



**GE Renewables**  
Wind Materials Engineering

PROCESS SPECIFICATION

**P28A-WE-0004**

Page 1 of 31

**GE CLASS II (INTERNAL CRITICAL)**

**SUPPLIER QUALITY REQUIREMENTS**

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## **SUPPLIER QUALITY REQUIREMENTS**

### **TABLE OF CONTENTS**

1. **SCOPE**
2. **APPLICABLE DOCUMENTS**
3. **DEFINITIONS**
4. **REQUIREMENTS**
  - 4.1 Introduction
    - 4.1.1 Purpose
    - 4.1.2 General Guidelines
    - 4.1.3 Communication
  - 4.2 Quality System
    - 4.2.1 Minimum Quality System Requirements
    - 4.2.2 Control of Special Process
    - 4.2.3 Record Retention
  - 4.3 Supplier Approval
  - 4.4 Supplier Qualification
    - 4.4.1 General Requirements
    - 4.4.2 Subtier Suppliers
    - 4.4.3 First Piece Qualification (FPQ)
    - 4.4.4 Pilot Lot Qualification (PLQ)
    - 4.4.5 Characteristic Accountability and Verification (CAV)
    - 4.4.6 Critical-to-Quality Characteristics (CTQs) & Reporting Process Capability
    - 4.4.7 Process Risk Assessment
    - 4.4.8 Product Safety Risk Assessment
    - 4.4.9 Detailed Drawing, Manufacturing and Producibility Review
    - 4.4.10 Manufacturing Process Plan
    - 4.4.11 Product Quality Plan
    - 4.4.12 Specific Item Type Qualification Requirements
    - 4.4.13 Qualification Documentation



4.4.14 Qualification Approval Form

4.5 GE Supplier Policies & Requirements

- 4.5.1 GE Policy for Specification Transmittal to Suppliers
- 4.5.2 Source Inspection and Test Witness Requirements
- 4.5.3 Supplier Deviation Request (SDR) Procedure
- 4.5.4 Corrective Action Procedure and Requirements
- 4.5.5 Packaging and Preservation Requirements-
- 4.5.6 Supplier Manufacturing Location Change Requirements
- 4.5.7 Process Capability Checks On-going
- 4.5.8 Preventive Maintenance

5. **SUPPLIER ENGINEERING CHANGE CONTROL**

6. **NOTES**

ADDENDUM A - Electronic Qualification Book



## **SUPPLIER QUALITY REQUIREMENTS**

### **1. SCOPE**

- 1.1 This specification provides the General Quality Requirements for all GE Renewables external direct material suppliers with the exception of GE Nuclear Energy, GE Water & Process Technologies, and GE Oil & Gas which will be governed by their business specific supplier quality requirements. This specification applies to all purchased direct material and services used in GE Renewables delivered goods and services.

### **2. APPLICABLE DOCUMENTS**

- 2.1 The following documents form a part of this specification to the extent specified herein. Alternate applicable business-specific specifications will be communicated to Supplier as required (examples, ASME, API). Unless otherwise indicated, the latest document revision shall apply.

#### **2.1.1 General Electric Company**

D50A152	Alternate Materials Approved for Manufacture of Power Generation Commercial Orders
D50A155	Alternate Materials Approved for Manufacture of Specific Parts for Turbines and Generators
P28A-AL-0203	Nondestructive Testing Process Qualification and Approval
P28A-AL-0001	Critical-to-Quality (CTQ) Process Capability Data Collection
P23E-AL-0255	General Requirements - Marking, Preservation, Packaging and Shipping Specification
P29A-WE-0001	Acceptability Limits for Wind Turbine Blades
P29B-AL-0001	Visual Inspection Requirements for Weldments
398A1729	Supplier Engineering Change Control

#### **2.1.2 International Standards**

ISO 9001	Quality Management Systems Requirements
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## 2.2 Hierarchy of Documents

- 2.2.1 Supplier - the Purchase Order is the governing document, which transmits GE Renewables requirements to the Supplier.
- 2.2.2 In the event of a conflict between documents, the order of precedence from highest to lowest is as follows:
- Purchase Order Part Drawing (unless by note, the drawing specifically defers to a specification as the overriding document)
  - Part Acceptance Specification
  - Part Process Specification
  - Material Specification
  - General Requirements Specifications

## 3. DEFINITIONS

### 3.1 Entities

- 3.1.1 Supplier - Unless noted otherwise, refers to the corporation, company, partnership, sole proprietorship or individual with whom GE Renewables places a Purchase Order.

External Suppliers - Entities outside of GE Renewables who provide goods or services to GE Renewables

Internal Supplier - Any GE Renewables manufacturing facility

- 3.1.2 Purchaser - The GE Renewables business, or its business associate.
- 3.1.3 Supplier Quality Engineer (SQE) - GE Renewables representative who communicates the qualification and production quality requirements, and is the key interface with the supplier relative to qualifications, process improvements, non-conforming material dispositions, corrective actions, and surveillance auditing. For the purposes of this document, the roles and responsibilities of the SQE shall apply to the Product Quality Engineer (PQE), Quality Process Engineer (QPE) or other business equivalent Global Supply Chain Management (GSCM) representative.



- 3.1.4 Sourcing Representative - GE Renewables representative who negotiates price, delivery, terms and conditions, and places the purchase order for qualification and production. The Sourcing Representative is also the official contact between the supplier and GE Renewables.
- 3.1.5 Responsible Engineer – GE Renewables Engineering representative who is responsible for participating and approving within the qualification process, and/or for reviewing all nonconforming issues for Engineering design approval, and coordinates disposition with the SQE for return response to the Supplier. For the purposes of this document the Responsible Engineer applies to the Design Engineer, Materials Engineer, Welding Engineer, Repair Engineer, or other Engineering representative assigned to the review of the nonconformance, document change or qualification. Any communication with the Responsible Engineer must be done with the knowledge of the SQE.

