AND MECHANICAL PIECE PARTS AND ASSEMBLIES, INCLUDING THE INTERNAL FABRICATION OF HARDWARE, DELIVERED TO HONEYWELL UNDER THE PROVISIONS OF THIS PURCHASE ORDER SHALL NOT HAVE PURE TIN FINISHES. ADDITIONALLY, ANY TIN-LEAD (SNPB) PLATING OR SOLDER PROCESS/PROCESSING SHALL RESULT IN A FINISH OF NO LESS THAN 3% LEAD COMPOSITION.

THIS APPLIES TO COMPONENT LEADS AND TERMINATIONS, CARRIERS, BODIES, CAGES, BRACKETS, HOUSINGS, MECHANICAL ITEMS, HARDWARE (NUTS, SCREWS, AND BOLTS), ETC.

THE SUPPLIER SHALL PROVIDE A CERTIFICATION OF CONFORMANCE (C OF C) WITH EACH SHIPMENT STATING “NO PURE TIN FINISHES” HAVE BEEN USED IN THIS PRODUCT. MATERIAL/PROCESS CERTIFICATIONS/CERTIFICATES OF CONFORMANCES SHALL BE INCLUDED IN THE DATA PACKAGE THAT VERIFY COMPLIANCE TO THIS REQUIREMENT

====

NO PROCESS AND OR MANUFACTURING CHANGES ARE AUTHORIZED WITHOUT PRIOR HONEYWELL APPROVAL: CONFORMANCE (OR COMPLIANCE) TO THIS REQUIREMENT SHALL BE CLEARLY ANNOTATED ON THE SUPPLIER’S C OF C.

DEFINITION OF CHANGE IS AS DESCRIBED IN EIA 649 AS FOLLOWS:

f. PROCESS CHANGES
   a. Example of process changes include but are not necessarily limited to:
      1. Material used to manage the process
         i. Chemical or physical properties
         ii. Optional material

Honeywell Internal
iii. Any change to sub-tier supplier (Ex. new sub-tier supplier)
iv. The source of a material, sub-component or out-sourced operation

2. Procedure (routers, work instructions, etc...)
3. Acceptance test procedure
4. Test equipment
5. Use of any tooling that has not been in production for a period of one year or more
6. Rework, refurbishment or replacement of any portion of the tooling used to produce the item on this Purchase Order (this does not include consumable tooling). Any change in the manufacturing process that changes or alters the configuration, composition, or physical properties of the item produced.
7. Location of the internal or external site where some or all of the work is being performed, including movement of the production line equipment.
8. Ownership
9. Inspection techniques
   i. Reduction, increase, and etc.
10. Production line machine/equipment changes
11. Any change in the supplier’s or sub-tier supplier’s process, tooling or engineering
12. Process changes
   i. Sequence of an operation
   ii. Method of an operation
   iii. Adding or deleting an operation
   iv. A change that does not impact the above criteria But
       Does impact cost/price, including incentives and fees, guarantees, warranties, and contracted deliveries or milestones, Shall also be submitted for approval

==== SHELF LIFE REQUIREMENTS:

NO EXTENSION OR MODIFICATION TO THE ORIGINAL MANUFACTURER’S DOCUMENTED SHELF LIFE REQUIREMENTS SHALL BE ACCEPTABLE WITHOUT HONEYWELL AND HONEYWELL’S CUSTOMER’S APPROVAL OF A PLAN FOR VERIFICATION OF MATERIAL INTEGRITY PRIOR TO MATERIAL USE OR IMPLEMENTATION. TRACEABILITY OF SHELF LIFE DATES TO ITEMS THE MATERIAL WAS APPLIED TO IS ALSO REQUIRED

==== CERTIFICATIONS SHALL BE MARKED WITH DATE CODES AND PROGRAM IDENTIFIER – SM-3

==========
NO HANDWRITTEN SERIAL NUMBERS ARE ALLOWED.
HANDWRITTEN SERIAL NUMBERS ON TAGS, LABELS OR ANY OTHER LABELING CONVENTIONS ON THE OUTSIDE OF BAGS CONTAINING DETAIL PARTS OR END ITEMS WILL NOT BE ACCEPTED. INK STAMP OR ELECTRONIC METHODS ARE ACCEPTABLE.

