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Ballard Supplier Manual



**BALLARD POWER
SYSTEMS**

POWER TO **CHANGE** THE **WORLD**

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1.0 Introduction

Ballard takes great pride in partnering with those suppliers who are aligned with our philosophy of delivering the highest performance products and best overall value propositions, while also sharing our vision to accelerate fuel cell adoption. Ballard's Supplier Development program will actively source and develop competitive suppliers that further enhance our leadership position.

Suppliers who partner with Ballard may expect to realize the fiscal and technology development benefits of a long-term relationship. We will remain at the forefront of technology by implementing joint development programs with suppliers who can contribute expertise and enthusiasm in bringing new ideas and methodologies to the design and manufacture of fuel cell products. An attractive supplier to Ballard will be a well-managed, financially sound and technically competent organization.

Consistent with our corporate values, Ballard will treat all its suppliers and their representatives fairly and objectively.

1.1 Summary

This Supplier Manual is intended to be the primary document that communicates our Supplier Development, Supply Chain and Quality philosophy to our Suppliers and helps align their business objectives with ours. It describes Ballard's method of evaluating, approving, and monitoring suppliers.

The following key items are discussed in detail in this manual:

- Ballard's guiding philosophies for Supplier Engagement
- Process for becoming an Approved Ballard Supplier
- Performance expectations
- Supplier Non-Conformance issue resolution methodology
- Change management methodology
- First Article (FA) part submissions
- Part Approval Process.

1.2 Scope

The primary focus of this document is for Suppliers who are providing materials, components or services that will be used in Ballard production parts or activities. It will be used as applicable to cover Suppliers who provide other non-production based materials, components or services.

It is not intended for the Supplier Manual to be applied in conflict with any other Ballard process, specification, engineering component definition, or Ballard Purchase order. In such cases, the latter shall take precedence.

2.0 Ballard's Philosophies

2.1 Vision

Be the leading global provider of innovative clean energy solutions.

2.2 Mission

"Use our extensive fuel cell and systems know-how to profitably deliver innovative clean energy solutions to our customers, create rewarding opportunities for our team, and provide extraordinary value to our shareholders."

2.3 Cultural Values and Conduct Principles

Our cultural values are:

Listen and Deliver

We will listen to our customers, understand their business, and deliver valuable solutions for lasting partnerships.

Quality. Always.

We will deliver Quality in everything we do, without exception.

Inspire Excellence

We inspire excellence through leadership, empowerment, and consistent demonstration of integrity, urgency, and passion.

Row Together

We achieve success through collaboration, respect, and trust.

Own It

We step up, take ownership for our results, and trust others to do the same.

Ballard wants to ensure that all of its suppliers also share this value set. Ballard has created a policy which sets out our requirements for supplier conduct: "POL5100158 Ballard Supplier Conduct Principles". This policy describes Ballard's expectations of its suppliers with respect to human rights, corporate and social responsibility, ethics, and compliance with applicable laws and regulations. Compliance with this policy is a condition of doing business with Ballard. Suppliers may be asked to submit a "Declaration of Compliance with Ballard Supplier Conduct Principles" (FRM5102095), as part of Ballard's monitoring of compliance to these principles.

When choosing a supplier among competitors for any goods or service, we will weigh the facts impartially and objectively and choose the supplier who can offer the best-valued product or service in accordance with Ballard's needs. Ballard employees will not do anything that suggests a purchase decision was influenced by irrelevant or improper considerations. In addition, we will not exert any influence to obtain "special treatment" from a particular supplier. We will strive to ensure that suppliers competing for Ballard's business have confidence that Ballard's selection process is ethical.

It is our policy that no Ballard employee accepts any gift (other than items with small intrinsic value) or other gratuity from any Supplier or bidder for Ballard's business. This policy applies to all employees whether or not they are directly involved in the purchasing activity.

2.4 Communication

Suppliers are an integral part of the value chain. We therefore promote early engagement in development programs to accelerate insights into the best technologies and materials. We also work with suppliers to optimize manufacturing processes and minimize cost. In most cases Suppliers will be required to sign a confidentiality agreement with Ballard prior to full communications taking place.

