



GE Oil & Gas Quality Management System

Sourcing

Supplier Quality Requirements

**Important: ARSB-O&G-001 has been replaced by BH-SOU-001 (EN)
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Document Revision Chart

The following chart lists the revisions made to this document tracked by version. Use this to describe the changes and additions each time this document is re-published. The description should include as many details of the changes as possible.

#.#	Section Modified and Revision Description	Date	Author
G	P28A-AL-0002 (GEE) was adopted	Prior to 04/02/2010	GEE
0	ARSB-O&G-001 issued by GE O&G adapt P28A-AL-0002 to GE Oil & Gas requirements	04/02/2008	Alessandro Ricca, Sara Bernardis
1.0	Added quality requirements of indirect material suppliers Eliminated Qualification requirements not describing Suppliers' responsibilities, eliminated Item type classification Eliminated use of SDR to approve shipment prior to FPQ closure Added Laboratories certification requirements Added supplier disqualification paragraph Added paragraph on Back Charge due to repetition of inspection Added paragraph on Cost of poor quality Merged with Drilling and Production general quality requirements Revision number aligned to Documentum Archive	15/08/2010	Salvatore Grillo
2.0	Eliminated reference to Drilling & Production, Introduced reference to Drilling & Surface and Subsea S Modified criteria for laboratory certification, Revised criteria and requirements for Supplier Qualification, Additional requirement for Non Conformity Management, Additional requirements for Document Management Revised Special Process List in addendum B, Introduced addendum D & E on TRS & Supplier Scorecards.	08/05/2014	Livio Loschiavo
3.0	Additional requirements for Cyber Security Additional Requirement Addendum C. Additions to Section E Documentation – Supplier to update iSupplier w/NDE personnel certificates & visual acuity certificates.	14/7/2015	Roberto Miniucci Richard Jones
3.1	Administrative change: removed par 4,1 with ref to MP100 & ARSB02-03 and VGS2 documents because, according to OGQ-0101.1 Para 3.1.7, those should not be listed as a reference document	16/11/2015	Claudio Stefani



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4.0	Added quality requirements for post shipment non-conformities notification requirements (par 8.10.1 Service Bulletins). Administrative change: typo in par 8.6 (reference to manufacturing location change paragraph modified from 7.14 to 8.12). Brought back par 4.1 (ref to ARSB02.03, MP100 and VGS2 documents) because still applied/required by the PCs	February 17 2016	Davide Battisti
4.1	Addendum C: "Additional Quality Requirements for Surface and Subsea Systems Suppliers". Added Section "L. Dimensional Inspector Qualification". Needed to support acceptance of product at a Supplier when the product may not be subsequently inspected at a GE plant (API 6A Section 7.3.4) Addendum C: Section E: "Documentation" Added paragraph on Legibility	April 22, 2016	Richard Jones Davide Battisti
5.0	Added safety briefing requirements to section 8.9. Under section 6.2, definition of "Residual Risk" added and language added to MPP definition for clarity purposes.	Oct, 14 2016	Dario Tortelli, Davide Battisti
5.1	Modified 1. to say that ARSB-O&G-001 has been replaced by BHGE-SOU-001 (EN) available in the Supplier Center for use.	25 September 2018	Fabrizio Cantini
5.2	Modified 1. to say that ARSB-O&G-001 has been replaced by BH-SOU-001 (EN) available in the Supplier Center for use.	3 December 2019	Fabrizio Cantini



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ADDENDUM A - Tech. Specification for Vendor Supplied Documentation-Qualification Book (Electronic)

ADDENDUM B – Special Processes List

ADDENDUM C – Additional Quality Requirements for Surface and Subsea Systems Suppliers.

Addendum D - Technical Regulations and Standards

Addendum E – Scorecard Description

1. Introduction



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GE Oil & Gas is committed to drive quality excellence and customer satisfaction with products and services manufactured by GE Oil & Gas or produced through Suppliers and Sub-Suppliers.

The purpose of this specification is to establish a set of procedures and practices pertaining to the quality of items purchased by GE Oil & Gas. The requirements set forth herein will ensure a consistent, quality-based relationship between GE Oil & Gas and its direct material Suppliers.

Important: ARSB-O&G-001 has been replaced by BH-SOU-001 (EN) available in the Supplier Center for use.

2. Scope

This specification provides the minimum quality requirements for GE Oil & Gas Suppliers. This specification is part of GE Oil & Gas's purchase order and it is fully applicable to Suppliers of direct materials used in GE Oil & Gas delivered goods and services.

All paragraphs, with exception of paragraph 8, are also applicable to Suppliers of indirect materials and services.

Surface and Subsea Systems specific requirements are defined in Addendum C.

3. Responsibility

Responsibility for updating this procedure lies with the Oil & Gas Global Supplier Quality Leader or a person delegated by the Oil & Gas Global Supplier Quality Leader.

This specification is a controlled document in the GE Oil & Gas Sourcing Quality Management System.



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4. Applicable Documents

The following documents form part of this specification to the extent specified herein. Alternate applicable business-specific technical requirements will be communicated to Supplier as required (examples, ASME, API, ITN, etc.). Unless otherwise indicated, the latest document revision shall apply. Scope limitations are highlighted in brackets.

4.1 GE Oil & Gas Documents

- ARSB-O&G-002 Preservation and Packaging (TMS and DP&S only)
- ARSB-O&G-003 Shelf life materials (TMS and DP&S only)
- MP100 Global Sourcing Quality Requirements (where applicable, for Surface or Subsea Systems only)
- VGS2.20 Special Quality Requirements (where applicable, for Surface or Subsea Systems Only)

4.2 International Standards

ISO 9001 Latest revision - Quality Management Systems Requirements

4.3 Hierarchy of Documents

The purchase order is the governing document that incorporates GE Oil & Gas requirements to the Supplier. In the event of any conflict, inconsistency or ambiguity between the purchase order's requirements and this document, statutory requirements or industry standards referenced in the document or any other document, this Specification shall prevail. It is the responsibility of the Supplier to be fully aware of all the statutory & industry standards related to the purchased component. In addition, it is solely responsibility of the Supplier to strictly adhere with the Technical Regulations and Standards ("TRS") described in Addendum D.

5. Communication

The GE Oil & Gas purchase order designates the Sourcing Representative who is the primary contact with the Supplier for commercial issues. The SQE is the primary quality



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and technical contact and will be assigned by Sourcing Quality management as appropriate. Changes to purchase order requirements shall not be accepted without a formal purchase order change, a change in the purchasing specification and/or applicable documents approved by GE Oil & Gas, an approved Supplier deviation request or through cleared nonconforming material reports.

Various process or procedure forms (e.g. SDR forms, frozen process change request forms, etc.) referenced in this specification may be obtained from the appropriate GE Oil & Gas Sourcing Representative.

6. Definitions

6.1 Entities

- **Supplier** - Unless noted otherwise, refers to the corporation, company, partnership, sole proprietorship or individual with whom GE Oil & Gas places a purchase order.
- **Purchaser** - The GE Oil & Gas business or its business associate.
- **Sourcing Quality Engineer (SQE)** - GE Oil & Gas representative who defines the qualification and production quality requirements, and is the key interface with the Supplier relative to qualifications, process improvements, nonconforming material dispositions, corrective actions, and surveillance auditing.
- **Sourcing Representative** - GE Oil & Gas 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 Oil & Gas.

6.2 Other Terminology

- **Characteristic Accountability and Verification (CAV)** - CAV form may be required in the qualification program; if so, CAV must be completed and maintained by the Supplier. The CAV form must include, at a minimum, the following items: Identification of components, Characteristics and feature accountability, Inspection and test results, Manufacturing Planning, Production Product Acceptance Criteria. 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 SQE on subsequent orders or as indicated on the purchase order.



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- **Critical Process:** Supplier manufacturing process that could have a significant impact on product conformity & functionality and GE Oil & Gas's customer impact. Special processes are considered as critical and require qualification.
- **Cyber component:** Any component that makes up a device, software or service that has software (or firmware), or has a processor (ex. eProm or FPGA) or a network or removable media interface.
- **Cyber product:** Any digital product or service that requires a microprocessor or microcontroller to operate and/or may have an active data communication port. This includes, but is not limited to, any product that stores, processes, or transfers data or metadata and their supporting engineered system branded as a GE O&G product that is the result of integration of products directly manufactured by supplier or its sub suppliers and not GE O&G parts or software application that GE O&G provides. Cyber products also include all services that utilize technology to perform those services.
- **Delivery:** Both the time and location where the risk and/or ownership of a good is transferred
- **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 Oil & Gas Qualification Team to ensure Suppliers' thorough understanding of drawing requirements and specifications during the qualification process. For Supplier Designed, not Build to Print (Functional Spec/Sourcing Controlled) type A and B items, the Supplier may be required to participate in an Engineering Capabilities Assessment and Supplier Design Reviews with the GE Oil & Gas Qualification Team.
- **Direct Material** – Material purchased for use on a Customer job and identified in the Bill of Material.
- **Engineering Technical Specification:** Technical specifications issued by GE Oil & Gas Engineering Department.