==========
ALL CERTIFICATIONS INCLUDING DIPS MUST BE LEGIBLE.
HANDWRITTEN ENTRIES MUST BE CLEAR AND LEGIBLE ON ALL CERTIFICATIONS, ITEMS THAT ARE NOT LEGIBLE WILL BE REJECTED BACK TO THE SUPPLIER. ELECTRONIC ENTRIES ON DIPS AND OTHER CERTIFICATIONS IS THE PREFERRED METHOD

==========
ELE CERTS

Honeywell Internal
CERTIFICATIONS SHALL BE SUBMITTED ELECTRONICALLY, AT THE TIME OF EACH SHIPMENT, TO THE FOLLOWING ADDRESS:


FOLLOW THESE INSTRUCTIONS:

GO TO DEXCENTER THEN GO TO THE GROUP HEADING AND CLICK ON THE DROP DOWN LIST AND SELECT THE PROGRAM FOR WHICH YOU ARE SENDING CERTIFICATIONS, SUCH AS, SM-3, ATLAS, RL10, CASTOR 120 or IVB, MK-21 ATP, CVN/PMEMA, AFFF, OBV, IRBM, TARUS, DSC, J2X, LCS2, SR-19, NDS, PHALANX THEN CLICK ON THE NAME OF THE PERSON THAT COMES UP UNDER THE PROGRAM NAME

CERTIFICATION AGAINST COUNTERFEIT PARTS/ HARDWARE

ALL MATERIAL AND HARDWARE, INCLUDING RAW MATERIAL, SHALL BE ORDERED FROM APPROVED SOURCES/ PER FAR CLAUSES. CERTIFICATIONS SHOWING TRACEABILITY TO THE RAW MATERIAL THROUGH ALL PROCESSES AND/OR ASSEMBLY PROCEDURES SHALL BE REQUIRED AS PART OF THE DATA PACKAGE ENTERED INTO DEXCENTER. HARDWARE WILL NOT BE ACCEPTED BY HONEYWELL IF THESE CERTIFICATIONS ARE NOT ENTERED INTO DEXCENTER PRIOR TO HARDWARE SHIPMENT TO HONEYWELL

A COMPLETE CERTIFICATION PACKAGE SHALL INCLUDE THE PART NUMBER IDENTIFIER, FAIR AND / OR DIP, PROCESS CERTIFICATIONS, BILL OF MATERIAL (BOM) DOWN TO THE LOWEST DETAIL, INCLUDING CERTIFICATIONS OF CONFORMANCE. EACH SHIPMENT SHALL CONTAIN A COPY OF THE CERTIFICATION OF CONFORMANCE AND EVIDENCE OF SOURCE INSPECTION IF THE SUPPLIER DOES NOT HAVE SELF RELEASE APPROVAL.

IN ADDITION ALL CERTIFICATIONS SHALL CONTAIN THE FOLLOWING STATEMENT “THE REPORTED RESULTS REPRESENT THE ACTUAL ATTRIBUTES OF THE MATERIAL FURNISHED AND INDICATE FULL COMPLIANCE WITH ALL APPLICABLE SPECIFICATIONS AND CONTRACT REQUIREMENTS”

IN ADDITION TO THE STANDARD CERTIFICATION PACKAGE AS DESCRIBED ABOVE, FULL MATERIAL CERTIFICATIONS ARE ALSO REQUIRED

FULL TRACEABILITY REQUIRED TO BE MAINTAINED FROM RAW MATERIAL THROUGH DETAIL AND ASSEMBLIES

CERTIFICATION AGAINST COUNTERFEIT PARTS ELECTRICS

NO BROKERED PARTS

BROKERED PARTS ARE NOT AUTHORIZED FOR USE ON THIS PROGRAM. ITEMS THAT HAVE ALREADY BEEN PROCURED FROM AN "UNAUTHORIZED DISTRIBUTOR OR BROKER" (NOT AN OEM/OCM OR AN AUTHORIZED OEM/OCM DISTRIBUTOR) WILL BE SUBMITTED ON AN RMRA FORM AS A PURCHASE ORDER NON-CONFORMANCE THROUGH E-CATS. IN ADDITION TO MRB APPROVAL ITEMS MUST BE APPROVED FOR USE ON THIS PROGRAM BY HONEYWELL ENGINEERING AND QUALITY ALONG WITH CUSTOMER APPROVAL AS NOTED ON THE RMRA. NOTIFICATION AND APPROVED RMRA FROM HONEYWELL BUYER IS REQUIRED PRIOR TO SHIPMENT OF GOODS