### 3.2 Other Terminology

- 3.2.1 Containment - Actions taken to minimize the risk to GE Renewables or its customers associated with a nonconformance. Containment actions can be focused on the product in which the nonconformance was detected as well as focused on similar products or product families in which the nonconformance may occur.
- 3.2.2 Correction - Action to eliminate a detected nonconformance, defect or other undesirable situation.
- 3.2.3 Corrective Action - Action taken to eliminate the cause(s) of an existing nonconformance, defect or other undesirable situation to prevent recurrence.
- 3.2.4 Field Service Notice (FSN) - A Field Service Notice documents nonconformances identified by GE Renewables field engineers and authorizes the field to perform warrantable equipment repairs. Examples include Power Answer Center (PAC) Cases or business approved equivalents.
- 3.2.5 Frozen Process - A manufacturing method, process, procedure or control that was approved by the GE Renewables Qualification Team. The connotation of a “Frozen” process is typically reserved for a Type A and B1 commodity or process.
- 3.2.6 Manufacturing Process Plan (MPP) - A detailed, step-by-step list of operations and requirements by which components or services are manufactured.



- 3.2.7 Non-Destructive Testing (NDT) - Analysis techniques used to evaluate properties of material, component or system without causing damage. Typical methods would include ultrasonic, magnetic-particle, liquid penetrant, radiography, eddy-current testing, etc.
- 3.2.8 Preventive Action - Action taken to eliminate the cause(s) of a potential non-conformance or undesirable potential situation to prevent occurrence.
- 3.2.9 Product Quality Plan (PQP) - A detailed, step-by-step list of operations and requirements in which a supplier identifies a process of how, what, why, when and who will perform tests or inspections and the applicable acceptance criteria. This may also be referred to as an Inspection and Test Plan (I.T.P.).
- 3.2.10 Qualification Package - All required documentation for qualification.
- 3.2.11 Repair - A type of correction performed to a nonconformance that reduces but not completely eliminates the nonconformance(s) such that the product is determined to be usable for its intended purpose.
- 3.2.12 Request for Design Change - A document submitted by the Supplier to request GE Renewables Engineering's approval prior to implementing a change in design for the supplier or its subtier supplier. Ref: 398A1729.
- 3.2.13 Request for Information (RFI) - A request initiated by the supplier to receive clarification on purchase order technical requirements (drawings, specifications, engineering instructions, etc.)
- 3.2.14 Rework - A type of correction performed to a nonconformance that completely eliminates the nonconformance(s) such that the product is determined to be conforming to specification or requirement.
- 3.2.15 Scrap - A disposition for nonconforming product that is not useable for its intended purpose and that cannot be economically reworked or repaired in an acceptable manner.
- 3.2.16 Special Process- A process by which results cannot be fully verified through subsequent nondestructive inspection and testing of the product and where processing deficiencies may become apparent only after the product is in use. Additionally, processes that require operators of that process to be qualified and certified to be able to conduct the process and meet technical regulations and standards are considered special processes.
- 3.2.17 Supplier Deviation Request (SDR) - A request initiated by the supplier to deviate from purchase order technical requirements (drawings, specifications, engineering instructions, etc.) or the approved qualification package.





- 3.2.18 Unusual Visual Condition (UVC) - A material supplied with a physical or visual appearance that is inconsistent with typical or expected product appearance or industry norms (example: atypical discoloration allowable per engineering drawing or specification, evidence of rework/repair that is not usually found on this part family, etc.)
- 3.2.19 Item Type Classifications - Categories into which GE Renewables production or repair components/materials are classified. These categories are A, B1, B2, C, G and R. Determination of specific item classification type is made by the GE Renewables qualification team.

**Type A** Metallurgical or chemically intense process or product with significant potential impact on the safe operation, performance or reliability of the machine or system. These items are typically GE RENEWABLES-designed and requiring one or more special processes.  
Examples: Investment castings, forgings, large castings, metallic raw material, and rotor bolting.

**Type B1** Moderately complex components or assemblies that have no or limited special processes. These components may be designed by GE Renewables per detail drawings or designed by the supplier to a GE Renewables functional specification.  
Examples: Fabrications, complex machined components

**Type B2** Same as B1 except typically assigned to components that are customer specific, or of limited production volume where process changes by the supplier would not be anticipated.  
Examples: Auxiliary skids, project specific fabrications

**Type C** Less complex, CAV Controlled parts with little impact on safe operation, performance or reliability or components controlled on the industry level. Simple assemblies or components with limited machining and some standard measuring devices.

**Type G** Item Type G components are all other general items which do not require a Type A, B, or C Qualification and require no qualification activity. These are simple components with limited impact on overall operation of the GE final assemblies, and where the overall cost for GE Renewables to qualify the part is deemed greater than the overall impact risk of failure of the part, or the overall value of the part. Examples include, components available to other companies to purchase (i.e. "off the shelf") which require little or no customization in order to meet GE Renewables' drawing or



specification requirements, supplier catalog items, simple machine parts, standard measuring devices and parts and materials defined per the Engineering Materials & Processes Information Service (EMPIS)

**Type R** Controlled repair items with qualifications defined within the applicable Repair Resource Substantiation, with a required revision to controlled MPP.

Note: GE Renewables Engineering may require some Supplier Designed hardware to implement , "SUPPLIER ENGINEERING CHANGE CONTROL" defined in 398A1729. This designation is in addition to and independent of the qualification Class Type defined above. See section 5 for details.

## 4. **REQUIREMENTS**

### 4.1 Introduction

- 4.1.1 **Purpose** - The purpose of this Supplier Quality Requirements specification is to establish a set of procedures, practices and expectations pertaining to the quality of items purchased by GE Renewables. The requirements set forth herein will ensure a consistent, quality based relationship between GE Renewables and all its direct material suppliers.
- 4.1.2 **General Guidelines** - It is the responsibility of the supplier to define and implement a detailed quality system that ensures all products supplied to GE Renewables are of the highest quality possible by conforming to GE Renewables drawings and/or applicable specifications, and meeting all the requirements set forth in this document. Any applicable industry standards (such as ANSI, AGMA, API, etc.) must also be incorporated into the system. This system must be made available to GE Renewables for review upon request.
- 4.1.3 **Communication** - The GE Renewables purchase order designates the Sourcing Representative who is the primary contact with the supplier for commercial issues. The SQE is the primary quality and technical contact and will be assigned by Sourcing Quality management as appropriate. Changes to purchase order requirements shall not be accepted by the supplier without a formal purchase order change, an approved SDR or through cleared non-conforming material reports (e.g., NCN). The supplier must identify and notify GE Renewables of its designated point of contact for the quality related activities.



