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SIGNATURES OF APPROVAL

Title:	Name:	Date:
Quality Manager	electronic	electronic
Supply Chain Manager	electronic	electronic

Approval Signatures Electronic

REVISIONS

Rev.	Date	By	Change	Page(s) Affected
NONE	12/11/2018	R. GOODEMOTE	INITIAL RELEASE	ALL

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1 APPLICABLE DOCUMENTS:

PS-00001, Enidine Supplier Requirements, QC 12, Frozen Manufacturing Control Plan
BPS-P-170, Boeing Process Control Requirements For Fasteners, Bearings And Bushings and Related Products
SQRM-001, Bell Helicopter, Supplier Quality Requirements Manual
FM1001071018, ITT Enidine One Way Non-Disclosure Agreement
FM1001071016, ITT Enidine Two Way Non-Disclosure Agreement

2 PURPOSE:

Frozen plan secures all manufacturing plans, materials and processes to prevent changes that could result in unintended consequences that could affect conformity to design and test requirements. A plan is considered “locked down” upon submission of first article, and “frozen” upon approval of a first article test by the customer. The objective is to ensure that all manufacturing materials, practices and procedures that been used to manufacture components and/or products that have demonstrated conformance to design, specification and performance requirements will not change for all future production.

3 SCOPE:

This “Frozen Manufacturing Control Plan” and requirements stated herein are applicable when Enidine Variable Quality Code “QC 12” is specified on the Enidine Purchase Order. All requirements apply to component parts and assemblies purchased and these requirements shall be flowed down to all sub-tier suppliers as appropriate.

4 REQUIREMENTS:

Requirements:

PROCESS CONTROL DOCUMENT (PCD'S) – Fully and completely define manufacturing processes required to manufacture a component part or assembly, restricting or controlling process changes and variations that could affect product realization. The PCD may be in any form or format provided all required elements stated herein are addressed. **NOTE: the typical Control Plan format captures most if not all required elements.**

- a. The PCD shall be part, part series and/or part family specific and shall document the sequence of operations used in the manufacture of the part, indicating which operations and process parameters affect Key Characteristics.
 - (1) All information including raw material controls, individual operations, plant or facility site for all operations (if different than that of the qualified manufacturer), controls, testing, etc., must be fully documented or referenced in the PCD and approved by Enidine Quality Engineer.
 - (2) Appropriate proprietary and Non-Disclosure Agreements between the manufacturer and Enidine shall be in place prior to qualification.

- b. Applicable Key Characteristics and specification limits are identified by Enidine on the part drawing or specification. The manufacturer shall monitor Key Characteristics and identify Key Process Parameters using

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Statistical Process Control. Additional Key Characteristics may be identified, as deemed necessary by the manufacturer to ensure process control.

- c. The creation and maintenance of the PCD is the responsibility of the manufacturer.
- d. The PCD shall identify those materials, processes and sequences, equipment and settings, inspections, facility locations for all operations, all specific out sourced or sub-contracted operations with specific processors names and addresses, etc., involved in manufacturing a specific part, part family or part series. The level of details contained within the PCD shall be such that the manufacturing plan/router for a specific part can be derived from the PCD. When applicable, and subject to review and approval by Enidine Quality Engineer, Controlled Process Parameters (CPP), including the upper and lower process settings shall be established and documented.
- e. The original version of the PCD shall reflect the manufacturing process utilized for the qualification lot of parts for which approval was granted. A copy of the original PCD used to produce qualification parts shall be maintained for the duration of time the manufacturer is listed as an approved manufacturer on the part standard.
- f. All modifications to manufacturer's operations that affect established process parameters or sequences shall be documented. All modifications or changes to operations or changes in sequencing of operations require Enidine Quality Engineering approval. All manufacturing lots shall be traceable to a specific PCD revision level.
- g. The manufacturer is responsible for verifying that there have been no process modifications from the original qualification requirements or Quality Conformance requirements, as specified on the Enidine part drawing or relevant specifications. The scope of the testing shall be coordinated with Enidine Quality Engineer prior to beginning. Tests performed and the data obtained to verify that the modifications are acceptable shall be submitted to Enidine Quality Engineering in a formal report along with a request for a revision to the PCD. This data shall be maintained by the manufacturer and shall be available for Enidine review upon request. A copy of the Enidine approval shall become a permanent part of the PCD.
- h. The PCD shall reflect the current manufacturing practices.
- i. The PCD shall be treated as proprietary information of the manufacturer. Copies of the PCD are not required to be kept at Enidine but are subject to Enidine and their customers review at any time.
- j. Parts produced by a process other than as documented in an approved PCD shall be deemed nonconforming, documented via the manufacturer's Internal Non-Conformance System and subject to the manufacturer's internal quality system and engineering review process. All dispositions related to the non-compliant product will require Enidine Quality and Engineering review and concurrence. Parts reworked within the defined limitations and requirements of the Enidine part specification where the rework has been documented with the manufacturer's internal non-conformance record are not subject to PCD control in regards to sequencing.