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- **First Article Inspection (FAI)** - The Supplier shall accomplish a FAI process for the first item or batch in a series to provide objective evidence that all design and specification requirements are properly understood and that prescribed production method have produced an acceptable item as specified. Such process will be described in a specific FAIR document for a specified item
- **First Piece Qualification (FPQ)** – Type of qualification process that requires the Supplier to manufacture a first piece of the item as outlined in the applicable GE Oil & Gas specifications and/or as defined by the appropriate Sourcing Quality and Engineering personnel. First Piece Qualification documentation must be submitted to GE Oil & Gas for review and approval. Upon successful completion of the FPQ, a Supplier may request release of the material for shipment to GE Oil & Gas. Confirmation of this release must be documented and placed with the item to be shipped, as well as retained for the Supplier’s record. Materials shipped without written authorization from the SQE will be considered non-conforming material and may be shipped back to the Supplier at their expense, or incur additional labor back-charges to the Supplier.
- **Field Service Notice (FSN or NCM)**- A Field Service Notice documents non-conformances identified by GE Oil & Gas field engineers and authorizes the field to perform warrantable equipment repairs.
- **Frozen Process** - A manufacturing method, process, procedure or control that was approved by the GE Oil & Gas Qualification Team and documented in the MPP.
- **Indirect Material** - Material purchased for use in the shop floor, in the plant or in the office not part of the Bill of Material (e.g. consumables, tools and equipment, etc.)
- **Inspection** – Conformance evaluation by observation and judgment accompanied as appropriate by measurement, testing or gauging.
- **Installation’s Country:** Country where the procured good will be installed for operation.
- **KOM – Kick Off Meeting** – Meeting between GE Oil & Gas and Supplier, in order to clarify the qualification requirements. Outcome of KOM is a summary detailing the specific requirements a Supplier must fulfill to successfully complete the qualification.



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- **Manufacturing Process Plan (MPP)** - A detailed, step-by-step list of operations and requirements by which component(s), or service(s) are manufactured. An MPP must, at a minimum contain the following information: A list of applicable GE Oil & Gas specifications, ordering sheets, outline drawings, and special process specifications/instructions along with the latest revision letter or number; List of Weld Procedure Specifications (WPS) and Welding Procedure Qualification Records (WPQR) used in the manufacture of the part; Identification of component parts and sources; Identification of critical sub-tier Suppliers. Critical sub-tiers include but are not limited to Raw Material and any special process Supplier; a sequence plan of major and critical manufacturing and inspection steps with appropriate sign-off documentation. Supplier proprietary processes may be handled with the SQE directly; the manufacturing location; when applicable, a visual weld inspection procedure according to GE Oil & Gas docs. Once the MPP is approved, the MPP shall be considered part of the purchase order requirements even if not explicitly referenced on the purchase order. Conformance to each purchase order, including applicable drawings and specifications, prevails over MPP approval, and any conflict must be managed by Supplier as a deviation through SDR.
- **Non-conformance Notice (NCN or Non-conformance Report NCR or GRR)** – A GE Oil & Gas nonconformance report initiated during processing through a GE Oil & Gas factory or location. This also may be referred to as Quality Control Report (QCR) or different names depending on the specific GE Oil & Gas business.
- **Pilot Lot Qualification (PLQ)** - A pilot production lot may be required as determined from GE Oil & Gas 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.
- **Process Risk Assessment** – When required by the qualification team, 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 Oil & Gas Qualification team members as necessary. One format for this assessment is a Failure Modes & Effects Analysis (FMEA).



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- **Product** - The result of a process. Whenever the term “product” occurs, it can also mean “service” or any deliverable associated with fulfillment of a purchase order.
- **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 a Quality Control Plan (QCP) or ITP (Inspection and Test Plan) or other equivalent names depending on the specific GE Oil & Gas business. The PQP must, at a minimum, contain the following information: clear identification of the item, component, or system to which the PQP is applicable; listing of technical documents that govern the inspection or test activity (i.e. Supplier documents, GE Oil & Gas specifications, industry codes/standards); 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; Identification of Project specific inspections and tests; 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; Clear definition of GE Oil & Gas 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 Oil & Gas and/or customer release inspections; Identification and verification of CTQs and inspection methods. CTQs can be identified by purchase orders, specifications, drawings, or by the appropriate SQE; Detailed planning of packaging and preservation for shipment and storage; The PQP or QCP may be included as part of the MPP or submitted as a separate document. The PQP must be approved by the SQE.
- **PQR – Process Quality Requirement** - Document issued by GE Oil & Gas that establishes the requirements necessary to validate a specific process.
- **Qualification Package** - Required documentation for qualification (for maximum case see Addendum A).
- **Requirement** - Need or expectation that is stated, generally implied or obligatory.



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- **Residual Risk** - The risk remaining after risk treatment (ISO 31000:2009), in other words, the amount of risk left over after natural or inherent risks have been reduced by risk controls.
- **S-400** – GE additional process to certify ISO 17025 laboratories for selected items.
- **Services**- Activity purchased by GE Oil & Gas as part of a contractual obligation to Customers or for internal needs.
- **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.
- **Specification** - Document stating technical requirements.
- **Standard** – “a published document that contains a technical specification or other precise criteria designed to be used consistently as a rule, guideline, or definition... They are a summary of best practice and are created by bringing together the experience and expertise of all interested parties – the producers, sellers, buyers, users and regulators of a particular material, product, process or service. Standards are designed for voluntary use and do not impose any regulations. However, laws and regulations may refer to certain standards and make compliance with them compulsory.” (British Standards Institute)
- **Supplier** - Entity, including both corporations and natural person that provides a product and/or a service.
- **Supplier Deviation Request (SDR or GRV)** -A request initiated by the Supplier to deviate from purchase order technical requirements (drawings, specifications, engineering instructions, etc.) This may also be referred to under different names depending on the specific GE Oil & Gas business.
- **Technical Regulation** – “a mandatory requirement for a product, it’s processing, or its production method (may include packaging, marking, and labeling requirements).” (World Trade Organization)



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- **Type A Items** – Criticality classification for part/service that in case of failure endangers safety or survivability of personnel and/or stop the entire system for long time with loss of production and/or requires special handling procedure to be repaired. Examples: investment castings, forgings, metallic raw material, highly processed part, metallurgical process, specialized for GE
- **Type B Items** - Criticality classification for parts/services that in case of failure stop the entire system with loss of production and/or require special handling procedure to be repaired. Examples: Large and small fabrications parts, skid, pressure vessels, HV-MV motors, AC generators, gearboxes, couplings, filter houses, packaged/engineered systems.

6.3 Other Acronyms

- **CTQ** - Critical To Quality
- **D&S** – Drilling & Surface
- **FAIR** – First Article Inspection Requirements
- **IQR** – Inspection Quality Report
- **ITP** – Inspection and Test Plan
- **NDE** – Non-Destructive Evaluation
- **NDT**- Non-Destructive Testing
- **PO** – Purchase Order
- **PQR**: Process Quality Requirements
- **QMS** – Quality Management System
- **RC1** – Inspection Report document
- **SQR** – Special Quality Requirement
- **SS** – Subsea Systems
- **SDRL** – Supplier Document Register List

7. General Quality Requirements for all Suppliers

7.1 Quality System

It is the responsibility of the Supplier to define and implement a detailed quality system that ensures products supplied to GE Oil & Gas conform to GE Oil & Gas drawings and/or applicable specifications, and meeting the requirements set forth in this document. Any applicable industry and regulatory standards (such as ANSI, AGMA, API, etc.) must also be



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included into the system. GE Oil & Gas requires that this quality management system meet the requirements of ISO 9001 (latest edition) and it must be made available to GE Oil & Gas for review upon request. GE Oil & Gas reserves the right to require a) an ISO9001 compliance audit to be conducted at Supplier's expenses by a third party service designated by GE Oil & Gas or b) ISO9001 certification within a specified timeframe (usually one year from approval).

7.1.1 Sub-Suppliers/Sub-contractors

Suppliers are responsible for communication and implementation of the GE Oil & Gas quality requirements to the subcontractors or Sub-Suppliers whose products, services or materials affect the quality of service or product provided to GE Oil & Gas or GE Oil & Gas customers.

Suppliers shall establish and control quality requirements of their Sub-Suppliers.