## 4.2 Quality System

- 4.2.1 Minimum Quality System Requirements - The supplier must maintain a documented quality system to ensure control and conformance to the requirements of GE Renewables' drawings and specifications. GE Renewables requires that this quality management system meet the requirements of the current ISO 9001 (Quality management systems – Requirements) standard or an equivalent applicable standard (as determined by GE Renewables). Compliance to this requirement must be demonstrated if requested by GE Renewables by either of the following:

Provision of a copy of a current certification(s) if requested, or

Successful completion of a quality management systems audit to the current requirements of ISO 9001. GE Renewables reserves the right to require this audit to be conducted by a third party service designated by GE Renewables. The supplier will be responsible for all costs of the audit directly to the auditing party.

- 4.2.2 Control of Special Processes – Exceptions to the following require approval of the qualification team.

Suppliers must have specific, documented and controlled procedures for each special process performed. The supplier shall establish process CTPs/CTQs and monitor them. Only personnel qualified/certified for the job shall be assigned to perform a special process. The supplier must develop a specific training plan and check the performance of the individual associate on a regular basis. Special processes include, but are not limited to:

1. Alloy Composition Check Method
2. Babbitting of Bearings
3. Brazing
4. Composite Processes
5. Coatings
6. Die casting
7. All forms of Non-Destructive Testing/Examination (NDT/NDE)
8. Electroplating/Plating
9. Forging and hot forming
10. Heat treatment
11. High-alloy cold forming
12. Hydrostatic testing



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13. Investment casting
14. Laser Drilling, Cutting and Marking
15. Non-conventional machining – e.g. grinding, STEM drilling, ECM (Electro-Chemical Machining), EDM (Electro-discharge machining)
16. Macro etching
17. Melting and raw material production
18. Nitriding/carburizing/boriding
19. Pickling, Etching, Chemical Cleaning
20. Painting and surface preparation
21. Passivation Process
22. PCBA (Printed Circuit Board Assembly) and PCB (Printed Circuit Board) manufacturing
23. Rubber Lining
24. Sand casting
25. Shot blasting/peening including GASP (to enhance mechanical or performance properties)
26. Soldering
27. Spin Pits – Cold Spin, Hot Spin
28. Stamping (metal forming)
29. Super-alloy machining / grinding
30. Tenon Peening
31. Thermal cutting of QT steels
32. Welding

#### 4.2.2.1 Process Specific Approval Requirements

##### **Welding**

For suppliers and sub suppliers performing welding as a primary value added process, certification as a qualified fabricator is required. This certification may be performed by a third party, as required by GE Renewables, and may include:

- AWS (American Welding Society) Certified Fabricator
- ASME (American Society of Mechanical Engineers) boiler and pressure Vessel Fabrication Stamp Holder
- CWB Certification
  - Major proof of qualification (Class E) in accordance with EN 1090 part 2 “Steel structures, execution and manufacturer qualification”
- PED (Pressure Equipment Directive) Certification
- AISC (American Institute of Steel Construction) Certification



- Other suitable certifying bodies as determined by GE Renewables

### **NDE**

Suppliers, including sub-tier suppliers, performing NDE shall be qualified in accordance with P28A-AL-0203, as applicable. Submittal of procedures for review and approval may be required.

- 4.2.3 **Record Retention** - The supplier shall have a written procedure for the documentation and retention of quality and product records for products supplied to GE Renewables. The record retention period shall be a minimum of ten (10) years unless otherwise specified by GE Renewables. Records shall include, but are not limited to, product quality or inspection and test plans and results, material specifications, qualification documentation and certificates of conformance. Specific component record requirements may be specified in GE Renewables purchase orders, contracts or specification. It is the responsibility of the supplier to determine the appropriate storage means to meet the retention requirement and allow for timely retrieval of records.

### 4.3 **Supplier Approval**

In order to receive a GE Renewables production purchase order, a supplier must be *approved* per GE Renewables Global Sourcing Quality Management System procedures. Criteria for approval could include, but is not limited to, the following: properly executed Mutual Non-Disclosure Agreement (MNDA), acknowledgement of compliance with GE Renewables integrity guidelines, completion and passing of required business and technical surveys, a documented quality system, technical capability, EHS compliance/employment/security practices, financial viability, customer service aptitude, and strategic value. The supplier approval process is performed prior to a purchase order being issued to the supplier. When the approval process has been successfully completed, a supplier code will be issued to the supplier.

### 4.4 **Supplier Qualification**

- 4.4.1 **General Requirements** - When approved, the supplier must be qualified for a specific process, part or commodity family. Through the qualification process, the supplier demonstrates ability to provide high quality parts in accordance with requirements and expectations of the GE Renewables business purchasing the material. Qualification requirements are defined and documented by a GE qualification team. The supplier is required to perform the qualification using the documented qualification requirements as communicated



by the SQE. Once the qualification requirements have been completed to the satisfaction of the qualification team, and the supplier has received the signed Supplier Qualification Approval form (6.2.3.A), the supplier is then considered qualified to provide the specific process, part or commodity family.

Qualification is required in, but not limited to, the following cases:

- (1) A new or existing supplier is manufacturing production material for the first time for GE Renewables.
- (2) A design or process change has occurred at the supplier or at GE Renewables, changing the processing, form or function of the product.
- (3) An existing supplier or critical subtier supplier changes its manufacturing location.  
Note: Reassessment of supplier approval will also be required when a manufacturing location is changed.
- (4) Quality issues arise at the supplier, putting current qualifications into question.
- (5) As required by GE Renewables.