Ballard clearly understands that our supply chain forms an extension of our own manufacturing capabilities, and that the expertise for managing that extension lies with the suppliers themselves. Early supplier engagement will undoubtedly lead to more robust product design, optimized manufacturing techniques, lower cost of product, and reduced product development time. This multi-faceted Supplier Engagement approach requires communication at various levels within Ballard and also across Ballard and our Suppliers.

Ballard's Supplier Management is broken into 2 key groups:

- Supply Chain Management (Purchasing)
- Supplier Quality Engineering and Quality

All commercial communication (including purchase orders, volumes, cost, lead times etc.) should take place between the Supplier and the appropriate **Supply Chain Management contact**.

All information related to manufacturing, process and quality should be communicated directly to the appropriate **Supplier Quality Engineer**. Supply Chain (SC) will be able to provide the name of the Supplier Quality Engineer (SQE) representative responsible for a particular Supplier.

In cases where the Suppliers need to communicate directly with our engineering and design people, it is recommended that the relevant Supply Chain and SQE representative both be informed. The following general rules should be followed:

- a.) **Email communication** - Copy SCM and SQE on all communication-taking place between the Supplier and other Ballard employees.
- b.) **Teleconferences** - Invite SCM and SQE to the teleconferences
- c.) **Meetings** - Invite SCM and SQE to any meetings

2.5 Supplier Management

Ballard's Supplier Chain Management and Supplier Quality Engineer will actively and continuously seek out competitive Suppliers to enhance Ballard's ability to manufacture more effectively in order to maintain its leadership in technology, quality and cost for the fuel cell market.

Ballard will remain at the forefront of technology by implementing new ideas, methodologies and joint development in the design and manufacturing of fuel cell products. An ideal Supplier to Ballard will be well managed, financially sound, and technically competent.

Ballard's Supply Chain is responsible for all aspects of commercial commitments, volumes, procurement, logistics, warehousing, and delivery. Ballard's Supplier Quality Engineer is responsible for the qualification of new Suppliers and re-qualification of existing ones and ensuring program deliverables are met for production part approvals. The choice of Suppliers in any of these areas may be the result of investigation and deliberation amongst various departments within Ballard, but the commitment to purchase rests solely with the appropriate procurement member of Supply Chain. **No other Ballard staff member can make such financial commitments.**

2.6 Standard Purchase Order Terms and Conditions

All Ballard purchase orders shall be subject to Ballard's standard purchase order terms and conditions, as amended from time to time, as posted on Ballard's website at http://www.ballard.com/files/PDF/Suppliers/Global_Terms_of_Purchase.pdf ("Ballard's Standard Global Terms of Purchase").

Unless otherwise agreed to by the parties, when a supplier provides goods or services pursuant to a Ballard purchase order, Ballard's Standard Global Terms of Purchase shall apply.

2.7 Shipping Documentation and Packaging

All products shall be packaged, marked and otherwise prepared for shipment in a manner which is:

- a) to Ballard's packaging standards or in accordance with good commercial practice;
- b) acceptable to common carriers for shipment at the lowest rate for the particular Suppliers;
- c) assure that the product performance and characteristics will remain unchanged during packaging, transit and unpacking;
- d) In some cases, the packaging may need to be reviewed and agreed upon with Ballard Supplier Quality Engineer to ensure the packaging is adequate and compatible with all material handling and assembly equipment.

The Supplier shall clearly mark all containers with:

- necessary lifting, handling and shipping information
- Supplier name
- Ballard Purchase Order number
- complete Ballard Part Number and drawing/ specification revision level
- description and quantity of the material
- lot number (if applicable)
- date of manufacture
- date of manufacturer recommended expiry (if applicable)
- name of the manufacturer

An itemized packing list must accompany each shipment. In addition, Suppliers may be required to electronically send a Certificate of Conformance (COC) and/or Certificate of Analysis (COA) containing the information as agreed upon with Ballard for each shipment to gcballard@ballard.com. This requirement will be stated in either the purchase order or the engineering design documentation (drawing notes or specifications). As well, the supplier may

be required to provide applicable material certifications, plating certifications, measurements, and any required critical specifications as agreed upon by the supplier and the Ballard Supplier Quality Engineer, Product Development and Quality. Ballard Quality and/or Supplier Quality Engineer will review the COC to ensure it meets Ballard requirements.

