



Supplier Quality Guidelines

**ABB Inc.
Robotics N.A.**

Eighth Edition
November 2012
3.03.P01.W01 Rev F



Approvals:

Patrick Matthews

Supplier Chain Management
ABB Robotics, N.A.



Quality Policy

We will provide the highest level of quality for products, systems, and services that meet our customers' requirements and exceed their expectations. The voices of our customers, suppliers, and employees are the driving force for continually improving our business processes.



Table of Contents

Section	Page #
Introduction.....	1
Section 1: ABB Guiding Principles and General Information.....	2
Section 2: Supplier Performance Measurements.....	3
Section 3: Supplier Expectations.....	5
Section 4: Non-Conformances.....	6
Section 5: SCM References.....	7
Appendix A: Requirements for “Design Only” and “Design & Build” Suppliers.....	8
Appendix B: Workmanship Standards & Inspection Requirements.....	10



Introduction

This document is intended to provide a framework to consistently conduct business and communicate between suppliers and ABB Robotics, N.A. (hereafter referred to as ABB). It does not replace any legal content found in purchase orders, supplier agreements, contracts, or other business agreements. Upon purchase order acceptance with ABB by seller, seller agrees to the Supplier Quality Guidelines stated hereto.

Superseded Documents

ABB Supplier Guideline rev. 7, September, 2010

Revision Control & Clarifications

Revision:

ABB will review this manual annually. Updates to this document can be found at this ABB site:
<http://www.abb.com/product/ap/seitp327/07de2c5b78dc83f3852574bb00453ea0.aspx>

Clarifications:

Requests for clarification should be directed to the appropriate ABB Supply Chain Management representative.



Section 1 – ABB Guiding Principles and General Information

1.1 Scope

The intent of this document is to develop a set of quality expectations that offer both ABB and our suppliers the best chance for mutual long-term success.

ABB recognizes four (4) supplier classifications:

- Catalog Commodity Suppliers
- Engineering/Design Only Suppliers
- Design & Build Suppliers
- Manufacturers/Assembly

1.2 Quality System

ABB's requires that suppliers continually develop and improve the processes by which they deliver value to ABB. Suppliers are expected to have formal, documented quality systems and quality controls in place, as applicable to their business. Independent certification to one of the industry-recognized quality system standards (ISOTS16949:2002, ISO 9001:2008 or ISO 14001:2004) is highly recommended.

ABB reserves the right to perform its own assessment of a supplier's quality processes. Such assessment will typically occur when the supplier's performance deteriorates. ABB may also assess a supplier's quality system prior to awarding business in the event the supplier chooses not to certify to one of the aforementioned quality standards.

Failure analysis with root cause identification will be required for systematic problems and repeated defects. ABB will audit permanent corrective action(s) to ensure they have been implemented.

1.3 Basic Quality Requirements

Suppliers are expected to provide products that are inherently safe for ABB and the end users to operate, maintain, and eventually decommission. This includes but is not limited to providing designs and products that use environmentally friendly chemicals throughout their life. Uses of materials that have been proven to be hazardous are strictly forbidden without obtaining written approval from the ABB Project Manager, end user acquisition engineer, and end user Health & Safety management.

Suppliers are required to engage in continual improvement techniques to strengthen their business and reduce their overall costs to ABB.

The supplier is responsible to provide written communication to ABB regarding any changes to the following: materials, processes, manufacturing location, sub-contractors, supply and capacity issues, and critical personnel.

Suppliers must keep all ABB detail prints on file for one year from time of equipment shipment to ABB.



Section 2 - Supplier Performance Measurements

2.1 Supplier Scorecard

Suppliers' overall performance will be measured on a Supplier Scorecard in three areas:

Measurement	Suppliers' Objective
<ul style="list-style-type: none">On-Time DeliveryAs-Received QualityCost Reduction Programs	<ul style="list-style-type: none">100% on-timeZero defectsCost reduction program in place

The Supplier Scorecard will provide objective criteria in the awarding of new business. Additional consideration will be given to the supplier's historic responsiveness to ABB's requests for support and the supplier's record of continual improvement.

The Supplier Scorecard will be reported to key suppliers once per year and it will be based on the supplier's performance over a 12 month period. Suppliers must maintain a "Qualified" status (see below) to be considered for future business with ABB. Critical key suppliers are chosen by shipment volume and buyer discretion; critical key suppliers are not necessarily driven by spend volume.

2.2 Performance Measurement

Table 1
Supplier Scorecard

Metric	Performance Target	Maximum Score
On-Time Delivery	100%	10
As-Received Quality	Zero Defects	10
Cost Reduction	Program in Place	2

2.3 On-Time Delivery

Suppliers should not promise delivery dates they cannot meet. ***For each Purchase Order line delivered in full into our building we measure the date consigned on the PO against the actual delivery date to our dock.*** Promised dates may be modified only if a supplier obtains written approval from ABB Supply Management. ABB defines "On-Time Delivery" as the percentage of PO lines received in full at ABB's Receiving Dock (i.e. from the dock date, not the date of shipment).