4.4.2 Subtier Suppliers - If a supplier chooses to outsource a process, the supplier is fully responsible for qualifying and surveillance of all subtier suppliers to GE Renewables requirements and notifying GE Renewables of this qualification. GE Renewables reserves the right to 1) review the supplier's process for selection, qualification, and surveillance of subtier suppliers, 2) to approve, or disapprove, subtier supplier qualifications, 3) audit and monitor the subtier supplier's processes and facilities when deemed necessary. This requirement also applies if the supplier is a sales representative or distributor that procures from subtier suppliers for manufactured parts or assemblies.

The planned use and manufacturing location of any subtier supplier must be clearly identified in the MPP during the qualification process. Upon successful completion and qualification of the primary supplier, the subtier supplier identified as part of that qualification must not be changed without prior approval from GE Renewables. This requirement shall also be applicable to GE Renewables -directed subtier suppliers.

4.4.3 First Piece Qualification (FPQ) - When required as part of a qualification program, an FPQ must be performed. This requires the supplier to manufacture a first piece of the item as outlined in the applicable GE





specifications and/or as defined by the appropriate Supplier Quality and Engineering personnel. First Piece Qualification documentation must be submitted to GE Renewables for review and approval.

Upon successful completion of the FPQ, a supplier may request release of the material for shipment to GE Renewables, for production. Confirmation of this release must be documented and placed with the item to be shipped, as well as retained for the supplier's record. If the qualification program has been successfully completed, the supplier will receive an approved qualification form 6.2.3.A from the SQE. If the qualification program has not been completed, this release must be received from the SQE in the form of an approved SDR, a supplier surveillance report (SSR), or other business specific document for accepting material noncompliant with GE Renewables specifications and/or procedures prior to shipment. Materials shipped without written authorization from the qualification team will be considered non-conforming material and may be shipped back to the supplier at their expense, or incur additional labor backcharges to the supplier.

- 4.4.4 Pilot Lot Qualification (PLQ) - A pilot production lot may be required as determined from GE specifications or processes. In addition, the qualification team may require a pilot lot or additional pilot lot testing to verify control of the supplier's processes upon final qualification.
- 4.4.5 Characteristic Accountability and Verification (CAV) - When required by the qualification program, a CAV form must be completed and maintained by the supplier. The CAV form must include, at a minimum, the following items:
  - 1) Identification of components
  - 2) Characteristics and feature accountability
  - 3) Inspection and test results
  - 4) Manufacturing Planning
  - 5) Production Product Acceptance Criteria

Product acceptance criteria must be established during the qualification process review of the CAV form. Once the level of inspection and product acceptance requirement has been determined and specified on the CAV form, it must be applied to all production components hereafter to ensure controlled processes for maintaining drawing features and characteristics.



- 4.4.6 Critical-to-Quality Characteristics (CTQs) and Reporting Process Capability - Suppliers must provide process capability for CTQs and CTPs identified on drawings or in specifications, or as requested by the qualification team per specification P28A-AL-0001 Critical-to-Quality Process Capability Data Collection.
- 4.4.7 Process Risk Assessment - When required by the qualification program, the supplier must perform a risk assessment of its manufacturing, and quality assurance processes to evaluate the effectiveness of these processes to consistently produce the component, or provide the qualified service. The appropriate cross-functional supplier personnel must perform this risk assessment with the assistance and participation by the GE Renewables Qualification Team members as necessary. One format for this assessment is a Failure Modes & Effects Analysis (FMEA).
- 4.4.8 Product Safety Risk Assessment – Supplier must perform a safety risk assessment for any supplier designed product in accordance with the principles defined by ISO 12100-2010 and provide residual risk information to the GE Renewables Qualification Team.
- 4.4.9 Detailed Drawing, Manufacturing and Producibility Review - Prior to part manufacturing, the supplier may be required to participate in a detailed drawing review with the GE Renewables Qualification Team to ensure suppliers' thorough understanding of drawing requirements and specifications during the qualification process. For Supplier Designed, non-Build-to-Print (Functional Spec/Sourcing Controlled) type A, B1 and B2 items, the supplier may be required to participate in an Engineering Capabilities Assessment and Supplier Design Reviews with the GE Renewables Qualification Team
- 4.4.10 Manufacturing Process Plan

An **MPP** must, at a minimum contain the following information:

- 1) A list of all applicable GE drawings/specifications, ordering sheets, outline drawings, and special process specifications/instructions along with the latest revision letter/number. For build to specification items the supplier shall provide a list of all supplier drawings and revisions.
- 2) List of Weld Procedure Specifications (WPS) and Process Qualification Records (PQR) used in the manufacture of the part.





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NOTE: Welders and procedures must be qualified in accordance with ASME Section IX or similar governing agency specified on purchase order from GE Renewables business.

- 3) Identification of all component parts and sources.
- 4) Identification of all critical subtier suppliers and their manufacturing locations. Critical subtiers include but are not limited to Raw Material and any special process supplier.
- 5) A sequence plan of all major and critical manufacturing and inspection steps with appropriate sign-off documentation. Supplier proprietary processes/documentation may be available for inspection/review by SQE and GE Renewables Engineering.
- 6) The manufacturing location
- 7) When applicable, a visual weld inspection procedure according to P29B-AL-0001
- 8) MPP shall include a revision history.

When the component is qualified, the MPP shall be considered part of the production purchase order requirements even if not explicitly referenced on the production purchase order. Further, this document should be treated as a quality document and revision controlled by the supplier.

#### 4.4.11 Product Quality Plan

The PQP must, at a minimum, contain the following information:

- (1) Clear identification of the item, component, or system to which the PQP is applicable
- (2) Listing of all technical documents that govern the inspection or test activity (i.e. supplier documents, GE specifications, industry codes/standards).
- (3) Identification of the test or inspection criteria in an itemized listing. Each line item must identify what is to be inspected (to the characteristic level), how it is to be inspected, what frequency it is to be inspected, when the inspection or test is to be performed (in the sense of the manufacturing process), who is to perform the inspection (e.g., Operator, Inspector, etc.), and the acceptance criteria. Each item must include provision for sign off by the party performing the inspection.
- (4) Identification of Project specific inspections and tests.
- (5) Completion of each inspection and test will be accompanied by appropriate sign-off documentation. Each inspection and test must be signed-off during the execution of the PQP.