2.8 Press Releases

Except as required by applicable law, a governmental authority or regulatory requirements, Suppliers will not issue a press release, grant an interview to the press, or otherwise make a general public announcement, regarding the subject matter of any relationship, agreement, etc., with Ballard without the prior written consent of Ballard. Consent will be granted only under exceptional circumstances.

3.0 Ballard Supplier Management Program

3.1 Ballard Supplier Management Program

In pursuit of our mission to accelerate fuel cell product adoption, we seek to work with Suppliers who also share Ballard's passion and commitment to succeed in the fuel cell industry. The Supplier Management Program consists of two main components:

1. The Supplier Approval Process.
2. The Supplier Performance Management System

3.2 Supplier Approval Process

The Supplier Approval Process (PRC5103451) is outlined in Figure 1 on the following page. The process starts with the supplier filling out forms to provide Ballard with basic business, commercial, quality and environmental management information. These forms are a fundamental first step in the supplier assessment and approval process.

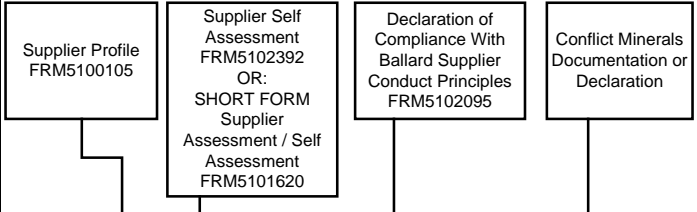
3.2.1 Forms to be completed by Supplier

The Supplier Profile (FRM5100105), the Supplier Self-Assessment (FRM5102392), and the Declaration of Compliance with Ballard Supplier Conduct Principles (FRM5102095) are the first forms that are filled out by the Supplier in order for Ballard to begin the assessment. These forms, as well as the supporting documents listed in Figure 1 can be obtained from Supply Chain or Supplier Quality.

It is Ballard's intention to work with Suppliers who excel in quality, competitive cost and on-time delivery to keep us competitive. We incorporate an open process that combines customer, partner, internal and supplier insights to identify innovations that address the product development, part production, manufacturing and customer needs.

**BALLARD Supplier Approval Process
PRC5103451**

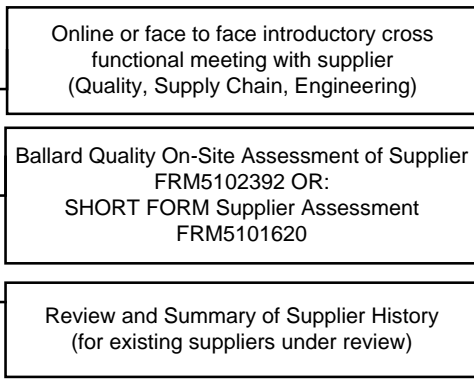
**STEP 1:
INITIAL INFO GATHERED USING FORMS
COMPLETED BY SUPPLIER**



SUPPORTING DOCUMENTS

Ballard Supplier Manual MAN5100058
Ballard Supplier Conduct Principles POL5100158
Conflict Minerals Policy POL5100162
Supplier Product/Process Change Notification (PCN) Requirements PRC5103218

**STEP 2:
FOLLOW UP AND DIRECT ENGAGEMENT
WITH SUPPLIER**



Cross Functional Review of Output from Steps 1 and 2 for Supplier (Quality, Supply Chain, Engineering)
(Results remain internal to Ballard)

Ballard Summary of Supplier Approval Process Findings FRM5102466

Includes classification
e.g.: - approved for production
- restricted (no new business)
- not approved (do not use)

(Results may remain internal to Ballard)

Supplier Approval Database:
Currently the supplier approval reports and data are stored in the network drive:
G:\Quality\Supplier Quality and Development\Supplier Qualification\Supplier Qualification Documentation Starting Jan 2015

Figure 1: Ballard Supplier Approval Process

The Supplier Profile will enable a commercial review to ensure that the potential Supplier is a viable company with strong quality and environmental management systems. It is Ballard's expectation that Suppliers will provide full financial disclosure for the business assessment.