7.2 Supplier Approval

In order to receive a GE Oil & Gas production purchase order, a Supplier must be approved per GE Oil & Gas Global Sourcing Quality Management System procedures.

7.3 Quality Records

Quality records of GE Oil & Gas purchase order of products and services must be retained for a period of at least ten (10) years unless otherwise specified by GE Oil & Gas. Quality records must be available upon request. Additional requirements for direct material purchases are detailed in paragraph 8.5.

7.4 Inspection and Auditing

GE Oil & Gas, GE Oil & Gas nominated inspectorate and/or GE Oil & Gas clients reserve the right of access to inspect, audit, expedite or witness at your premises and at any of your subcontractors' (of any tier) locations.



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GE Oil & Gas shall provide reasonable notice to the Supplier prior to the commencement of any agreed audits. GE Oil & Gas and/or its nominated inspector may perform inspection surveillance at both Supplier and Sub-Supplier locations in accordance with the approved PQP/ ITP. However, GE Oil & Gas reserves the right to amend the inspection activity and frequency of visits as it deems necessary.

8. Specific Requirements for Direct Material Suppliers

Suppliers of direct materials must comply with the requirements of section this paragraph and its sections. Suppliers of Surface and Subsea Systems must also comply with requirements in Addendum C.

8.1 Special Processes

Suppliers must have specific, documented and controlled procedures for each special process performed. Suppliers are responsible to identify the special processes performed. Special processes include, but are not limited to what listed in Addendum B.

Supplier shall ensure that processes which require pre-qualified procedures and/or work methods are tested and qualified before work begins; e.g. NDT, special fabrication techniques, lining and painting, etc. Such procedures shall be submitted to GE Oil & Gas for review and approval where specified in the purchase order before the work begins. It's the Supplier responsibility to ensure operators are qualified for the process in accordance with the procedures and/or applicable standards.

Suppliers must also maintain documentation for any special processes performed by their 3rd party Suppliers.

8.1.1 Welding

Suppliers, including sub-tier Suppliers, performing welding as a primary value added process, shall be qualified in accordance with procedures and technical specifications



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proper applicable in GE Oil & Gas (including ANSI B31.3, ASME section IX or AWS, if applicable). Submittal of procedures for review and approval may be required on purchase order. Welders and procedures must be qualified in accordance with ASME Section IX or similar governing agency specified on purchase order from GE Oil & Gas business.

8.1.2 NDE

Suppliers, including sub-tier Suppliers, performing NDE shall be qualified in accordance with procedures and technical specifications applicable to GE Oil & Gas. Submittal of procedures for review and approval may be required. This certification may be performed by a third party, as required by GE Oil & Gas.

8.2 Independent Validation / Certification

When required by equipment specification and data sheets, the Supplier shall engage a recognized independent Certification Authority (i.e. Lloyds, DNV, etc.) to certify equipment design and compliance to specified codes such as pressure vessels, heat exchangers, lifting equipment, etc. Material certification should have independent verification indicating the scope of verification, including witnessed, reviewed, it shall be signed, dated, position of the representative, shall have official stamps.

8.3 Material Certification

The agreed levels of material certification for supplied items/parts shall be detailed within the approved MPP or within the ITP submitted for review after purchase order award or specified in the purchase order requirements. The Supplier shall ensure that these requirements are included in associated sub-orders and clarified with Suppliers. Material test reports, certificates of compliance, type test certificates etc. as applicable for materials and items/parts of equipment within packages shall be made available for review (original or verified copies) at the package Supplier's or sub-Supplier's works. Documents shall quote GE Oil & Gas purchase order and item/part numbers.

8.3.1 Certified Laboratories



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GE Oil & Gas requires that certificates of conformity to GE quality requirements related to forgings must be issued by laboratories that meet the requirements of ISO17025 or equivalent or higher standards (NADCAP) for mechanical properties (the laboratories need to be certified for each type of mechanical properties tests specified in GE specifications)

Additional requirements (like S-400) will be applicable when specified in product/process specifications.

8.4 Material Traceability

Traceability is meant to ensure proper identification of finished products down to raw materials. Suppliers shall demonstrate effective material control procedures that, where specified, can trace materials from point of origin through stages of the manufacturing process through to acceptance by GE Oil & Gas. The Supplier material control system and traceability procedures shall be made available, upon request, for review.

8.5 Quality Records of Direct Materials

The Supplier shall have a written procedure for the documentation and retention of quality and product records for products supplied to GE Oil & Gas as applicable and determined by the SQE during qualification. The records retention period shall be at least (10) years unless otherwise specified by GE Oil & Gas. 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 Oil & Gas 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.

8.6 Supplier Qualification

Once approved the Supplier may only supply parts that they have been formally qualified to produce by GE. No parts can be supplied out of the scope of the qualification.

Suppliers shall request a new qualification process in any of the following cases:



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- (1) Supplier wants to extend the scope of supply to new materials, products or items
- (2) A design or process change has occurred at the Supplier /Sub-Supplier or at GE Oil & Gas, significantly changing the processing, form or function of the product
- (3) Supplier (or critical sub-tier Supplier included in the MPP) wants to change its manufacturing location. Please refer also to paragraph 8.12.
- (4) Supplier wants to introduce a new critical Sub-Supplier
- (5) Any other deviation from the MPP

GE Oil & Gas may reject, in its discretion, this request of qualification extension or change.

Qualification process is structured in two steps:

- 1) Process Validation
- 2) Product Verification

8.6.1 Process Validation

Process Validation is applicable only to qualification type A&B and consists in the verification of conformity for all Critical Processes linked to the part under qualification. Each Critical Process is verified against the related PQR and result tracked as an audit. If some Critical Processes are outsourced to sub-tier Suppliers, verification of related PQRs shall be carried out directly at sub-tier Supplier site, or evidence of sub-tier Supplier process conformity shall be collected.

Critical Processes are identified by SQE.

Special processes to be qualified are those (as minimum requirement) reported in the Addendum B. Qualification team will communicate, during Kick off Meeting (KOM), the complete list of special processes requiring qualification and related exceptions as per applicable procedures.

8.6.2 Product verification

Qualification requirements are defined and documented by a GE Oil & Gas qualification team, during the KOM and in any case before authorizing the Supplier to start manufacturing.



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8.6.3 Sub-tier Suppliers

If a Supplier chooses to outsource a Critical Process, the Supplier is fully responsible for qualifying sub-tier Suppliers to meet GE Oil & Gas requirements and notifying GE Oil & Gas of this qualification. No outsourcing can be performed to any Sub-Supplier beyond the list of approved sub-tier Suppliers.

GE Oil & Gas reserves the right to review the Supplier's process for selection, qualification, and surveillance of sub-tier Suppliers, to approve sub-tier Supplier qualifications, audit and monitor the sub-tier Supplier's processes and facilities when deemed necessary. This requirement also applies if the Supplier is a sales representative or distributor that procures from sub-tier Suppliers for manufactured parts or assemblies.

The planned use and manufacturing location of any critical sub-tier Supplier must be clearly identified in the MPP during the qualification process. Upon successful completion and qualification of the primary Supplier, the sub-tier Suppliers identified as part of that qualification must not be changed without prior approval from GE Oil & Gas. This requirement shall also be applicable to GE Oil & Gas directed sub-tier Suppliers.

8.6.4 Qualification Documentation

Qualification records, MPPs, material certifications, PQP/ITP and related documentation records are subject to periodic review by GE Oil & Gas. GE Oil & Gas also reserves the right to request submittal of these records at any time.

An Electronic Qualification Book must be submitted in accordance with requirements, defined during KOM, and as outlined in Addendum A. Any deviation from these requirements must be accepted at the discretion of the SQE.

Upon successful completion of the qualification process and receipt of the Supplier Qualification Approval, the Supplier is released to fulfill subsequent purchase orders received from GE Oil & Gas. This 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 Oil & Gas drawing and specification requirements.



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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 drawing and specification requirements, unless formal, written approval for a deviation is obtained from GE Oil & Gas via an SDR/GRV or equivalent process.

8.7 Supplier Disqualification

Failure to meet the GE Oil & Gas quality standards, or the ISO9001 QMS standards, or breaches in the MPP/PQP/ITP will cause the disqualification of Suppliers. Suppliers cannot receive new purchase order until their qualification status is back to “qualified”. GE Oil & Gas can decide not to restart the qualification process.

Supplier shall initiate a new qualification process to change their status back to qualified.

8.8 Document Management

When Suppliers receive a new purchase order, it is the Supplier’s responsibility to verify they have the latest revision of all contractual specifications called out on the drawings and purchase order.

Documentation review will be requested during KOM, in case the purchase order is related to an item under Qualification.