Note that ABB does not review, modify, or make exceptions to these dates "after the fact." It is your responsibility to have adequate PO acceptance and monitoring system in place to constantly respect the purchase order (PO) parameters, and to communicate with your ABB Supply Chain Management (SCM) representative as early as possible when exceptions occur. In all cases this must be done before actual delivery.



On-time delivery performance will be rated as follows:

OTD Performance	Rating
95% - 100%	10
92% - 94%	9
90% - 91%	7
<89%	5

2.4 As-Received Quality

ABB considers each part delivered to have one (1) opportunity for defect. If a part cannot be immediately used for its intended application, even without additional cost incurred, it is considered to be a defect.

Delivering the wrong “off-the-shelf” unit(s) will be considered one (1) defect per incorrect unit received. Missing units will also be considered “defective.”

Individual units received with more than one defect (for example, a part with a rusted surface and a welding defect) will be considered as one (1) defect.

As-Received Quality is based on a percent of the number of nonconforming parts delivered to the total number of line items delivered annually.

As-Received Quality will be rated as follows:

As-Received Quality Performance	Rating
99%-100%	10
95% - 98%	9
90% - 94%	8
<89%	0

2.5 Cost Reduction Program

Maintaining an active cost reduction program is crucial to a supplier’s success with ABB. Not only does an active program increase a supplier’s overall performance rating, it helps keep a supplier favorable compared to others in its commodity group by offering the most competitive pricing.

For cost reductions, we are looking for the activities in your facility which will reduce your production costs. The activities can be process improvement for higher efficiency, low cost outsourcing plans, new investments for productivity, quality system enhancement for reducing waste, discount programs, rebates and the like.

Cost Reduction Programs will be rated as follows:

Cost Reduction Program	Rating
Yes	2
No	0



2.6 Overall Performance Rating

Overall performance will be calculated as follows:

Supplier Performance = As-Received Quality Rating + OTD Rating + CRP Rating

All critical key suppliers will be rated based upon the Supplier Performance Measurement described in Table 2.

**Table 2
Supplier Performance**

Status	Supplier Performance Measurement
Best in Class	- Overall Rating: 22
Preferred	- Overall Rating: 20 - 21
Qualified	- Overall Rating: 15 - 19
Must Improve	- Overall Rating: <14

Best In Class Status

Best In Class suppliers set the standard for all other suppliers. Flawless execution and price leadership make these suppliers ABB's choice for long-term and strategic relationships.

Preferred Status

Proven performance and cost competitiveness give these suppliers the opportunity to bid for new business. Preferred suppliers can expect to receive business from ABB provided they sustain this high level of performance.

Qualified Status

ABB buyers are authorized to solicit bids and award orders to those suppliers holding Qualified Status.

Must Improve Status

Soliciting bids and awarding orders to suppliers on Must Improve status is permitted, but requires the advance approval of the Manager of Supply Chain Management. While this does not preclude them from doing business with ABB, we evaluate these suppliers on a case-by-case basis and determine if alternatives need to be developed. Must Improve suppliers are strongly encouraged to implement corrective actions and to actively engage ABB in demonstrating that they are improving their performance.

Section 3 – Supplier Expectations

3.1 ABB Supplier Code of Conduct

ABB expects all of its Suppliers to adhere to good working standards and business ethics. Please review and understand this document found on the ABB Robotics SCM website.



3.2 Sustainability Affairs

All suppliers to ABB Inc. are required to review and understand “Sustainability in the Supply Chain: Developing Strength in our Networks” article dated March 8, 2012. This can be found on the ABB Robotics SCM website.

3.3 Are you a critical key supplier to ABB?

All critical key suppliers to ABB N.A. are required to complete and submit form 9AKK102951 (ABB Qualification Questionnaire) and review form 9AKK102949 (Supplier Requirements) every 3 years. Completed forms must be forwarded to department administrator. If you are unsure if your company is considered a “critical key” status, please contact your respective buyer. These forms can also be found on the ABB Robotics SCM web site.

Section 4 – Non-Conformances

4.1 NCM (Nonconforming Material) & Supplier Corrective Action Request

A Nonconforming Material Report (NCM) will be issued when defective materials or engineering are provided by a supplier. An initial response to an NCM is required within 24 hours of notification. A final response is required within 20 days. In some cases Supplier Corrective Action Requests (SCARs) will be part of closing an NCM. Suppliers must adhere to our requirements with regard to communicating progress on SCARs. SCAR's are not closed until written approval is provided by ABB. ABB's preferred method for a SCAR is through 8D reporting. Forms are available on the ABB supplier portal web site.