Ballard requires that all of its Suppliers and Service Providers comply with all applicable Governmental, Federal State/Provincial and local environmental regulations. Suppliers must also ensure compliance of their products and services to all applicable laws and regulations. This includes compliance to all environment, health and safety, requirements on restricted toxic and hazardous substances.

Ballard prefers that all Ballard Suppliers be registered to ISO 9001, or have plans to register to ISO 9001. Suppliers that do not have ISO 9001 certification are recommended to work towards registration. If there is no plan to being certified in the future, a full audit/review may be conducted by Ballard. Ballard may simply request that specific quality documents be forwarded (i.e. Quality Manual, environmental policy, FMEA's, control plans, and PPAP).

Some of the products that Ballard sells may need to be RoHS compliant. Suppliers of materials, parts and assemblies for such products will be required to provide statements of compliance. Full details of the DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the restriction of the use of certain hazardous substances in electrical and electronic equipment can be obtained from the website:

<https://www.gov.uk/guidance/rohs-compliance-and-guidance>

In addition, Ballard requires its Suppliers to be active in the implementation and management of environmental best practices. ISO 14001 registration is strongly recommended.

3.2.2 Qualification of Suppliers

An important second stage of the supplier approval process includes a cross functional introductory meeting with the supplier, where both parties learn more about the products they produce, their capabilities, and the markets they serve. Ballard will also discuss the application(s) in which they might use the supplier's products, with the intent of determining whether it is a good fit between supplied product and intended use.

In many cases Ballard will visit the supplier to meet face to face, learn more about them, and to help develop a relationship. These visits may also include an on-site assessment by Ballard Quality. Typically, Ballard will review the technical, commercial, management approach and environmental capabilities of new Suppliers before placing any orders for parts or services from new Suppliers. Ballard may also periodically re-evaluate the Supplier's capabilities.

Ballard may require additional actions to qualify a supplier, depending on the criticality of the Supplier's part in our products. A cross-functional team may meet to assess the criticality of the component. The main criteria that will be reviewed to determine criticality include, but are not limited to:

- component impact on product performance,
- component impact on product reliability,
- component cost,
- whether alternate sources are available for this component (i.e. not sole sourced),
- whether a new plant, new technology and/or new process is being used to produce the component.

Depending on the criticality of the component, the Ballard SQE and Supply Chain will determine the appropriate actions that are required to qualify the Supplier. These may include:

- On-site Supplier Assessment

- Process/documentation review
- Design and Specification Review

The output of the supplier approval process is a classification assigned to each supplier, which may vary from “strategic” and “approved for production” to “not approved”.

3.3 Supplier Performance Management System

The Ballard Supplier Performance Management System (SPMS) is a business process that is used to measure, analyze, and manage a supplier’s performance in an effort to reduce costs, alleviate risks, and drive continuous improvement. The ultimate intent is to identify potential issues and their root causes so that they can be resolved to everyone’s benefit as early as possible.

SPMS focuses on reviewing and analyzing the Supplier’s Quality Performance on a regular basis. The quality performance metrics are collected based on Ballard data collection systems, for example, the IQC Non-Conformance Reporting System. Cross functional team review meetings are scheduled to review the results and decide on an action plan for the lowest performing suppliers. Action items from the review meetings are assigned to responsible attendees to work with suppliers in order to improve the supplier quality performance. Once the improvement actions have been implemented, the effectiveness of the actions is also tracked and reviewed on a regular basis. The SPMS report is generated on a regular basis for review at cross functional levels and reported to the senior management team to indicate the current status of suppliers and the impact to Ballard’s Cost of Quality.