It is also the responsibility of the Supplier to review specification revisions with the Sourcing Representative and/or SQE in preparation of the intermediate or final inspections or prior to release for shipment, if such inspections are required.

8.9 Source Inspection and Test Witness Requirements

The Supplier is responsible for the PQP/ITP to be applied during the execution of the purchase order. PQP/ITP must be pre-approved in the MPP or approved by GE Oil & Gas before the commencement of work.



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GE Oil & Gas 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. Source inspection and test witness requirements are to be identified and coordinated through the GE Oil & Gas SQE, Quality Assurance, quality representative or other designated representative.

It will be the responsibility of the Supplier to notify GE Oil & Gas in advance, when material will be ready for inspection according to purchase order requirements. In case a witnessed inspection needs to be repeated by GE Oil & Gas due to Supplier's responsibility, GE Oil & Gas will back charge the costs of the inspection to the Supplier.

When required by GE Oil & Gas SQE, Supplier shall use/fill out GE Oil & Gas provided inspection checklists during Supplier's internal tests.

GE Oil & Gas and/or customer acceptance of product does not relieve the Supplier of its obligations to supply components that meet drawing and purchase order requirements.

Inspection by GE Oil & Gas personnel or representative does not relieve the Supplier of its responsibility to execute and document the internal tests and inspections as per PQP/ITP. GE Oil & Gas has the right to review and approve this documentation upon request.

GE is committed to safe work environment for workers and for visiting people and expects the same of its suppliers. Therefore Supplier shall brief its visitors about general safety information and Residual Risks relating to the witnessed activities prior to the start of those. The risks associated with test failure and the personnel safety mitigation plans should be reviewed. This may include the review of signage implementation that identifies an area of risk and additional PPE that will be required. For examples of Residual Risks, (i) a pneumatic high pressure test may require explanation of how risks are mitigated and to remain at the proper distance and why or (ii) a high voltage test may require observation of the warning signs and to not touch any live part. Examples are for illustration only and are not intended to limit possible heightened risk scenarios that require additional safety briefings. Supplier shall develop an internal process for determining when risks are heightened and ensuring repeatability of the briefings.

8.10 Non Conformity Management



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For Supplier detected Quality issues, the Supplier shall operate a system to detect and control non-conformances at stages of the purchase order. The Supplier shall immediately notify GE Oil & Gas in writing of any non-conformances to specified requirements or conditions that may have an impact on the final product or service.

For eSDR-enabled Suppliers, this is through the eSDR system. For SIMON enabled Suppliers this is through the GRV system. For non-eSDR/non-SIMON enabled Suppliers, this is via electronic medium such as email to the GE Buyer or other representative. Non-conformance notifications shall include details of the non-conformance, immediate containment action immediately, other product lines that have been shipped that may be affected, proposed corrective and preventive action, estimated time to perform the corrective action, schedule and cost implications. Supplier shall review and document effectiveness of corrective and preventive actions.

The non-conformance report shall be communicated via the GE Oil & Gas nominated system where applicable. Corrective action shall not be taken prior to GE Oil & Gas approval being granted.

A Supplier deviation request (SDR/GRV) must also be submitted by the Supplier for approval of alternate materials, processes, drawing errors, drawing changes, and other deviations to the purchase order requirements. The request must include a complete description of the deviation, drawing number, zone of referenced area, material specification, the quality affected, and special processes involved in the repair (if applicable). Additionally, the specific material covered by the SDR/GRV must be identified on the SDR/GRV. For serialized parts, the serial number(s) must be identified; for non-serialized parts, the specific purchase order(s) must be identified.

Non-conforming material or other requests may not be accepted or repaired without prior GE Oil & Gas approval. Such prior approval will be required also in case GE Oil & Gas takes the responsibility to implement any applicable remedies. The Supplier shall not presume approval of the request until a dispositioned copy is made available to the Supplier. The Supplier may act on the disposition only at that time, including shipping hardware that has been accepted in the SDR/GRV disposition.

For any approved deviation, the Supplier must send a copy of the approved disposition 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.



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SDRs/GRV's are "one-time" exceptions to GE Oil & Gas requirements. Unless the SDR/GRV involves a drawing change, GE Oil & Gas, expects the non-conformance(s) to be eliminated on subsequent deliveries.

SDRs/GRV's should be submitted by the primary Supplier (the Seller on the purchase order). Any deviations (e.g. drawing changes, material substitutions, etc.) related to a sub-tier Supplier's scope should be submitted through the primary Supplier. If a sub-tier Supplier has a GE Oil & Gas -issued Supplier code, then, with concurrence from the responsible SQE, the sub-tier Supplier may be permitted to submit the SDR directly to GE Oil & Gas.

All costs associated to the Supplier deviation requests (including but not limited to engineering extra hours or Supplier deviation management with the Customers) due to Suppliers' mistake can be back-charged to Suppliers.

GE Oil & Gas has implemented a quality system to rate the Supplier using the methodology explained in greater details in Addendum E. Each Product Company belonging to GE Oil & Gas business may adopt a separate scorecard formula that will apply to the applicable Supplier's base.

8.10.1 Post shipment Non-Conformity notification (Service Bulletins)

When Supplier discovers that goods or material already shipped or delivered to GE has a defect, a quality or performance deficiency, or is not in compliance with the Order, specifications, any applicable code, standard or legal requirement, supplier must notify GE by a Service Bulletin and GE may require that such goods be recalled, replaced and/or repaired.

The Service Bulletin must at a minimum:

- identify specifically the impacted materials, goods and/or units of the fleet, by clear GE tracking references (at a minimum GE Purchase Order/Purchase Order lines number and job numbers).



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- provide a clear analysis of the likely failure causes by detailing a description of the issue (problem summary), identified root-causes and investigation path.
- specify a clear action plan proposal for immediate Containment actions and long term Corrective and the Preventive Actions, including who are the action owners, when are the deadlines and where work will take place.
- highlight the level of urgency by indicating the potential risk in case of failure, including but not limited to danger to people, property, facilities, and reduced equipment reliability or efficiency.

Supplier is also required to have in place a substantially similar process with its suppliers and to notify GE of any such service bulletins from Supplier's supply chain. Supplier will provide the Service Bulletin in writing to GE.

8.11 Non Conformities detected after release to GE Oil & Gas or its Customers

For quality issues detected by GE Oil & Gas, GE representative or its Customers, a Nonconformance report/Global rejected Report will be communicated to the Supplier. At notification of the non-conformity, the Supplier shall immediately:

- Clarify the issue with the SQE
- Describe containment actions to be put in place within 24 hours from notification of the non-conformity. This is required to ensure that no more defects escape the Suppliers location and shall include:
 - List of suspect products and communicate the list to GE
 - Location of the parts
 - Plan to purge suspect parts, to be submitted within 72 hours.
- When required by GE Oil & Gas, execute an RCA to be carried out with corrective actions and permanent preventative actions to be communicated to GE within 7 days. RCA shall include:
 - Identified root cause(s) of the non-conformance
 - Corrective and preventive action Plans (action, owner, due date).
 - Analysis of the internal Supplier control(s) which failed
 - Actions to improve the failed control(s)
 - Planned date for next internal audit to verify actions have been effective

Actions remaining open longer than the specified period may result in disqualification of the Supplier.



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Supplier shall review and document effectiveness of corrective and preventive actions.

Upon request, all Suppliers and Sub-Suppliers must immediately provide all necessary support and data associated with nonconformance issues or quality investigations.

8.11.1 Cost of Poor Quality

GE Oil & Gas may incur costs in connection with defects attributable to Suppliers' defects, non-conformities and/or poor quality. Costs associated with such defects, including but not limited to inspection costs, storage and transportation costs, rework costs, engineering redesign costs, non-conformity management costs will be recovered by GE Oil & Gas. GE Oil & Gas will be entitled, among other things, to set off the back-charged amounts with amounts due to the supplier in connection with the same or a different purchase order, suspend or revoke the qualification of Supplier, and any other remedy permitted by GE Oil & Gas Standard Terms of Purchase, as amended and/or supplemented from time to time.

8.12 Supplier Manufacturing Location Change or Sub-Supplier Change Requirements

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 Oil & Gas reserves the right to reject any and 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 or changes of sub-tier Suppliers. Failure to notify a Supplier's manufacturing location change or a sub-Supplier change may result in disqualification of the Supplier.

8.13 Process Capability / Special Quality Requirements (SQR)

The Supplier must measure and record data for CTQ / CTP identified on the drawings and specifications and by the SQE. The SQE may require the Supplier to analyze the CTQ data for process capability and supply periodic reports to the SQE. Under the direction of the



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SQE, the Supplier may be requested to execute improvement projects based on the process capability analysis. The Suppliers can also independently and regularly analyze the CTQ data for process capability as part of their Quality Management System.

