

Turbomachinery & Process Solutions

<ARSB-O&G-004 | Rev. 2.0>

<Guidelines for FPQ/PLQ inspection>

<04 June 2015>

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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
1.0	First issue	07/11/2013	Ester Monaco
2.0	Modified Responsibilities of Supplier (6.0) Added note 2 to Table 1	04/06/2015	Ester Monaco
--	Document rebranded (GE O&G > Baker Hughes); updated obsolete references (ARSB-O&G-001 > BH-SOU-001)	08/04/2020	Carolina Biondi

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1.0 General Overview

The purpose of this document is to establish a set of instructions relevant to the quality inspection of items/goods purchased by Baker Hughes (Nuovo Pignone and Thermodyn sites) under a First Piece/Pilot lot Qualification process type A and B, as defined in BH-SOU-001 Supplier Quality Requirements.

2.0 Scope

This document is incorporated by reference in the Baker Hughes purchase order and it is fully applicable to suppliers of direct materials, used in Baker Hughes to supply goods and/or services, under qualification process of type A and B, as specified above.

It is Suppliers responsibility to implement all necessary actions in order to comply with the requirements set forth herein.

3.0 Applicable Documents

The following documents form part of this document to the extent they are referenced herein.

3.1.1 Baker Hughes Documents

BH-SOU-001 Supplier Quality Requirement

3.1.2 International Standards

ISO 9001 Latest revision - Quality Management Systems Requirements

4.0 Definitions

4.1 Entities

- **Supplier** – Unless stated otherwise, shall mean a corporation, company, partnership, sole proprietorship or individual with whom Baker Hughes places a purchase order.
- **Purchaser** – The Baker Hughes business or its business associate.
- **Sourcing Quality Engineer (SQE)** – Baker Hughes representative who establishes the qualification and production quality requirements and is the key interface with the supplier's counterpart for qualifications, process improvements, nonconforming material dispositions, corrective actions, and surveillance auditing.
- **Sourcing Representative** – Baker Hughes representative who negotiates price, delivery date, terms and conditions, and issues the purchase order for qualification purposes. The Sourcing Representative is also the contact person between the supplier and Baker Hughes.

4.2 Other Definitions

- **Kick Off Meeting** – Meeting between Baker Hughes and Supplier, in order to clarify the qualification requirements. The outcome of Kick Off Meeting is documented by a summary detailing the specific requirements the Supplier must fulfill to successfully complete the qualification.
- **Direct Material** – Material purchased for use on a job with Baker Hughes' end customer and identified in the Bill of Material.
- **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 Baker Hughes' specifications and/or as defined by the appropriate Sourcing Quality and Engineering ("SQE") personnel. First Piece Qualification documentation must be submitted to Baker Hughes for review and approval. Upon successful completion of the FPQ, a Supplier may request release of the material for shipment to Baker Hughes. 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 will be rejected at Supplier's expense, which shall be liable, among other things, for required extra works.
- **Inspection** – It means the verification process of conformity of the goods supplied.
- **Pilot Lot Qualification (PLQ)** – A pilot production lot may be required as determined by Baker Hughes' specifications or processes. In addition, the qualification team may require a pilot lot or additional pilot lots testing to verify control of the supplier's processes upon final qualification.
- **Inspection and Test Plan (ITP)** – List of all inspection activities including applicable specifications, acceptance criteria, attendees (Baker Hughes, third party, Baker Hughes end customer) and Baker Hughes attendance level for each inspection.
- **Supplier** – Organization or person that provides a product.

4.3 Other Acronyms

- **ITP** – Inspection and Test Plan
- **NDT** – Non-Destructive Testing
- **PO** – Purchase Order
- **QMS** – Quality Management System
- **FPQ** – First Piece Qualification
- **PLQ** – Pilot Lot Qualification

- **SDR** – Supplier Deviation Request

4.4 Any other terms not defined herein shall have the meaning assigned to them in BH-SOU-001 Supplier Quality Requirement.

5.0 Guideline for FPQ/PLQ inspection

For PO line subjected to Baker Hughes qualification process, unless otherwise agreed in writing with the SQE, the following test shall be repeated:

5.1 Testing activities to be repeated on duplicated specimen at a 3rd party lab (Laboratory Tests)

Only for qualification purposes, Destructive Tests as per table 1 shall be repeated, where applicable, by Baker Hughes third party approved laboratory.