4.0 Part Approval Process

4.1 Product Development Cycle

It is Ballard’s intent to involve Suppliers in the product planning cycle as early as possible. There may, however, be unique requirements related to the confidential and competitive stage of our business, which will require a confidentiality agreement to be signed.

Ballard’s Product Development Engineers and Supplier Quality Engineers work with Suppliers to create a specification and/or drawing which is mutually agreeable and mutually understood. This ensures that the supplier understands the design intent, the important aspects of the design, and that the acceptance criteria are understood and agreed upon. Ballard may require that the design documentation be approved by the Supplier using the Supplier Design and Specification Review form (FRM5100574). The Supplier is required to assess the parts and drawings for manufacturability, and signing off this form will signify acceptance, or will list required changes to make it acceptable. The completed form will be reviewed by Ballard’s Supplier Quality Engineer to ensure that the issues can be resolved in a timely manner to meet program required dates.

Where possible, it is preferred that Suppliers have quality and rapid prototyping capabilities that are representative of the intended production processes. Ballard will choose to work with Suppliers who are capable of supporting a comprehensive prototype plan throughout the development cycle and to the ultimate supply of production volumes.

4.2 Production Part Approval / Qualification

When a supplier is approved for production by the Ballard Supplier Approval Process, they will usually be required to become qualified on a part by part basis, depending on the nature of the parts in question. To ensure quality launches of production products and to verify manufacturability of part designs prior to release into production, Ballard may require suppliers to provide first articles and/or production samples. Depending on the criticality of the part or assembly, Ballard may determine that additional testing or qualification is required before the supplier is approved for supply of a given part for production. In some cases Ballard may require that a PPAP submission be provided.

4.3 Supplier Product and Process Change Requests

Ballard has a process for Suppliers to notify Ballard or request permission for changes to product or process for Ballard parts or assemblies. This is detailed in the "Supplier Product/Process Notification (PCN) Requirements" (PRC5103218). This document describes what types of changes require notification and permission, and instructs suppliers on requesting changes with the use of the "Supplier Product/Process Change Request" form (FRM5100416).

4.4 Supplier Selection and Quoting Process

Supplier Quality Engineers (SQE) and Supply Chain (SC) will review drawings and specifications to identify the appropriate supplier(s) from the existing supplier base, or source a new supplier if required.

Ballard's selection process is based on a balanced evaluation of commercial and technical merits, strategic implications as well as quality and cost. Approved suppliers may have an advantage in the part and Supplier selection process. Ballard makes every attempt to be transparent in part selection and may share the part selection matrix that will be used in the selection process.

Supply Chain will forward the appropriate Drawings, specifications, CAD files, volumes and cost targets (if available) to the Supplier(s) to review, comment and supply a quote. Quotes are reviewed to ensure that the requirements have been met. If any changes are needed, a re-quote will be required from the supplier. Preference for the award of business will be given to those suppliers who supply feedback on the design, tolerances, manufacturability, and cost savings suggestions.

4.5 Product Verification (Supplier Quality Assurance)

The Supplier should establish inspection plans to document product measurement requirements. The inspection plans may be part of the production documentation, but should include the following:

- Criteria for acceptance and/or rejection
- Where in the process measurement and testing operations are performed
- A record of the measurement (and approval of the record) as required
- Type of measurement instruments required and any specific work instructions for their use.
- For areas deemed critical or significant on the drawing or specification the actual measurement/inspection results should be recorded.

The supplier should monitor and measure the characteristics related to the manufactured products to verify that the component requirements have been met for all products supplied. The supplier should document the characteristics to check, as well as the method and the frequency of the sample measurements in the control plan.

5.0 Supplier Corrective Action Requests

If any parts supplied to Ballard do not conform to the drawings and specifications, the supplier must request a deviation prior to shipping the parts. Once the deviation is approved, the parts can be shipped to Ballard. All parts shipped to Ballard under a deviation must be clearly identified with the deviation number in a manner agreed upon with Ballard.