Note that the original NCM tag MUST be attached to the new shipper when returning material to ABB!

4.2 Standard Charge-Back Policy for Non-Conformance and On Time Delivery

ABB expects all materials and equipment to arrive at our facility built according to the drawings and/or specifications and inspected prior to shipment. If it is confirmed by SCM that a non-conformance is attributable to a supplier, then ABB expects that supplier to take financial responsibility for its resolution.

In all cases the supplier will be notified of the non-conformance, and whenever possible will be given the opportunity to resolve the defect itself. In cases where this is not possible, ABB will back charge suppliers for our direct costs to resolve the non-conformance plus any related indirect costs at the rate of \$85.00 per hour.

Effective August 1, 2008 late deliveries to ABB will result in a payment offset of 0.5% for each day late. It is imperative that committed delivery dates are adhered to.

4.3 Deviation Delivery

ABB reserves the right to receive at any time material that does not meet specifications. Under these circumstances, this material will not be counted as NCM with presented written approval.



Section 5 – SCM References

5.1 Please visit the following web site to receive updated ABB SCM forms and information:

1. www.abb.us/
2. Under “Our Offerings”, select “Robotics”
3. In the far right lower column, select “SCM Collaboration”



Appendix A – Requirements for “Design Only” and “Design & Build” Suppliers

Design Only Sources:

We expect our Design Only resources to deliver designs that are reliable, easy to maintain, and that achieve the end user and ABB's cost targets. In order to do this consistently the following requirements reinforce our core engineering values.

1. Supplier Activities

In order to meet ever-higher targets for equipment availability and reduced costs related to maintenance activities, these “vital few” R&M activities are required for new designs:

1.1 Things Go Right /Things Go Wrong:

It is the supplier's responsibility to eliminate prior failure modes or maintenance issues from designs whenever possible. It is the supplier's responsibility to contact ABB Engineering, SCM and Customer Service to identify areas for improvement or things that went very well that should be repeated.

1.2 Tier 2 Buyoff

Design sources shall identify critical components in the design. Letters of Application Agreement from the components' manufacturers shall be supplied to provide evidence that the components were applied and installed correctly.

Letters of Application Agreements shall be included as part of the final design documentation.

1.3 Design Calculations – Mechanical:

Suppliers must verify that components are able to withstand the stress that will be applied during operation through design derating.

1.4 Design Calculations - Electrical

All controls shall be design derated. In addition to this, the controls design house shall perform heat calculations for panels that are deemed to be the highest risk, (e.g. multiple spindles/servo controls in the same panel, etc.). **ABB's official maximum allowed panel temperature is 130 F.** The set of calculations shall be included as part of the final design documentation.

1.5 Design Reviews with a Maintainability Focus

Evidence of design reviews shall be turned in as part of the final engineering documentation package

1.6 FMEA's

The design supplier is required to identify and list the critical subsystems of the design and complete machinery FMEA for each subsystem at appropriate points during the design process. The supplier is encouraged to complete the appropriate FMEA with the responsible engineer from ABB. Nonparticipation by ABB does not absolve the supplier of responsibility to complete the FMEA. **The supplier must obtain written approval from ABB engineering if FMEA is not required.**

2 Optional R&M Activities:

The following may be required at the direction of ABB's application engineer.

- **Data Collection**
 - Inherent
 - Operational
- **RBD (Reliability Block Diagram)**



3 Reference Jobs

Supplier must verify that any reference concepts being used reflect the “as-built” condition of the reference equipment.

4 Drawing Standards and Specifications

Unless otherwise specified, the standard format for all engineering media will be AutoCAD.

5 Drawing Control

The supplier shall have a formal process to control engineering documentation and engineering changes. This process must ensure that:

- No one ever works to an out-of-date print at the supplier site, at ABB, or at the end customer's site.
- Drawings/data are controlled during the assembly/debug/ installation/ commissioning process at ABB and the customer site.
- Any changes made by the supplier and executed during build and install are fed back and incorporated into the final engineering documentation package prior to submission to ABB.

ABB requires an updated “As-Built” drawing package free from engineering revisions for file.

6 Control of Customer Supplied Material and Drawings

The supplier shall have a process to make certain that they are working to the latest revision of customer part prints and engineering specifications. Changes to part prints/specifications will be communicated by the acquisition engineer. The supplier's process must control how the changes are communicated through their organization and must assure that changes are addressed in final design.

7 Documents for Run-off

The supplier should have a set of final document ready for run-off. “ABB Buy-Off” form shall be utilized here.

8 Supplier Book

The supplier shall provide one supplier book for each design or design & build job. The book shall consist of following contents.