- (6) Clear definition of GE Renewables and customer involvement in the inspection and test activities. This includes but is not limited to in-process inspections, customer witness and hold points, document reviews and GE Renewables and/or customer release inspections.
- (7) Identification and verification of CTQs and inspection methods. CTQs can be identified by purchase orders, specifications, drawings, or by the appropriate GE Renewables Qualification team.
- (8) Detailed planning of packaging and preservation for shipment and storage (refer to P23E-AL-0255).

The PQP or ITP may be included as part of the MPP or submitted as a separate document. In all cases, the PQP must be approved by the SQE. Further this document should be treated as a quality document and revision controlled by the supplier.

#### 4.4.12 Specific Item Type Qualification Requirements

##### 4.4.12.1 Type A Qualification Requirements

Special control of the MPP applies. The supplier shall submit a MPP for review and approval by the GE Renewables qualification team. This includes any imbedded or separately referenced special process procedures. Following successful qualification, a 6.2.3.A form will be issued to the supplier and the process will become a “Frozen Process”. Any changes to the MPP or supplier designed components after this point need to be approved by GE Renewables using a Frozen Process Change Request. Approval will be granted via signed Form SPS-PSSQMF-0160 or 6.2.3.A Form.

GE Renewables Engineering may require some supplier designed hardware to meet the requirements of “Supplier Engineering Change Control” defined in 398A1729. Approval and any requested modifications of the “Frozen” Bill of Materials (BOM) shall be managed in accordance with Section 5 of this specification.

##### 4.4.12.2 Type B1 Qualification Requirements

An MPP must be submitted to GE for review and approval prior to manufacture of the product. The supplier must not change the MPP after completion of the qualification process without notifying and obtaining the approval of SQE. Form SPS-PSSQMF-0160 (Frozen Process Change Request), or equivalent is to be used to request MPP revision approval.



GE Renewables Engineering may require some supplier designed hardware to meet the requirements of “Supplier Engineering Change Control” defined in 398A1729. Approval and any requested modifications of the “Frozen” Bill of Materials (BOM) shall be managed in accordance with Section 5 of this specification.

#### 4.4.12.3 Type B2 Qualification Requirements

An MPP must be submitted to GE for a qualification team review and approval prior to manufacture of the product

#### 4.4.12.4 Type C Qualification Requirements

For material classified as Item Type C, a CAV form or equivalent is required. The CAV form will contain all characteristics as identified on the drawings and specifications.

#### 4.4.12.5 Type G Qualification Requirements

For Item Types considered as General, no formal Qualification is required by GE Renewables. This includes EMPIS materials, supplier catalog items, and other components defined above as “Other”. GE Renewables reserves the right to request and review suppliers’ quality and inspection data concerning these components; and to require a qualification if escaping defects are detected or if quality trends decline.

#### 4.4.12.6 Type R Qualification Requirements

A preliminary MPP must be submitted prior to repairing of the first piece/pilot lot to be approved by the Repair Engineer. Approval of the MPP prior to production release is required and approve/reject of the Frozen Process Change Request. Test and inspection results will be evaluated to assure all metallurgical and other technical requirements of the applicable specification are met prior to approval.

#### 4.4.13 Qualification Documentation

Qualification records, MPPs, material certifications, and related documentation records are subject to periodic review by GE Renewables. GE Renewables



also reserves the right to request submittal of these records at any time. Qualification documentation must be in English as a minimum.

For material shipped to a GE Renewables location, a CAV form or equivalent form is required at time of shipment of the part. This is only required on the first piece unless specifically required by the qualification team on subsequent orders or as indicated on the purchase order.

For material shipped directly to a GE Renewables customer site, a Supplier Compliance Summary may be issued and maintained as the quality document for each unit shipped. The compliance summary may include but is not limited to the following:

- (1) Major component nameplate information and serial numbers as applicable.
- (2) Completed MPP and PQP with appropriate signatures. This should be on file and need not be shipped with the unit.
- (3) Results of all functional test requirements.
- (4) Documented results of all CTQ measurements/verifications.

If required by the qualification team, an Electronic Qualification Book must be submitted in accordance with requirements as outlined in Addendum A. Any deviations from these requirements must be accepted at the discretion of the qualification team. Should a supplier need to ship material prior completion of the qualification the supplier must submit a SDR requesting "Request to ship unqualified material". As applicable the supplier shall attach all documentation to the SDR which supports the request.

#### 4.4.14 Qualification Approval Form

Upon successful completion of the qualification program and receipt of the Supplier Qualification Approval Form (6.2.3A), or equivalent, the supplier is released to fulfill subsequent purchase orders received from GE Renewables. This qualification form indicates that, at the time of qualification and based on data provided by the supplier, the manufacturing process used to produce the component(s) or perform a process was capable of complying with GE Renewables drawing and specification requirements. Qualification approval does not relieve the supplier of the full responsibility, on subsequent orders, to assure the manufacturing processes remain in control and the product or process supplied meets all drawing and specification requirements, unless formal, written approval for a deviation is obtained from GE Renewables via an SDR process.



#### 4.5 General Electric Supplier Policies and Requirements

##### 4.5.1 General Electric Policy for Specification Transmittal to Suppliers

4.5.1.1 It is incumbent upon the supplier to review with the Sourcing Representative and/or SQE the appropriate document retrieval methods that may be specific to their business. It is also the responsibility of the supplier to review specification revisions with the Sourcing Representative and/or SQE on a continuous basis to ensure that the correct revisions are being worked to. When suppliers receive a new purchase order, it is the supplier's responsibility to verify they have the latest revision of the specification called out on the drawings and purchase order.

4.5.1.2 Unless otherwise notified by GE Renewables, suppliers are required to implement specification revisions on all existing and future purchase orders except where parts have already entered the manufacturing process. Any exceptions to this policy must be negotiated between the GE sourcing representative and supplier. If the supplier does not have the latest revision of any relevant specification as described in the latest GE Renewables purchase order, it is the supplier's responsibility to request the latest revision of the specification.