Where an SQR is identified on the drawing, the additional requirements on the drawing are also applicable. For Surface or Subsea Systems, SQR are identified in the Engineering Part Specifications,.

8.14 Cyber Security

The requirements related to Cyber Security are relevant and applicable for suppliers who provide a cyber component or cyber product (see definition in section 6.2) to GE Oil & Gas. A supplier will be identified as cyber security relevant within the qualification process. For all the cyber security requirements described below, upon request, the supplier shall provide documented evidence of the listed controls or relevant policies in place.

8.14.1 System Hardening

The Supplier shall provide GE Oil & Gas with a hardening guide document detailing the process for secure use/operation of the supplied components. The Supplier shall implement a scanning process to ensure all of the components supplied and processed are free of known viruses and malware. The Supplier shall have a patch & antivirus management strategy and process, which includes:

- Patch qualification
- Auditing the current patch status and identifying missing/validated patches (including software and firmware)
- Updates of products to the latest patches approved by the buyer
- Evidence that all security patches have been validated and installed prior to the start of FAT/release

The Supplier shall have a process to ensure the systems used in product development environment(s) are properly and timely patched. The Supplier shall have a process to ensure all software components, ports, and services (logical and physical) that are not required for the normal or emergency operation and maintenance of the product, are removed or disabled prior to the FAT/release.



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The Supplier shall have a process to ensure components are configured with least privilege permissions for all user accounts, file systems, and application-to-application communications. Examples of file systems which implement file protection based on privileges are *nix and NTFS. The Supplier shall have a process to ensure all software used in the creation of the components is genuine and licensed.

8.14.2 Account and Password Management

The Supplier shall have a process for Environment Account and Password Management to (i) ensure new account information/passwords are provided via protected media/channel and (ii) ensure passwords are not stored electronically/on paper in clear text (unless the media is physically protected).

The Supplier shall have a process for Component Account and Password Management to (i) ensure account activity on supplier systems is logged and auditable, and that logs are properly protected, (ii) disable or remove all accounts which do not need to be active, prior to the FAT/Release, and (iii) disable, remove, and/or modify any default or guest accounts/credentials, no later than the time of installation/commissioning, re-installation or recovery.

8.14.3 Malware Detection & Protection

The supplier shall have a process to ensure malware protection measures are implemented at the supplier's site.

8.14.4 Network segmentation

The Supplier shall provide an environment where firewalls and other intrusion detection tools as appropriate enforce isolation and segmentation between network zones. If wireless access is implemented within the supplier's network, it shall meet authorization, strong authentication (e.g. WPA2 at the time of this writing) and encryption protocols commonly accepted by the industry and security community. The Supplier shall have a process in place to verify any supplied components with wireless technology can be configured with strong security feature(s).

8.14.5 Data Security



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The Supplier shall have a process to identify any remote channel used in the context of GE Oil & Gas's product/projects and ensure it is based on architectures and protocols approved by GE Oil & Gas (e.g. IPsec, SSL etc.).

Data Sharing & Storage

Information classified by GE Oil & Gas as sensitive (e.g. Confidential or higher), shall be encrypted when transferred (including emails) over public networks (such as the Internet) using commonly accepted industry and security standards (e.g., at the time of this writing, NIST security strength 256 level). The Supplier shall have a process to identify data sharing platforms/channels and ensure they are approved by GE Oil & Gas when sensitive data is to be exchanged. Sensitive data shall be stored in encrypted form. Non-Sensitive data must, at a minimum, be stored in a folder with controlled access.

Mobile devices

The Supplier shall have a process to ensure that Mobile Devices (e.g. tablets, smartphones, etc.) used to access GE Oil & Gas's Sensitive data (including emails) have strong security controls enforced that include at a minimum required authentication, minimum passcode length (at least 4 digits), inactivity lock, device wipe capabilities, and encryption. The Supplier shall also have a process in place to immediately remove the data when notified that a mobile device is lost or stolen. Mobile device disks and laptop disks operated within the Supplier's environment shall be encrypted.

8.14.6 Physical Security and Integrity

The Supplier shall have a process to ensure appropriate physical security mechanisms are in place, including, but not limited to, (i) allowing access to GE Oil & Gas's components' environment only to personnel cleared by both supplier and GE Oil & Gas, (ii) verifying that the range of the wireless communications is limited to within the supplier's facilities perimeter, and (iii) the use of tamper evident seals on media and containers, to detect unauthorized access to protected products (e.g. tamper evident labels or seals, which self-destruct and leave a residue sticker if removed).

8.14.7 Training

The supplier shall provide training and ensure a process is in place to ensure its personnel and subcontractors have been informed of, accept and comply with GE Oil & Gas's cyber security policies. Supplier personnel and subcontractors must undergo an awareness and



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role-based training program that promotes cyber security. This includes relevant security policies, procedures and awareness of industry standards (e.g. IEC62443). The training shall be given to personnel and subcontractors on a yearly basis at a minimum.

8.14.8 Coding practices

The Supplier shall have a process to make sure secure coding practices and secure development lifecycle practices are applied in developing the delivered software. This includes validation activities, such as code reviews, static/dynamic code analysis reports, vulnerability scans, security testing, industry security certifications (e.g. Achilles, ISAsure etc.) as applicable. The Supplier shall also have a configuration management process including hardware, software, documentation and any other aspect which may potentially impact the product cyber security posture. The Supplier shall have a process to ensure the development environment access is restricted to authorized personnel, including granting read-only access to only those authorized to view the code base and only granting read/write access to those who are permitted to submit code to the code base.

With respect to third party libraries and components, the Supplier shall have a process to:

- Provide a list of third party components and libraries used in the components. This list must include version numbers of the component/library, and where possible a brief description of which part of the product uses it.
- Clearly provide to the buyer licenses of third party libraries and components whenever the component makes use of third party components with a copyright license (e.g. inclusion of open source software which requires GPL).
- Ensure third party components integrated in the product are security tested.
- Ensure use of third party components is raised at the earliest opportunity.
- Ensure GE Oil & Gas retains the right to prohibit the use of components if the licensing is incompatible or if the component is not reputable.

8.14.9 Incident management

The Supplier shall have an incident management process to ultimately support the end user, including notification of the start and resolution of an incident. Incidents include, but are not limited to:

- Physical security breach
- Cyber Security breach – e.g. network attack, virus infection etc.
- Vulnerability report on GE Oil & Gas's product, or related product.



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The supplier shall have a process to:

- Manage extra security enhancement requirements, which may arise due to unforeseen events (e.g. discovered technologies vulnerabilities), added during project development. This includes the bounds of acceptability for these requests.
- Agree on how to manage these changes and provide roadmap to fix these vulnerabilities.
- Track the identified vulnerabilities
- Inform GE Oil & Gas on instigation and resolution of the issue
- The supplier will address and remediate security vulnerabilities brought to the suppliers attention

The Supplier shall have a process to record security issues/bugs discovered during testing and report them to GE Oil & Gas, even if they are fixed. This includes a record of how the software responds to testing invalid/inappropriate/malicious inputs.

8.14.10 Security Risk Assessment

The Supplier shall have a process to perform a security risk assessment of its components. The Supplier shall be able to support GE Oil & Gas with such information as needed.

8.14.11 Auditing

GE Oil & Gas is permitted to conduct a cyber security audit on supplier's process and products subject to agreed upon notice. Work subcontracted by the Supplier is subject to these requirements and must be approved by GE Oil & Gas.



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ADDENDUM A

Electronic-Qualification Book

This addendum defines the suggested requirements for preparing and submitting an Electronic-Qualification book for inclusion into GE Oil & Gas e-SQM, or Sourcing Quality Electronic Library. Detailed list shall be agreed with the GE Oil & Gas Qualification Team.

- 1.0 Qualification Documentation Requirements As the final requirement of the Qualification Process, the Supplier must submit one Electronic- Qualification book to GE Oil & Gas for Qualifications
- 2.0 Qualification Book Requirements The Electronic- Qualification Book requires 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 Oil & Gas Purchase Order	Provide Copy of GE Oil & Gas Purchase Order for this Project
2	GE Specifications/GE Oil & Gas Drawings	Provide a list of all GE Oil & Gas Specifications, and GE Oil & Gas 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 Sub-Tier Suppliers used
6	Characteristic Accountability and Verification Forms (CAV)	Provide a copy of the CAV report for this project.