A Supplier Corrective Action Request (SCAR - FRM5000017) may be issued to the Supplier should non-conforming parts be delivered to Ballard without prior notification of the issue and/or without a deviation request. SCAR related communication should take place between Ballard's Supplier Quality Engineer, Supply Chain and the Suppliers' quality representatives. Corrective actions may also be requested informally at the discretion of the SQE.

Upon receipt of a SCAR or request for corrective action for a non-conforming material/ service, the Supplier is required to react immediately with the following:

1. Verify concern on-site and initiate immediate containment/quarantine of all suspect material/ service.
2. Review all quality and/or manufacturing records related to the production of the suspect material/service.
3. Respond to Ballard's SQE within a reasonable time with appropriate supporting documentation attached.

Questions related to the SCAR requirements and structured problem solving process may be directed to Ballard's SQE as identified on the SCAR.

6.0 Design and Development

The design and development process requirements apply to suppliers who are authorized by Ballard to create design definitions using:

- o the Supplier's design rules and standards;
- o the constraints defined in this document;
- o Ballard's requirements;
- o government regulations and Ballard's customer requirements.

The requirements also apply to other product development activities such as design analysis and testing.

Design and development suppliers shall ensure that they and their supply chain comply with the technical requirements, and any additional contract specific process' and design requirements as outlined by Ballard.

The technical requirements are the product requirements produced by Ballard through engagement with Ballard customers and the Supplier. The technical requirements may be

presented by a Technical requirements document (i.e. component requirements, envelope drawing, request for proposal, standards document etc.).

7.0 Geometric Dimensioning and Tolerance (GD&T)

Ballard's drawing standard is ASME Y14.5M-1994 [Geometric Dimensioning and Tolerance (GD&T)].

In relation to this, Suppliers of Ballard Production parts and services (if applicable) are preferred to have the knowledge and understanding on how to use GD&T in the manufacture and inspection of parts/ service. Initiating early supplier involvement to develop the parts and drawings will ensure that the parts can be manufactured within the tolerances of the specified manufacturing process.

8.0 Special Characteristics

Ballard identifies potential special characteristics (significant or critical) on its documentation (e.g. on drawings, specifications, control plans, etc.). Significant characteristics are identified with a ■ symbol, while critical characteristics are identified with a ★ symbol.

Table 1: Definition of Special Characteristics

	FMEA	Definition
Critical Characteristic	Severity >8 And Occurrence >1 And Detection >1	A product or process characteristic that can affect compliance with government regulation or safe product function, and require special actions or controls that must be listed on a Control Plan.
Significant Characteristic	Severity 5 to 8 and occurrence >=4	A product or process characteristic that is important for customer satisfaction and for which Quality Planning actions must be addressed on a Control Plan.

For Ballard documents (drawings, specifications, control plans, etc.) with potential significant/critical characteristics symbols, Suppliers should be able to demonstrate how these potentially special characteristics are affected by the Process FMEA (Failure Modes and Effects Analysis). Characteristics that are confirmed as special after PFMEA are required to be managed by reporting product/process capability, using appropriate control plans, and submitting dimensions/test results. A control plan should be in place to ensure that such special characteristics are met. This requirement does not affect a Supplier's responsibility to ensure that other product/ process characteristics are satisfied.

9.0 Forms and Related Documents

POL5100158: Ballard Supplier Conduct Principles
FRM5102095: Declaration of Compliance with Ballard Supplier Conduct Principles
FRM5100105: Supplier Profile
FRM5102392: Supplier On-Site Assessment by Ballard Quality and Supplier Self Assessment
FRM5101620: SHORT FORM Supplier Assessment / Self Assessment
FRM5100574: Supplier Design and Specification Review Form
PRC5100965: Supplier Design and Specification Review Procedure
FRM5100416: Supplier Product/Process Change Request (PCN)
PRC5103218: Supplier Product/Process Change Notification (PCN) Requirements
FRM5101624: Part Submission Warrant
FRM5101622: Prototype and Interim Approval
FRM5101623: PPAP Submission checklist
FRM5000017: Supplier Corrective Action Request Form (SCAR)
PRC5103090: Supplier Corrective Action Request (SCAR) Process
POL5100162: Conflict Mineral Policy