##### 4.5.2 Source Inspection and Test Witness Requirements

4.5.2.1 GE Renewables and/or its customer may elect to inspect parts, and/or witness subassemblies at the supplier's facility during processing, testing, or at final inspection. All source inspection and test witness requirements are to be identified and coordinated through the GE SQE, Quality Assurance, quality representative or other designated representative.

4.5.2.2 It will be the responsibility of the supplier to notify GE Renewables in advance, when material will be ready for inspection. The timing of this advance notification will be at minimum 20 days (unless otherwise approved by GE Renewables) prior to any scheduled test/inspection/witness points.

4.5.2.3 GE Renewables and/or customer acceptance of product does not relieve the supplier of its obligations to supply components that meet drawing and purchase order requirements.

##### 4.5.3 Supplier Deviation Request (SDR) Procedure

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4.5.3.1 General Supplier requirements are:

- a. When a deviation to a requirement including a drawing, specification, MPP, packaging, or a material shortage is known or expected to exist, the supplier must submit a Supplier Deviation Request to the SQE or business specific designate using the assigned SDR system/process. If a deviation exists or could potentially exist, an SDR must be submitted and approved prior to shipping deviated parts.
- b. The supplier may not ship any deviated part before it is in cleared or closed SDR stage. GE has the right to request additional inspections and tests beyond applied drawing and specifications to prove deviated part's form, fit and function prior to SDR disposition.
- c. The SDR must contain detailed description, containment, probable source and proposed remedial action (when business directed) information as part of the initial submittal. Failure to supply all of the information as required may result in the SDR being returned to the Supplier for completion of the required information. If this rejection impacts fulfillment requirements charges may apply to the suppliers account.
- d. The supplier must immediately notify their GE Renewables Supplier Quality Engineer or GE Renewables Sourcing Department upon discovery of a deviation to the purchase order, including cases where deviating material has been shipped, is in transit or at GE Renewables
- e. No repair shall be performed on a deviation prior to disposition by GE.
- f. SDRs are "one-time" exceptions to GE Renewables requirements.
- g. The approved SDR applies to only the PO's listed on the SDR.
- h. Unless the SDR involves a drawing change, GE Renewables, expects the non-conformance(s) to be eliminated on subsequent deliveries.
- i. SDRs must be submitted by the supplier for approval of alternate materials, processes, to correct drawing/documentation errors or omissions and other deviations to the PO requirements.
- j. The supplier must utilize the SDR process to document any changes to Spare Part Lists, subcomponents or software even if it does not appear to change fit, form, or function within assemblies referenced on a GE procurement drawing that is changing due to supplier redesign, re-identification or obsolescence. The supplier is required to document each request for such changes, so that field personnel can readily tell that they have the correct component when the received component's identification matches the ordered replacement components.
- k. To request clarification on a GE drawing, specification or purchase order, the supplier may submit a Request for Information (RFI). No





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approvals to ship parts deviating from GE POs or Specifications can be granted through the RFI process.

- l. SDRs must be submitted by the primary supplier (the Seller on the Purchase Order). Any deviations (e.g. drawing changes, material substitutions, etc.) related to a subtier supplier's scope should must be submitted through the primary supplier.
- m. Alternate materials listed in GE Specifications D50A152 or D50A155 may be utilized in lieu of the specific material identified by the drawing or parts list unless specifically prohibited by the drawing or part specification.
- n. Note: The specifications identified in the preceding paragraph may not be applicable to all GE Renewables businesses. Confirmation with the SQE is required for applicability.

#### 4.5.3.2 Description

Where appropriate, the Supplier should provide a complete deviation description to include:

- the drawing/item number with zone of referenced area
- material specification
- special processes
- inspection results
- samples or photographs where applicable
- number of defects for the lot(s) of material
- specific purchase order numbers by part grouping
- serial numbers of the components
- estimated time to make correction(s)
- cost related issues

The supplier is to provide process capability charts and datasets to generate capabilities for the process, as requested by any GE Renewables representatives.

For serialized parts, the serial number(s) must be identified; for non-serialized parts, the specific purchase order(s) must be identified on the SDR.

In the event of any reported, observed or anticipated UVC(s) on a part, the Supplier must identify the UVC situation by clearly annotating UVC in the description within the SDR deviation details.



UVC shall be treated as deviation, unless GE Renewables is notified in advance. The advance notification by the supplier shall include:

- A description of how the material is deemed atypical of conforming material
- The reason for the deviation
- Substantiation for cases where the supplier considers the Unusual Visual Condition to be acceptable for use

GE Renewables reserves the right to reject the visually nonconforming material regardless of the content of the advanced notification.

#### 4.5.3.3 Containment

Containment is expected to be immediate when nonconformances are discovered, with all parts affected being contained. Containment actions apply to products, process and materials in which the non-conformance was detected as well as similar products or product families in which the nonconformance may occur. If the nonconformance is discovered during random audit, all inventory must be evaluated.

Containment at the supplier is expected to isolate (separate from normal production), insulate (inspect products to sort for defects at the supplier, in transit for shipment and at the customer site) and aid in control of risk related to the nonconformance. An effective containment process must document the supplier's efforts to verify control of its processes, (pre-production, production and post-production).

#### 4.5.3.4 Probable Source

The supplier provides the source of the problem considering the following as applicable:

- Situations involving the same or similar material, product, equipment, instrument or system abnormalities and inconsistencies in the process
- Environmental conditions (e.g., temperature, humidity, light)
- Trends associated with equipment performance or specifications
- Cause code and deviation category

#### 4.5.3.5 Proposed Remedial Action





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Where applicable, suppliers to GE Renewables should provide a rework or repair concept plan for all deviating products and services prior to disposition. Also, provide a rework, repair, or accept as is recommendation.

Where rework or repair is not possible, substantiation should be provided.

Proposals should include:

- Identified risks that would adversely impact the product
- Planned completion date
- Estimated time (labor) required to complete correction

The supplier shall have a positive identification plan, which ensures deviations and or corrected and or conforming materials are appropriately identified.