NO FOREIGN

NO FOREIGN PROCUREMENT ALLOWED (INCLUDES SINGAPORE) EXCEPT FOR QUALIFYING COUNTRIES AS ALLOWED BY DFAR 252-225.

NO MRB

THERE IS NO SUPPLIER MRB AUTHORITY ON THIS PROGRAM.

NO PART / MATERIAL SUBSTITUTION IS AUTHORIZED: USE OF GEN EO 1005 OR GPS 1031-ALL REVS; IS STRICTLY PROHIBITED FOR ALL SPACE AND MARINE PROGRAMS

NO PROCESS SUBSTITUTION IS AUTHORIZED: USE OF 41-8612, GPS 1010-1 OR ASI AEROSPACE INDEX LIST, IS STRICTLY PROHIBITED FOR ALL SPACE AND MARINE PROGRAMS

SPOC LIST

Honeywell Internal
The following additional SPOCs also apply to this order: 172,

FOR THE FOLLOWING PART NUMBERS SPOC 277 ALSO APPLIES
3255281-2
3255340-4
3255329-1
3255342-3

==========
ATTACHMENT B
# Special Process Suppliers

**Dated: October 29, 2015**

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<tr>
<th>Name</th>
<th>Service provided</th>
<th>Specifications</th>
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<td>Micro Tronics</td>
<td>EDM machining</td>
<td>None called out on drawing</td>
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<td>ChemResearch</td>
<td>Plating</td>
<td>GPS-3118-1</td>
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<td>Micro Tronics</td>
<td>Copper Braze</td>
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<td>High Energy Weld</td>
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<td>Electroless Nickel Plate</td>
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<td>Annealing</td>
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<td>G W Lisk</td>
<td>Non Destructive Testing (NDT)</td>
<td>MIL-STD-1907</td>
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<td>Braze</td>
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<td>Weld</td>
<td>AMS-STD-2219</td>
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<td>Tube Specialties</td>
<td>EDM machining</td>
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<td>Mears</td>
<td>Passivation</td>
<td>QQ-P-35</td>
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<td>Tram Tec</td>
<td>Anodizing</td>
<td>None called out on drawing</td>
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<td>Liquid Penetrant Inspection</td>
<td>None called out on drawing</td>
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<td>Heat Treat</td>
<td>None called out on drawing</td>
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<td>CAD</td>
<td>E-Beam weld</td>
<td>AMS 2681</td>
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ATTACHMENT C
## TSRM MWI Status Sheet Dated: NOV. 13, 2018