PCD CONTENT AND CONTROL

The PCD, at a minimum, must include the following sections:

1. Part Number
2. Revision
3. Manufacturer Name and physical address where manufacturing occurs.
4. Flow Chart, or defined sequence of all operations, (including sub-contracted processes),
4. Raw Materials Control, sources, specification,
5. Manufacturing Control
6. Manufacturing Operations

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7. Sub-Contractors Name and physical address where any sub-contracted manufacturing or processing occurs.

8. Inspection / verification steps with method and frequency

FLOW CHART

The Flow Chart section may include a diagram of all the steps in the manufacturing process clearly noting Key Process Parameter (KPP) and Controlled Process Parameter (CPP). Flow chart shall note specific locations for SPC (or other process monitoring activities) and which operations will/or may be performed by an outside processor. The flow chart shall note which operations might be subject to a revised sequencing at the discretion of the manufacturer to facilitate production. Manufacturers shall designate on the flow chart which operations are significant. Manufacturers' designated operations are subject to Enidine Engineering approval.

RAW MATERIALS CONTROL

The Raw Materials Control Section shall include the following:

- a. A list of the applicable raw material specification(s) utilized to manufacture the product. It shall include or reference the manufacturer's specific requirements for acceptance (e.g. grain size, tensile, yield and elongation properties), form of raw material (e.g. wire or bar stock), starting diameter and finish (e.g. dry film lube, copper strike, etc.).
- b. A list of approved raw material suppliers, with physical address.

MANUFACTURING OPERATIONS

The Manufacturing Operations section shall include all necessary manufacturing process control information. The manufacturers' internal process control documents may be referenced in lieu of duplicating the same detailed information again in the PCD provided the documents are revision controlled and a copy of the document is available for review by Enidine. The manufacturers' internal process control documents referenced in the PCD shall be considered a part of the PCD. The minimum required information is as follows:

- a. Designate all manufacturing operations that may be subcontracted.
 - (1) Any subcontracted operations including testing, shall be specifically listed in the PCD and shall include the flow down of all requirements. The subcontractor's company name and address for each specific process shall be included.
 - (2) Include receiving inspection requirements for all outside processing receipts.
 - (3) All manufacturers utilizing outside processing for designated significant operations shall ensure the outside processors have documented their processes on a manufacturer approved PCD or a revision controlled procedure which shall be referenced in and shall become a part of the manufacturer's own Enidine approved PCD.

Exceptions to this will be for BAC or BMS processes which have a specific Enidine QPL.
- b. Designate any CPP, KPP or process subject to SPC, (or other process control activity).
- c. Include where in process inspection and testing shall occur.
- d. Blanking process used (e.g. headed or forge) and whether cold forming or with elevated temperature. If elevated temperature is used, specify temperature range. Specifically how the temperature will be controlled.
- e. Heat treatment process. Specify all solution and aging temperatures. Specify minimum hardness or shear requirements. Specify specific furnaces to be used.
- f. All cleaning processes employed.
- g. Specify which processes utilize machining operations and which use a grinding operation.
- h. All fillet rolling or cold working operations. Where applicable specify all controls such as, dwell times, pressures, etc.

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- i. Tapping or thread roll process controls. Where applicable specify elevated temperature ranges, room temperature operations, pressures feed rates, etc.
- j. Specify all surfaces treatments and inspection processes.
- k. Designate all outsourced inspection and testing requirements. Sampling plans shall be provided for both. All sub-tier inspection/testing is subject to Enidine approval.
- l. Designate at which operations all in process part counts will be performed.
- m. Disposition of non-conforming material and rework procedures.

5 PCD CONTROL AND APPROVAL OF CHANGES:

No changes to the Frozen Plan requirements or sequence shall be made by the Supplier/Processor without Enidine approval prior to performing applicable operation(s). In the event that a change to the planning shall be required, a request for change shall be submitted to the Enidine Buyer and written approval shall be received by the Supplier prior to continuation of work.