The Supplier must document and show evidence to GE Renewables that the remedial actions have been executed. GE Renewables will validate that the remediation execution eliminated the deviating condition or met the disposition requirements.

- 4.5.3.6 If requested by the SQE, the supplier must send a copy of the approved SDR along with the part(s) at the time of shipment. Additional markings, or "Green tags" may also be required at the discretion of the SQE.

#### 4.5.4 Corrective Action Procedure and Requirements

When requested by the GE Renewables SQE, the supplier shall perform a formal root cause analysis and identify containment, corrective, and preventive actions. Corrective Action Requests that remain open longer than the specified period may result in disqualification of the supplier.

Corrective action is intended to:

- a. Prevent the recurrence of the problem
- b. Avoid creation of further product or process issues

As a minimum, corrective action is necessary when:

- a. The production process is incapable or inconsistent
- b. There is a potential issue with machine, tooling, or fixturing



As required or requested, supplier corrective action plans should contain as a minimum the following:

- Containment Action(s) - Execution of containment plans
- Process capability as requested by GE
- Descriptions and cycle time of previous remediation performed or total duration to complete remediation
- Root cause analysis utilizing 6 sigma methods (e.g. 8-D)
- Long term process changes that will likely eliminate the causes
- Owner and Target date for implementation and completion
- Any identifiable risk items to the product or process that may impact GE Renewables or its customers

All corrective action plans shall have approval by GE Renewables prior to execution and follow all GE Renewables supplier quality requirements.

Any deviation from the corrective action plan shall require approval from GE Renewables.

All identified corrective actions shall be completed and validated for effectiveness prior to closure of the deviation request.

Preventive actions are taken to eliminate the cause(s) of a potential non-conformance or undesirable potential situation to prevent occurrence. The supplier must provide and maintain objective evidence that the actions have been accomplished

If the deviation is incorrectly charged to a supplier, this should be denoted on the corrective action request and sent to both the Sourcing representative and the SQE.

#### Validation of Corrective Action(s)

Corrective Actions must be documented and validated through objective, factual evidence to assure that the root cause(s) have been eliminated.

Validation may take many forms such as:

- data
- records
- revised or developed procedures



- observations
- production quantities

Upon request, all supplier related processes, training, specification and / or drawing changes shall be documented and made available to GE Renewables and the supplier prior to closure

Validation must be documented by the SQE as effective after implementation of the Corrective Action, prior to closure.

#### 4.5.5 Packaging and Preservation Requirements

Preservation and Packaging must be in accordance with GE Renewables drawings and specifications P23E-AL-0255 unless otherwise specified in the purchase order, or approved through the qualification process. GE Quality must approve any changes to the qualified packaging procedure.

#### 4.5.6 Supplier Manufacturing Location Change Requirements

All suppliers are required to notify their respective Sourcing representatives and SQEs in the event the supplier's manufacturing location changes from that specified on the approved MPP for a given item. Notification must take place prior to manufacturing product and must be in writing. GE Renewables reserves the right to reject any and all products not meeting the location requirements stated on the qualification form and/or approved MPP. The supplier will be responsible for shipping and handling charges that will be applied to any products rejected for this criterion. This requirement also applies to sub-tier supplier relocations.

#### 4.5.7 Process Capability Checks On-going

The supplier must as a minimum, measure and record data for all CTQ / CTP / KCPs identified on the drawings, specifications and by GE Renewables representatives. The supplier must regularly analyze the CTQ / CTP / KCP data for process capability and supply periodic reports to the SQE. Under the direction of the SQE, the supplier may be requested to execute improvement projects based on the process capability analysis. Refer to specification P28A-AL-0001 for CTQ details regarding supplier responsibilities, definitions, data analysis, and reporting requirements.

#### 4.5.8 Preventive Maintenance



The supplier shall establish and implement a preventive maintenance program for all product specific (GE funded) tooling. This shall include cleaning, inspection, repair and small refurbishment (spotting, cleanup of parting lines, replacement of damaged tool components, etc.).

Major repairs and tool replacement are to be handled on a case-by-case base by GE Renewables purchaser.

## 5. SUPPLIER ENGINEERING CHANGE CONTROL

### 5.1 General Requirements

GE Renewables Engineering may require some Supplier designed hardware to implement “Supplier Engineering Change Control” defined in 398A1729. When applicable this designation will be incorporated in the supplier’s qualification program and will be identified by a note in the ordering drawing or functional spec as follows:

“Design Change Control. The Supplier shall implement the requirements of change control as specified in 398A1729.”

The Supplier is required to:

1. Implement a Configuration Management System to ensure the control of the engineering definition of the product being developed, manufactured and supported in the field.
2. Submit a Bill of Materials (BOM) as part of the First Piece Qualification that will represent the product delivered with each subsequent order.
3. Submit a Request for Design Change (RDC) to GE for approval prior to implementing any changes to the qualified product.
4. Ensure that all subtier suppliers maintain configuration control on components supplied and any design changes be approved via RDC’s.
5. Maintain the “Frozen” or qualified BOM and all subsequent RDC’s on file for review and audit by GE Supplier Quality Engineers.

### 5.2 BASELINE IDENTIFICATION.

The baseline BOM is defined as the Bill of Material, down to its detailed component level, at the time of the supplier design review (per 4.4.8) as part of the for First Piece Qualification and prior to entering production. If the Supplier change requirement is added after production is begun, the baseline can be the BOM “snapshot” of current production if agreed by GE Renewables Engineering.



### 5.3 RESPONSIBILITY & PROCEDURE

#### 5.3.1 DESIGN SUPPLIER

The design vendor or supplier will submit copies of the Request for Design Change (RDC) to the responsible GE Renewables Supplier Quality Engineer via the “Supplier Deviation Request” (SDR) tool, or equivalent identified by the GE Renewables business. The change shall NOT be implemented until approval is received from GE Renewables. The supplier will maintain the approved design change documents and updated BOM in records available for audit.

#### 5.3.2 GE Renewables Supplier Quality Engineer

The Supplier Quality Engineer will forward the Supplier RDC to the responsible GE Design Engineer for disposition. The SQE will add the approved BOM and all subsequent RDC’s to the Qualification records by GE part number.