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<th>TSRM ACS</th>
<th>Product Name</th>
<th>MWI Date</th>
<th>MWI Current Released Revision</th>
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<tr>
<td>3255316-5</td>
<td>Pilot Valve Assembly</td>
<td>05/10/2017</td>
<td>Rev U</td>
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<tr>
<td>3255314-11-900</td>
<td>Cold Gas Regulator Sub Assy.</td>
<td>04/08/2013</td>
<td>Rev -</td>
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<tr>
<td>3255315-12</td>
<td>Thruster Valve Assy.</td>
<td>05/10/2017</td>
<td>Rev W</td>
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<td>3255315-13</td>
<td>Thruster Valve Assy.</td>
<td>05/10/2017</td>
<td>Rev T</td>
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<tr>
<td>3258399-3</td>
<td>Bonded Stack</td>
<td>10/01/2018</td>
<td>Rev G</td>
</tr>
<tr>
<td>3258399-6</td>
<td>Bonded Stack</td>
<td>11/13/2018</td>
<td>Rev B</td>
</tr>
<tr>
<td>3257997-4</td>
<td>Pitch Thruster Manifold</td>
<td>04/18/2013</td>
<td>Rev B</td>
</tr>
<tr>
<td>3257998-4</td>
<td>Yaw Thruster</td>
<td>02/18/2011</td>
<td>Rev A</td>
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<tr>
<td>3257995-4</td>
<td>Diverter Valve</td>
<td>05/21/2014</td>
<td>Rev D</td>
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<tr>
<td>3255314-11</td>
<td>Cold Gas Regulator Assy.</td>
<td>02/20/2015</td>
<td>Rev C</td>
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<tr>
<td>3269657-12</td>
<td>TSRM Valve Assy.</td>
<td>06/02/2017</td>
<td>Rev F</td>
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<th>Product Name</th>
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<th>TI Current Released Revision</th>
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<td>Cold Gas Thruster Valve Assembly</td>
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<td>Rev D</td>
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<td>3255315-13</td>
<td>Cold Gas Thruster Valve Assembly</td>
<td>07/10/2017</td>
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<td>08/29/2007</td>
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<td>Yaw Thruster</td>
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<td>Rev B</td>
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**EXAMPLE**
ATTACHMENT D
As Built/As Designed Summary  
ACS S/N

<table>
<thead>
<tr>
<th>TITLE</th>
<th>PART/ID NUMBER</th>
<th>AS DESIGNED REVISION</th>
<th>SERIAL NUMBER</th>
<th>AS BUILT REVISION</th>
<th>AS BUILT REV DESCRIPTION</th>
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<td>SM3 TSRM ACS OUTLINE</td>
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<td>SM3 TSRM ACS ASSEMBLY</td>
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<td>THRUSTER VALVE ASSEMBLY</td>
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<td>THRUSTER VALVE ASSEMBLY</td>
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<td>PILOT VALVE ASSEMBLY, ACS</td>
<td>3255316-5</td>
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<td>VALVE ASSEMBLY PITCH/YAW, TSRM ACS</td>
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<td>MANIFOLD, THRUSTER, PITCH</td>
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<td>MANIFOLD, THRUSTER, YAW</td>
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<td>COLD GAS REGULATOR ASSY</td>
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<td>COLD GAS REGULATOR ASSY (SUB ASSY)</td>
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ATTACHMENT E
Example of Recommended MRB Record Format for TSRM ACS Logbook

ACS MRB Index

ACS S/N:

<table>
<thead>
<tr>
<th>Affected Part/Assembly</th>
<th>PART ID NUMBER</th>
<th>SERIAL or LOT#</th>
<th>Nonconformance #</th>
<th>OA Letter#</th>
<th>Description/Reference</th>
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</table>
SM-3 ACS Logbook List of Contents

- 3255314-11-900-Cold Gas Regulator Assembly Data package which includes The CGR C of C(Including the statement “No Pure Tin Finishes”), AP 9021-6, Inspection Reports/DIPs, FAIRS, Material Certifications, Process Certifications and test data
- SAP BOMs for all of the following 3269656-12(the ACS Outline) 3255314-11, 3255315-12 and 3255315-13 which will have the follow items recorded on them: all Traceability data including Serial Numbers and or lot/date codes, TECO, RMRA and QN numbers.
- 3269656-12 As Built As Design Record Per ES 105 Attachment D
- 3269657-12(Outline only) SAP Inspection Report which will also include SAP Fit Check Inspection Record.
- 3269656-12 -C OF C (Including the statement; “No Pure Tin Finishes”) and Shipper
- 3269656-12 -Final ATP data sheets and ATP2 Data sheets
- 3269657-12 /3269656-12- Per ES 105 Attachment E list of all MRB/QNs/RMRAs ON MRB Index List. Also include Actual Copies Of All MRB items including all QNs, CARF Forms, RMRAs, TECO, PET with complete supporting data and Customer approval if required
- For 3269656-12, 3255314-11,3255315-12, 3255315-13, and 3255316-5 Include the Name Plate and Data Configuration Index(NDC)