1. R & M
2. Calculations
3. Letters of applications
4. Purchased component cut sheets
5. Final drawing package (As-Built) available at time of run-off for engineering validation
6. Manufacturers materials that come with purchased components
7. Copies of applicable certification documents



Appendix B - Workmanship Standards & Inspection Requirements

1 Workmanship Standards

Materials

- No material substitution is allowed unless written approval is issued from ABB purchasing.
- All specifications and tolerances, as stated on the drawing, must be adhered to.

Machining

- Unless otherwise specified all threads are to be left soft
- Burrs left over from tapping operation must be removed
- All sharp edges must be broken on details

Welding

- All welds must have equal length legs within reason
- Welds are to be continuous unless otherwise specified on the print
- Welds must use the necessary current, filler material, and surface/joint preparation to assure penetration that meets AWS D1.2 Structural Code. **All cold welds will be rejected on sight.**
- All bases or large weldments must have leveling bolt holes re-tapped after heat treatment or painting.
- If there are welds in areas of through holes, there must be a weld and spatter free region around the through hole large enough to accommodate the anticipated bolt and a washer. Washer/Bolt must be able to sit flat against surface.

Painting

- There must be NO PAINT inside of threaded, through, or dowel holes
- There must be NO PAINT on any machined surface
- Paint must be applied uniformly (no runs, under/over-spray, etc), and be of the specified shade.
- Paint must be dry prior to shipment and must be well protected for shipment.
- All paint must be purchased through an ABB-approved paint source. All paint will be bought on a project basis. The ABB acquisition engineer will deliver the proper paint specification(s) for their projects to the ABB source. ABB suppliers will contact the approved source and will reference the project when ordering paint.
- Paint must be applied at a minimum thickness of 0.5 mil unless otherwise specified.

Protection

- Parts must be oiled prior to shipment to ABB.
- Smaller parts that are prone to rusting are also to be wrapped with VCI paper.
- Threaded holes must be free of grit from sand blasting prior to being shipped to ABB
- All Pneumatic, hydraulic, lubrication, and coolant lines on assemblies or details must be clean and capped to prevent contamination on shipment.

2 Inspection Requirements

- Inspections will only be conducted by personnel who are specially trained to conduct the measurement of interest. Records of their training/abilities must be available for auditing.
- All equipment used to inspect final part dimensions must be certified and calibrated within the prescribed period of time.
- Inspection results are to be logged on the supplier's inspection form. The detail print or Inspection Sheet must be signed / dated by the technician completing the inspection.
- All linear dimensions with tolerances of +/- 0.001" (+/-0.025mm) and tighter and all geometric feature tolerances of +/- 0.002" (+/- 0.050mm) or tighter are required to be certified prior to shipment.
- Material hardness needs to be checked against specification.



- Inspection records must be included with the package the detail is shipped in (if a detail print is used as the inspection record, a copy is to be included, as the supplier must keep the original print on record for one year). **Note: Inspection report(s) are required with shipments.**
- Surface finish call outs are to be checked at minimum using widely available surface finish standard blocks (visual/touch comparison to standard).
- All threaded holes are to be gauged using the appropriate thread gage just prior to being shipped to ABB.

3 Packaging and Transportation

- Parts must be packaged and shipped in a manner as to be protected from all reasonably expected hazards (including from weather) from the supplier's shipping dock through final receipt at ABB's receiving dock.
- If there is more than one part per container, the parts must be protected from one another (the protection must withstand any harsh road/driving conditions normally encountered).
- Reference document "3.04.P08.W03 Rev. O ABB AH Vendor Packaging Guidelines December 2012." This document can be found on the ABB Robotics SCM web site.

ABB reserves the right to reject parts based on any dimension, note, or aesthetic appearance, whether the feature requires physical inspection or not.

4 Common Quality Problems found

Following is common quality problems found from the deliveries. The suppliers should take preventive actions to avoid them happen in future deliveries.

Manufacturing

- Machined surfaces, threaded holes and dowel holes should not be painted.
- Painting Quality
 - o Apply pre-treatment on the part surfaces before painting
 - o Painting process must be followed (base coat plus 2 or more top coats with drying times in between).
 - o Painting finish must be smooth.
- Machined surfaces must be greased for antirust protection.
- Welding quality should improve and dross has to be cleaned up before painting.
- Any deviations from specifications and/or requirements must be approved by ABB before proceeding.
- Critical dimensions must be checked (They must be the items in final inspection report.)
- Hardness call outs must be verified before shipment (It must be an item in final inspection report if applicable.)



Packing and Delivery

- Packed parts should be supported properly in the crate to avoid motion during transportation.
- Packing should be done after paint is completely dried.
- Painted surfaces should be protected properly, especially packed with other boxes and small parts, to avoid shipping damage.
- Parts must be part-number stamped or have part tags attached for identification.

Figure 1 - A Good Example How **Not** to Do It