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7	GE Oil & Gas Qualification Program, GE Oil & Gas Product Quality Plan	Provide a copy of the GE Oil & Gas Qualification Program, and or GE Oil & Gas 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. It includes but not limited to 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 utilized
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 Oil & Gas business specification
22	Preservation and Packaging	Provide a copy of procedures and data to verify compliance in accordance with GE Oil & Gas specifications.
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



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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 OIL & GAS - Certificate of Conformance	Provide a copy of the C of C that is submitted to The GE Routing Center
30	GE Oil & Gas Final Inspection Report	Provide a copy the GE Oil & Gas Final Inspection Report in this section

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

3.0 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.

4.0 Electronic- Qualification Book Format

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

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.



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Supplier Quality Requirements

Important: ARSB-O&G-001 has been replaced by BH-SOU-001 (EN) available in the Supplier Center for use.

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ADDENDUM B

Special Processes List

This addendum includes a list of Special Processes, for reference of Suppliers and sub-tier Suppliers. Such list is for reference and may not be fully exhaustive. Additional requirements may be defined by the reference GE Oil & Gas SQE or other representative.

<u>1. Raw Material Production</u>
1.1 Forging
1.2 Forming
1.3 Stamping
1.4 Hipping
1.5 Powder Metal
1.6 Melting
1.7 Blade Extrusion Process
1.8 Die Casting
1.9 Investment casting
1.10 Sand Casting
1.11 Melting and raw material production
<u>2. Heat Treatment & Surface Treatment</u>
2.1 Annealing
2.2 Quenching
2.3 Tempering
2.4 Hardening
2.5 Ageing
2.6 Normalizing
2.7 Carburizing
2.8 Nitriding
2.9 Boriding
2.10 Anodizing
2.11 Surface Hardening
2.12 Flame Hardening
2.13 Stress Relief
2.14 Post weld heat treatment
<u>3. Conventional Machining</u>
3.1 Rolled thread machining
3.2 Superalloys machining
3.3 Superalloys Grinding
3.4 Broaching
<u>4. Non Conventional Machining</u>
4.1 STEM Drilling
4.2 ECM (Electro Chemical Machining)
4.3 EDM (Electro Discharge Machining)
4.4 ECDM (Electro Chemical Discharge Machining)



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4.5 Laser Drilling, Cutting, Marking
4.6 Waterjet cutting and drilling
4.7 Grinding
4.8 Thermal cutting
4.9 Additive manufacturing
5. Welding
5.1 LBW (Laser)
5.2 EBW (Electron beam)
5.3 GTAW (Gas Tungsten Arc Welding) TIG
5.4 GMAW (Gas Metal Arc Welding) MIG-MAG FCAW
5.5 SMAW (Shielded Metal Arc Welding)
5.6 PAW (Plasma)
5.7 FW (Flash)
5.8 Welding Cladding (Arc Welding, Laser)
5.9 Lining
5.10 ESW Cladding- Electro Slag
5.11 PTAW Cladding (Plasma Transferred Arc)
5.12 SAW (Submerged Arc Welding)
5.13 Blind hole repair
6. Special joining
6.1 Tenon Peening
6.2 Brazing
6.3 Soldering Pipe
6.4 Soldering Electric
6.5 Wire Crimping
7. Non Destructive Testing
7.1 Liquid penetrant evaluation
7.2 Magnetic particle evaluation
7.3 Radiographic evaluation and tomography
7.4 Fluorescent Penetrant
7.5 Thermal / Infrared
7.6 Eddy Current Testing
7.7 Ultrasonic evaluation
7.8 Hydrostatic testing
7.9 Air Flow Test
7.10 Visual Test
7.11 Phased Array Ultrasonic Evaluation (PAUT)
7.12 Time of flight diffraction (TOFD)
7.13 Thermoelectric Potential
8. Other Testing
8.1 Metallography
8.2 Mechanical testing
8.3 Chemical analysis
8.4 Hydrostatic Testing
8.5 Gas testing (PSL 3G/4G)
8.6 Positive Material Identification
9. Spin Pits
9.1 Cold Spin



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9.2 Hot Spin
10. Thermal Spray
10.1 APS (Air Plasma Spray)
10.2 VPS (Vacuum Plasma Spray)
10.3 HVOF (High Velocity Oxygen Fuel)
10.4 Detonation Gun
10.5 Cold Spray
10.6 LPPS (Low Pressure Plasma Spray)
10.7 TAS (thermal aluminum spray)
11. Babbitting of Bearings
11.1 Babbitting of Bearings
12. Diffusion Coatings
12.1 Pack Cementation (Platinum Aluminum & Aluminide)
12.2 CVD (Platinum Aluminum & Aluminide)
12.3 ATP (Platinum Aluminum & Aluminide)
12.4 Slurry (Aluminide)
13. Plating
13.1 NP (Nickel Plating)
13.2 ENP (Electroless Nickel Plating)
13.3 Hard chromium Plating
13.4 Hot dip galvanizing
13.5 Zinc plating
14. Surface special treatments & Coatings
14.1 Cleaning – Chemical and Mechanical
14.2 Pickling, Etching and passivation
14.3 All Shot Peen, including GASP and Laser shock peening
14.4 Macroetching
14.5 Waterjet Strip
14.6 Painting
14.7 Smoothcoat (sermalon, desoto)
14.8 Laser Cladding (Coatings / Layers)
14.9 EB-PVD (Electron Beam Physical Vapor Deposition)
14.10 PVD (Physical Vapor Deposition)
14.11 PA-CVD (Plasma Assisted Chemical Vapor Deposition)
14.12 Surface finishing, tumbling (drag and chemical), Abrasive flow
14.13 Xylan Coating – spray application, curing in the oven <1>
14.14 Phosphate coating – application method by immersion <1>
14.15 MOLYBDENUM DISULPHIDE LOADED PROTECTIVE COATINGS <1>
15 Electrostatic Discharge
15.1 Electrostatic Discharge control (ESD)
16. Torqueing
16.1 Torqueing



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ADDENDUM C

Additional Quality Requirements for Surface and Subsea Systems Suppliers

A. Special Processes

Weld qualifications, Welder Qualification Certificates, NDT procedures, and NDT Operators Certificates are to be approved by GE Oil & Gas Surface or Subsea Systems prior to commencement of work. Prior to any Welding of Free Issue material, the supplier must ensure that a copy of the Material Certification is available to ensure the parameters of the Weld Procedure does not exceed the original tempering temperature of the material. Missing certification should be requested from the relevant GE Oil & Gas Surface or Subsea Systems representative. Incoming documents of fabrications shall include a weld map that has been signed off by GE Oil & Gas Surface or Subsea Systems, irrespective of documentation being retained by the Manufacturer / Supplier. NDE requirements are as dictated by any additional requirements that may be called up on the purchase order or relevant drawings.

B. Certifications

The agreed levels of material certification for supplied items/parts shall be detailed within the ITP submitted for review after purchase order award. The Supplier shall ensure that these requirements are included in all associated sub-orders and clarified with Suppliers. Material test reports, certificates of compliance, type test certificates etc. as applicable for materials and items/parts of equipment within packages shall be made available for review (original or verified copies) at the package Supplier's or sub-Supplier's works. All documents shall quote GE Oil & Gas Drilling & Surface or Subsea Systems purchase order and item/part numbers.

C. Marking



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All forgings / material should be identified with hard stamp (labeled for small parts) and stenciled with minimum 1" high letters. Required identification includes the following, where applicable:

- i. GE Log Number
- ii. GE Purchase Order, Line Item and Unit Number, Part Number and Revision Status (at time of manufacture)
- iii. Manufacturing Order
- iv. Any GRR or GRV pertaining to the part

Where agreed, the Supplier may use his own Serial Numbering System to identify the part. The documentation which accompanies the goods must cross reference the GE Purchase Order Number. Lacking other instructions, the following apply:

- i. Turnkey Supply - The GE Oil & Gas Surface or Subsea Systems Purchase Order will be used as the Serial Number of the Part. E.g. Purchase Order Number/Line Item/Item Number (P136200-0001-1).
- ii. Free Issue Material - GE Oil & Gas Surface or Subsea Systems will allocate a Works Order Number, e.g. M123456/001 indicated on the purchase order. This number will be the Serial Number of the equipment.

Low Stress stamps will be used on finished Machined Parts, where practical, unless otherwise instructed by purchase order, drawing or Bill of Material.

Fabricated Assemblies will have all stamped areas masked prior to final paint. This area will be finished at GE Oil & Gas Surface or Subsea Systems prior to shipment to Customer. Hard Stamps will be used for stamping of Fabricated Parts e.g. Tree Frames etc., with the exception of Riser Fabrication Components e.g. Connectors, Tubular and any Structural Component subjected to cyclic loadings, which require identification by Low Stress Stamps. (Where the BOM is unclear, clarification must be requested by the Supplier).