A set of coupon shall be sent by the Supplier to the laboratory indicated by Baker Hughes to allow tests' repetition according to 6.4 below. Specimen shipment and testing shall be notified according to 6.5.

5.2 Testing activities to be repeated at Supplier site by Baker Hughes approved third party (NDT)

Only for qualification purposes, Non-Destructive Tests as per table 2 shall be repeated, where applicable.

These tests shall be repeated at Supplier site by Baker Hughes approved third party. Testing results on material shall be notified according to 6.5.

5.3 Coating/Painting process assessment carried out at Supplier site by Baker Hughes approved third party

Only for qualification purposes, Coating/Painting process shall be verified by Baker Hughes approved third party.

Coating/Painting process assessment shall be notified according to 6.5.

6.0 Responsibilities of Suppliers

Supplier will be solely responsible for the following activities:

- 6.1 Define, under the supervision of SQE, the Inspection Test Plan specific for the First Piece/Pilot lot Qualification item.
- 6.2 Identify, under the supervision of SQE, the quality inspections to be executed under the direct responsibility of Baker Hughes, defining Baker Hughes involvement in test activities as “re-executed by Baker Hughes”.
- 6.3 Define a suitable and sustainable inspection schedule.
- 6.4 Arrange, prepare and execute the delivery of the material test coupons at the Baker Hughes Authorized third party laboratory, providing specimen serial number and reference PO line.
- 6.5 Notify, through SQE002 form, test activities defined as “re-executed by Baker Hughes” at least 10 working days before inspection date (1 day before specimen shipment day in case of Laboratory Tests), unless otherwise agreed in writing with the SQE , in order to allow Baker Hughes organization to arrange for the execution of the above.

SQE002 form is available on Supplier Portal internet web page.

For each testing category (Laboratory Test, Not Destructive Test, Coating/Painting process assessment), a dedicated form SQE002 shall be sent by mail to Qualification Inspection Call Center address SQE002.ICC@ge.com. Information related to Baker Hughes Authorized Organizations engaged to perform testing activities on behalf of Baker Hughes will be provided via notification e-mail.

In case any test repetition, planned in ITP, is missed, supplier is asked to open a SDR.

During the qualification Kick Off Meeting, SQE will provide more information about notification process and test execution.

Should such repeated testing activities have a negative outcome and need to be re-performed, Supplier shall pay to Buyer the full amount of the cost for the re-performance cost, which remedy may be in addition to the other remedy available to Baker Hughes.

Table 1 – Testing activities to be repeated on duplicated samples at a 3rd party lab

Test Category	Test Description	Attendance level	Execution place
Laboratory Test	Ladle chemical analysis*(1)	3rd party Baker Hughes approved lab	3 rd party Labo
Laboratory Test	Product chemical analysis	3rd party Baker Hughes approved lab (2)	3 rd party Labo
Laboratory Test	Mechanical Properties Tensile/Yeld/Elongation	3rd party Baker Hughes approved lab (2)	3 rd party Labo
Laboratory Test	Mechanical Properties Impact Test	3rd party Baker Hughes approved lab	3 rd party Labo
Laboratory Test	Micrographic Test	3rd party Baker Hughes approved lab (2)	3 rd party Labo
Laboratory Test	Hardeness on samples	3rd party Baker Hughes approved lab (2)	3 rd party Labo

* **(1)**: when ladle chemical analysis and product chemical analysis are both requested by applicable specifications then only a product chemical analysis needs to be executed; when only ladle chemical analysis is requested by applicable specifications then a product chemical analysis needs to be executed.

(2) For products made by investment casting, if the supplier internal (captive) laboratory, or external laboratory is ISO17025, NADCAP or S400 certified for the specific scope of certification, the use of such laboratory in lieu of 3rd party Labo, is acceptable.

Table 2 – Testing activities to be repeated at Supplier site by Baker Hughes qualified Inspectors

Test Category	Test Description	Attendance level	Execution place
NDT	Painting thickness measurement	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site
NDT	Ultrasonic Test	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site
NDT	Visual Test	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site
NDT	Radiographic Test- film review only	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site
NDT	Magnetic Particles Test (not fluorescent)	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site
NDT	Liquid Penetrant Test (not fluorescent)	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site
NDT	Hardness on the piece	Repeated by 3rd party Baker Hughes approved qualified Inspector	supplier's site