#### 5.3.3 GE Renewables Responsible Engineer

Will provide disposition including requesting additional data or a detailed review. Disposition shall be provided via the SDR tool or equivalent per 398A1729.

### 5.4 Record Retention

The supplier shall retain records of the approved Bill of Material, RDC’s submitted and GE’s approval or rejection form for inspection and audit by GE Sourcing representatives as defined by 4.2.3.

## 6. NOTES

6.1 Various process or procedure forms (e.g. frozen process change request forms, etc.) referenced in this specification may be obtained on the Supplier Center Webpage at <https://www.gepower.com/business-info/suppliers/document-library.html>

6.2 All supplier’s information is held in confidence between GE and the respective Supplier. All GE information shall be held in confidence by the supplier.

## ADDENDUM A

### **Electronic Qualification Book**

This addendum defines the requirements for preparing and submitting an Electronic-Qualification book for inclusion into GE Energy’s SMS system or a Sourcing Quality Electronic Library.

#### 1.0 Qualification Documentation Requirements

As the final requirement of the Qualification process, the Supplier must submit one (1) Electronic- Qualification book to GE Renewables for all Qualifications.

#### 2.0 Applicable Sections and Documents

The Supplier and the SQE shall discuss prior to submission of the Electronic-Qualification Book which Sections and Documents are applicable to the Commodity.

#### 3.0 Qualification Book Requirements

Unless directed otherwise by the Qualification Team, the Electronic- Qualification Book shall include the following items, preferably in this order.

Section #	Quality Form Name	Quality Form Description
N/A	Cover Sheet	None
N/A	Table Of Contents	None
1	GE Purchase Order	Provide Copy of GE Purchase Order for this Project
2	GE Specifications/ GE Drawings	Provide a list of all GE Renewables Specifications, and GE Renewables Drawings, including Revision level.
3	Supplier Drawings	Provide copy of all Supplier generated drawings, including Revision level.
4	Supplier Product Quality Plan (PQP)	Provide a copy of the Supplier Product Quality Plan (PQP), signed and dated by the Supplier Quality Representative
5	Supplier Manufacturing Process Plan (MPP)	Provide a copy of the Supplier Manufacturing Process Plan (MPP), signed and dated by the Manufacturing Representative and/or the Subtier Suppliers used

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6	Characteristic Accountability and Verification Forms (CAV)	Provide a copy of the CAV report for this project.
7	GE Qualification Program, GE Product Quality Plan	Provide a copy of the GE Qualification Program, and or GE Product Quality Plan for this Project
8	Bill of Materials (BOM)	List to include Item #, description, model, etc...
9	Component Conformance	Include C of C for all major components: e.g., pump curves, testing certifications, calibration certificates, and relevant data sheets
10	Design Calculations	Provide a copy of all design calculations for applicable Components/Systems (Pipe Stresses, Pipe Supports, Pressure Vessels, Lifting Lugs) per Domestic and International Codes
11	Code Compliance	Provide a copy of all documents to validate this commodity meets all Domestic and International Code Compliances for the following but not limited to: CSA,CRN,IEC,CE,PED,ATEX,NEC
12	Material Test Reports	Provide copies of Material Test Reports for all material used on this Project to include, but not limited to the following: Piping, Structural Steel, Bolting materials (Bolts, nuts, washers), Tubing, Raw Materials, Welding Consumables
13	Welding Procedures	Provide a copy of the Welding/ Brazing Procedure, Specification, and all welder qualification records used on the Project.
14	Nondestructive Testing	Provide copy of all Nondestructive Testing procedures. Provide copy of NDT Personnel list qualified to perform NDT on this project. Suppliers written NDE Practice Per. ASNT SNT-TC-1A
15	Castings and Forgings	Provide all procedures, data and charts for the following processes: casting, machining, forging, bar stock
16	Mechanical Testing and Heat Treating	Provide copy of all Hardness testing, Heat Treatment, Stress Relieving, Metallography, and Grain Etch procedures and results
17	Surface Preparation and Painting	Include all Metal Preparation, Prep for paint, paint procedures along with QA Paint data, signoffs, and paint specifications
18	Calibration	Provide copy of all calibration procedures and certificates for all devices that were used and calibrated on this
19	Functional Testing	Provide a copy of all Mechanical, Electrical, and Functional Tests performed. This should include testing procedures, documented data of all testing performed and signoffs that equipment passed testing.



20	Proof Test, Type Test	Provide Procedures and results for all Proof Tests, and Type tests performed on this Project ASNI Referenced. Include the methods to be used in all type and proof testing, either by ANSI, ASME, IEEE, IEC, NEMA or other standard procedures, or by written description
21	Flushing and Cleanliness	Provide a copy of the Flushing procedure and cleanliness procedure used to verify cleanliness per GE spec. (362A2412) or any other GE Renewables business specification
22	Preservation and Packaging	Provide a copy of procedures and data to verify compliance in accordance with GE Spec. (P23E-AL-0255).
23	Repair/Rework	Provide any Rework procedures and results
24	Supplier- Inspection Reports	Provide a copy of all Inspection reports, travelers, and other quality documents used in the Suppliers Facility
25	Critical to Quality (CTQ) Data	Provide any Critical to Quality (CTQ) Data defined by the SQE for this project
26	Supplier Deviation Record List	Provide a copy or List all SDRs used on this Project
27	Photographs of the Equipment	Provide photos of the completed Commodity
28	Packing List	Provide a copy of the Packing List
29	GE- Certificate of Conformance	Provide a copy of the C of C that is submitted to The GE Routing Center
30	SQE Final Inspection Report	Provide a copy the SQE's Final Inspection Report in this section

#### 4.0 Electronic- Qualification Book Format

Documentation is to be supplied in an Electronic Format, (PDF) is preferred. The Qualification Book shall be supplied on a CD labeled accordingly and sent to the SQE.

#### 5.0 Qualification Book (Hardcopy)

There may be cases where a hardcopy of the Qualification Book is also required. This requirement will be at the SQE's request.