D. Packing and Preservation

The Supplier shall not commence any packing or shipping of any components before final inspection and mechanical completion release documentation has been reviewed and accepted by GE Oil & Gas Surface or Subsea Systems. The preparation for transportation or export shipping may be subject to inspection by GE at Supplier's or Sub-Supplier premises prior to shipment. Inspection shall not relieve Supplier from any responsibilities or obligations under the purchase order Agreement. It is the Supplier's responsibility to ensure that all materials and equipment are properly and carefully packed for sea, road, rail or air transportation as appropriate.



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Material delivered to GE Oil & Gas Surface or Subsea Systems must be shipped in a safe manner as to make it easy to unload by forklift truck, i.e. pallets or skids. Stamping details should be clearly visible without the need for GE personnel to manhandle the material.

Note: If it is unsafe to position the material on the pallet to show identification, additional indelible markings will be required to show a minimum of purchase order Number and Part Number, on an area clearly visible to GE Goods Receipt personnel.

Goods arriving without relevant paperwork or marked incorrectly may not be unloaded and returned to the source at the Supplier's cost.

Goods must be protected with a coating of suitable rust preventative (Esso Rustsolve Light, Shell Ensis Fluid or an alternative approved by GE Oil & Gas Surface or Subsea Systems)

In compliance with GE Oil & Gas Surface or Subsea Systems Health Safety & Environmental objectives, any load and / or material delivered loaded in an unsafe manner shall be rejected without being unloaded. All associated risks and liabilities rest with the Supplier.

Any part or box that can be lifted manually must be weighed by the Supplier. If found to be more than 25kg, the part or box must be identified with the total weight. This measure is to highlight any risk to GE receiving personnel.

Where Suppliers pack multiple parts into one box, the combined weight must be clearly identified.

Load/Lifting Certification must accompany goods. Equipment received without the appropriate certificates will be rejected and regarded as non-conforming product and an Inspection Rejection Report raised. Slings must be loaded in such a manner as to make it easy to unload by forklift truck, i.e. pallets or skids.

E. Documentation

For a full list of document requirements by commodity, see Section K of this Addendum, Supplier Document Requirements List.

All documentation submitted shall be produced / written in the English language.

All electronic files and documents shall be submitted in native file electronic format and, where agreed, documents may be scanned and submitted in electronic PDF format.



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All electronic files and documents shall be legible. Legible is defined as having all relevant details written or printed, free from defects that render information on the document unreadable. (Examples of defects include: Blackouts, Cutoffs, Whiteout, Correction Tape, Scanlines, Disruptive Lines, Dark Backgrounds, Watermarks, Dirt, Wrinkles, Shadings, Spills...) The simple existence of a defect does not make the document illegible, only if the defect renders the file or document unreadable.

Where required by a specific project, the Supplier may have to submit documents for approval prior to production commencement. Such documents may include but are not limited to Test Procedures, Inspection Procedures and NDE procedures.

Drilling and Pressure Control Suppliers with access to iSupplier shall submit required documentation within the iSupplier application.

Additionally, NDE personnel qualification certificates and visual acuity certificates shall be submitted and maintained current within the Quality Module of iSupplier. This applies to the following scenarios: Initial loading of current employees/contractor: Addition of new employees/contractors as they occur: update of certificates upon expiration.

Tier 1 Suppliers are responsible for the accuracy and validity of all certificates applicable to the personnel performing work on GE Oil & Gas orders, both their employees and Tier 2 Suppliers.

F. Certificate of Conformity

One copy of a certificate of conformity must accompany goods at time of delivery. The certificate and the goods must be identified with the GE Oil & Gas Surface or Subsea Systems Part Number and Order Number as a minimum. The receipt of the certificate will form part of our invoice approval procedure.

The certificate of conformity shall contain as a minimum the following information:

- Supplier's name and address
- The consignee name and address
- Reference traceable to the delivery note
- Detail of the product being delivered

- Part number



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- Part description
- Revision
- Quantity

- Material traceability information/reference to (as applicable)
 - Lot
 - Batch
 - Serial numbers
 - Mould number and batch number for elastomeric type products (moulded parts)

- A statement of conformity to the purchase order and or any drawings or specifications quoted. National specifications shall be quoted in the statement. Including any Tests carried out referencing accompanying results

-

Any “Concession, Permit or Repair Scheme” agreed by GE Oil & Gas Surface or Subsea Systems must be referenced on the C of C quoting Concession, Permit or Repair Scheme reference number.

All testing carried out must be referenced on the C of C quoting the approved test document/standard.

When the supplied part is CE marked; the C of C must reference the applicable EU Directives or Legislation and cross reference the accompanying EU Declaration of Conformity.

The certificate of conformity shall contain the authorization by the company appointed designee

- Name (printed)
- Signature
- Position within the company
- Date

Note: if the Supplier is contracted to retain all other paperwork it shall be stated on the certificate of conformity

- What certification is being retained
- Supplier reference

G. Databooks



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All documentation must be compiled in Data Book format in a chronological manner and accompany the Finished Part. The contents shall be, but not limited to:

- 3.1 Material Certification (Turnkey Supply)
- 3.2 Material Certification (See definition)
- Dimensional reports
- NDE reports
- Cladding Thickness Report
- Weld Maps / Log Sheets
- Weld Procedures
- Welders Qualifications
- Heat Treatment Charts
- Hardness Reports
- Threading Certificates
- Coating Certificates
- Pressure Test Certificates
- Drift Certificates
- Certificate of Conformity
- Material Substitutions
- Concessions / GRVs Raised
- PMI report certifying material to VGS

Note: Material Certification, NDT, Hardness, Coating, Clad Thickness Reports must state the Standard used for the part / material supplied.

H. Mechanical Properties

For purposes of determining conformance with material specifications, all specified ultimate tensile strength and yield strength limits are absolute limits, as defined in ASTM Practice E 29, Using Significant Digits in Test Data to Determine Conformance with Specifications.

I. Dimensional Reports

Where material is shown as “oversize to guarantee finished dimensions,” GE Oil & Gas Surface or Subsea Systems will only accept up to a maximum of $\frac{1}{4}$ ” per side on dimensions given. Where BOM’s do not state a tolerance, the Supplier must contact GE for clarification at the quotation stage.

- **Machined Parts** - Machined parts with dimensions as follows must have actual results recorded on the report:



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- Diameter and Lengths with a tolerance of + / - 0.005" or less.
- Angles with a tolerance of + / - ½ Degree or less.
- Surface finishes with 32 Microns or less (where accessible)

All other dimensions will be recorded as being verified by applying a tick to the report.

Where Thread Gauges are used, the Serial Number must be recorded on the Dimensional Report. (If a gauge number has been specified on the VG Drawing, every effort must be made by the Supplier to obtain the specific gauge from GE Oil & Gas Surface or Subsea Systems).

- **Fabricated Assemblies** - Dimensional Reports stating actual dimensions shall be required for all machined areas with a tolerance of + / - .010" or less, all other dimensions will be verified as acceptable to requirements and documented on suitable format.
- **Proprietary Parts** - No Dimensional Report is required to be supplied with proprietary parts, the recording of dimensions will be in accordance with Suppliers own Quality System. GE Oil & Gas Surface or Subsea Systems reserves the right to request any proprietary and fabrication dimensional information that will assist in establishing root cause of any subsequent test failures of GE Oil & Gas Surface or Subsea Systems equipment.

Where Quality Plans have been agreed upon, documenting the level of certification required to be sent with the goods, the above will not apply.

J. Product Specific Requirements

- **Pipe**

Pipe purchased in accordance with API 5L may be drifted in accordance with Vetco Gray Procedure A022510. However this requirement will depend on specific contract requirements therefore, will be highlighted on the purchase order if required.

Super Duplex and Duplex piping must be carefully handled and protected during all phases of manufacture, assembly and storage - please refer to PIMS document HTS-940143, and or ASTM A380, sections 1.3 & 1.4

- **Studs**



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Studs and stud bolts must be marked in accordance with ASTM specification and should be fully traceable.

For hot dipped galvanized studs only, the thread on tap end after galvanizing must meet the gauging practice for the type of thread stated to class 2A requirements.

- **Fasteners**

Fasteners must be marked in strict accordance with ASTM A194, including Grade and Manufacturers mark.

Material Certificates must refer to Cast or Heat Code.

Certification must conform to the requirements of ASTM A194, Suppliers to retain copies of original certificates for a minimum of 15 years

Suppliers shall provide a delivery note or certificate of conformance with each delivery summarizing inspections performed.

Where required by ASTM A194, proof load testing will be performed in strict accordance with ASTM A194

Where agreed by GE Oil & Gas Surface or Subsea Systems, certification may be retained by the Supplier (unless specified on the purchase order), providing that it can be made available to GE Oil & Gas on request. If additional cost is incurred from a sub-Supplier, the retrieval costs shall be formally agreed between the two parties.

- **Elastomers**

Elastomers to be supplied in black polythene bags suitably labeled with the following information:

- Vetco Gray Part Number / Specified Part Number
- Quantity
- GE Oil & Gas Purchase Order and Item Number
- Type of Material
- Compound Number
- Batch Number
- Cure Date
- Storage Life
- Durometer Hardness



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- **Proprietary Valves**

For proprietary valves classed as 'major pressure containing', that form a primary barrier integrated within VG equipment, a Design Verification Certificate and Product Conformity Testing Certificate from a designated independent regulatory certifying authority of the Supplier's choice, shall be included in the documentation supplied. A copy of the pressure test charts and reports shall also be supplied.

K. SDRL Documents

The documents will be requested via purchase order or SDRL Check Sheet.

	Raw	Machining	Fabrication	Coating
Certificate of Conformity	x			
Material Test Reports / Certs	x			
Load Test Certificate			x	
Lifting Certificate			x	
Trace Sheets				
Trace - Raw Material, Assy, Weld Map, Weld Filler	x	y	y	
NDE Reports	x		x	
Radiographic Report (X-Ray/PAUT)	y		y	y
Ultrasonic Test Reports (UT)	y		y	y
Magnetic Particle Test Reports (MT)	y		y	y
Liquid Penetrant Test Reports (PT, LP)	y		y	y
Heat Treat Reports				
Heat Treat Charts	x			y
PWHT/Stress		y	y	y
Performance Tests	Raw	Machined	Fabrication	Coating
Factory Acceptance Test (FAT)				
Pressure Test			x	
Drift Report	z	z	z	
Product Inspections				
Dimensional Log/Report	x	x	x	
Hardness	x			
Coating Report				y
Paint Report				y
Final Checklist		x	x	
Incoming Inspection Report	x	x	x	
Assembly Inspection Report			x	
Clad Thickness Report				y
Welding Inspections			x	
Visual Report				



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Torque Report/Charts			x	
Positive Material Identification Report	x	x	x	
Surface Test Report	x	x		y
Raw Material				
Volumetric NDE	x		y	y
Hardness	x		y	y
Mech/Performance Testing	x			y
Misc				
Concessions	y	y	y	y
GRR's	y	y	y	y
Inspection & Test Plan	z	z	z	z
Manufacturing Process Plan	z	z	z	z
TPI Sign-offs *	z	z	z	z
TPI/Customer release note				
Completed Databooks				
Photos of Equipment (Nailsea)				
Purchase Order Receipts				
Stock Tickets				
Mini-Packs / Work Packs				
Tally Sheet				
Pick List				
Warehouse Receiving List				

Document Required	x
Document Required if Operation Performed	Y
Stated in purchase order if Required	Z

L. Dimensional Inspector Qualification

Suppliers, including sub-tier suppliers that provide machined components to GE Oil & Gas shall have a quality program in place to ensure accuracy of their final dimensional inspection. The quality program shall include, providing training and verifying knowledge and skills of the quality inspectors. Supplier may be audited to verify compliance to these requirements. At a minimum, Quality Inspectors shall:

- have an annual eye examination
- pass a practical and/or written exam
- be re-qualified every three (3) years or more often
- provide complete and accurate reports of Inspection results, including Traceability of the part as applicable (Part Number, Serial Number, Drawing Number,... and applicable Revision(s)) (Inspection Quantities and Sample Sizes if applicable)
- record gauges used for acceptance by description, Serial Number and Calibration due date



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- verify applicable Revision levels of Drawings, Part Numbers, Specifications etc are in use for the Final Inspection
- identify acceptance records with their printed name, signature and date the work is performed
- use sample inspection only if allowed or required by GE Specifications.



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ADDENDUM D

Technical Regulations and Standards

Technical Regulations and Standards (“TRS”) are mandatory requirements that a product, its processing or its production method need to comply with.

They are defined to ensure the protection of Health and Safety, the property and the environmental and promote the free trade and competition within a region through the technical harmonization of the regulations.

The number of TRS adopted by applicable jurisdictions has grown significantly as a result of higher demand for products’ safety and high-quality. Hence, the commitment of GE Oil & Gas and all its Suppliers shall grow accordingly, to ensure that the exported products do comply with applicable regulations.

Compliance with TRS, pursuant to applicable laws, is required for all such Suppliers that supply products and/or services that may be used in various jurisdictions. GE Oil & Gas is required to deliver products and services that need to comply with all applicable TRS requirements (e.g. design, procurement, manufacture, packaging, shipping/transportation, installation, testing, operation, maintenance, and disposal). Supplier shall be solely responsible to ensure that the product and/or services supplied or rendered to GE Oil & Gas are compliant with applicable TRS requirements as of the date such products are delivered and/or services are rendered. Supplier also covenants and agrees to cooperate with GE Oil & Gas to provide any necessary update to TRS requirements in case of future changes to such requirements.

It is solely responsibility of Supplier, who provides a product, service, process, or management system, to comply with applicable mandatory provisions, relating to, design, manufacture and testing. Supplier shall provide written evidence or certification, as applicable, that the product, service, process, or management system is in compliance with applicable laws and regulations, as needed. In case of any doubts concerning the applicable requirements, the Supplier shall seek a formal clarification from GE Oil & Gas, prior to submitting its quotation proposal.

It is further agreed and understood that Supplier shall be entirely responsible for the following actions:

1. Ensure that all products and services are in compliance with applicable law requirements of the Installation Country (if stated); and



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2. Deliver its products according to TRS requirements written in the Engineering Technical Specification mentioned in the order.

In the Engineering Technical Specification, Supplier can find:

a. the indication of the Installation Country. In case the product requirements are not impacted by TRS of the Installation Country, this information is not provided. In case of doubts, Supplier shall contact GE Oil & Gas to have a formal clarification.

b. TRS specific requirements. In case the Engineering Technical Specification does not contain any TRS specific requirements it shall be Suppliers solely responsibility to comply with laws applicable to the Installation Country; provided, however, that, Supplier shall be responsible to double check TRS specific requirements as indicated by Engineering Technical Specification and verify whether there are any other laws or regulations that are applicable to its scope of supply.

3. Please be advised that the TRS certification and/or documentation shall be duly completed in accordance with the applicable specifications before requesting the final inspection of the goods.

The forgoing shall constitute an obligation of the Supplier deriving from mandatory law provisions. It is agreed and understood that any violations by the Supplier of one or more of the forgoing points shall constitute a material breach and shall entitle GE Oil & Gas to pursue any remedy available by contract equity or law.

If Supplier, as manufacturer, declares any TRS requirement to be applicable to any of their products, the Supplier shall specify such conformity to TRS requirements on IQR/RC1 and the Supplier Quality Leader (or a delegate) shall certify the foregoing.



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ADDENDUM E

Scorecards

In this context, GE Oil & Gas has implemented a “Scorecard” detailing Supplier performance against GE Oil & Gas metrics in certain critical areas, as detailed below.

An evaluation expressed in points will be assigned to each defect found and acknowledged by the competent Supplier Quality Engineer (SQE) as attributable to Supplier. GE Oil & Gas will consider two major areas of defects:

- 1- No escaping defect: e.g. defects that have been found by Supplier during the manufacturing phase and required a Standard Deviation Request.
- 2- Escaping defect: this type of defect encompasses two subcategories: (A) defects found at GE Oil & Gas’s site, before the delivery of the goods to GE Oil & Gas’s final client and/or (B) defects found at GE Oil & Gas’s client’s site.

Depending on the number and magnitude of the ascertained defects, certain actions will be implemented:

- (A) In case the defects found in a given period of time had changed the scorecard balance de minimis, then no action will be implemented.
- (B) In case the defects found in a given period of time had changed the scorecard balance beyond certain levels, GE Oil & Gas will require from Supplier corrective actions that will be agreed upon on an individual basis, including, but not limited to, charging applicable costs to Supplier.
- (C) In case the defects found in a given period of time had changed the scorecard balance to a level of warning, GE Oil & Gas may suspend the Supplier from its approved vendors list.

The information on the Scorecard will form the basis for the periodic performance review of our Supplier base, and will allow GE Oil & Gas to work more closely with Suppliers that are able to meet the targets and standards set for such areas of focus.

GE Oil & Gas will detail how the Scorecard mechanic works in individual meetings, depending on which part of the GE Oil & Gas a Supplier works the most. GE Oil & Gas anticipates that there will be a different formula to calculate variations of the Scorecard balance, depending on the GE Oil & Gas P&Ls Supplier is working with and separate communications may follow.