



Improving Procurement Reliability Through Planning & Better Communication

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Following the letter of the ISO 9001/2 standard, clause 4.6 is a good place to begin to document your basic procurement related needs. However, this baseline may not be sufficient enough to:

- Reduce your own liability associated with purchased products
- Improve communications internally
- Improve communications between your company and the supplier
- Improve your supplier's performance

Careful consideration should be given to the various aspects of your procurement cycle to determine if any possible shortcomings may exist. The following questions offer a means of self-assessment and are focused upon the criticality of the items which make-up your final offering to your customer.

“Criticality” could be defined as the level of importance, based upon your company’s perceptions and experience, that should be placed upon any of the following topics to reduce liability (e.g., suppliers, hardware, software, processed materials, software, personnel, processes, facilities, equipment, technology and your offering to the customer). Whereas, “liability” (management system related definition) could be considered to be anything that has the potential to cause the loss of revenue (e.g., downtime, mishap, failure, etc.).

Self-Assessment Questionnaire

1. Have you ever analyzed the level of control placed upon purchased products cross functionally throughout the organization?
2. Do any groups have the authority to make purchases from unqualified suppliers or through means outside of the standardized procurement system?
3. Can purchases made by the following functions/groups (as an example) have an impact upon your offering to the customer, particularly if their purchases are not controlled: facilities/maintenance, field service, installation, repairs, shipping, warehousing, warranty?
4. If such procurements are made, can the purchased products eventually end up in an offering to the customer (e.g., prototypes)?
5. Do you have a receiving verification program consistent with the level of criticality of the purchased product?
6. Do you apply receipt verification only to processed materials or hardware, or do you extend it to services (e.g., calibration, etc.) or software applications?
7. Do you document verbal requests from your customers and reconfirm these requests with them?
8. Do you document purchase requirements to your suppliers at the time of purchase?
9. Do these requirements include controls or restrictions regarding the use of a subcontractor to the supplier?
10. Do these requirements specify how many levels of subcontractors can be used?
11. Do these requirements include your right and/or your customer's right to visit the supplier's facility and/or each level of subcontractor involved?
12. Have you had problems with this supplier being able to understand your requests the past?
13. Have you received inconsistent product in the past?
14. Do you require suppliers to document their compliance to purchase order requirements through certificates of compliance, certificates of analysis, material test reports or through a similar means?
15. If a supplier is furnishing product "just in time", have you analyzed the level of control and verification at the supplier's facility and do you specify the level of documentation necessary to demonstrate their conformance to the requirements?
16. Has the supplier ever shipped you the wrong product?

17. Have you received damaged incoming product in the past?
18. Have you ever analyzed the method(s) of product delivery to your company?
19. Have you analyzed the method of delivery versus the type of products and do you address specific controls associated with the criticality of the product (e.g., environmental, packaging, preservation, handling, and shipping)?
20. If a supplier nonconformity is identified after receipt, but prior to shipment of the final offering to the customer, could the nonconformity have an adverse impact upon your design, product or process?
21. If a nonconformity is not identified during the receiving process, what is the cost or potential impact to production?
22. Would a failure of your product in service have a libelous effect upon our company?
23. Could such a failure be related to the products (hardware, software, processed materials and/or services) received from your suppliers?
24. Would such a failure soil the customer's perception of your company or could it potentially cause adverse publicity?

Criticality could be boiled down into a single question "how much?" How much compliance and/or documentation is necessary to ensure that our purchase and related activities meets specified requirements?

Level of Criticality Clarified

Depending upon the organization and/or the offering to the customer, the criticality may be designed into the product. However, sometimes, ancillary services or activities could have an effect upon the critically, for example:

- ***Preservation or marking materials:***
a preservative or type of marking material, when applied, causes a chemical reaction to a certain type of materials– potential result, corrosion over a period of several months to several years.
- ***Packaging:***
an improperly packaged component encounters excessive vibration during transit – potential result, premature failure after installation at the customer's facility.
- ***Handling or shipping:***
a pressure vessel made from specialty materials was shipped unprotected on a flat-bed trailer that traveled a national highway where road salt was used during a snow storm – potential result, eventual corrosion.

- **Off-site calibration of inspection, measuring and test equipment:**
calibrated equipment has been returned from the calibration supplier; however, packaging and handling requirements were not clearly specified. Subsequently, the shipper dropped the improperly packaged equipment after calibration on its return to the purchaser—potential result, the equipment was used in an out of calibration state for 6 months, thereby causing the user to re-evaluate past inspection/test results, including the possible need for a product recall.
- **Engineering prototypes:**
the Engineering Department is manufacturing Prototypes. Materials for the prototypes are being purchased from local consumer electronic stores and not from a qualified supplier – potential result, premature failure of your company’s product which was subsequently used as a component in your customer’s offering to the end user.

In consideration of your self-assessment results criticality could be expressed in simplistic terms as shown in Table 1 and applied to your suppliers to the extent necessary. However, once criticality is determined the method of supplier evaluation and product receipt (i.e., hardware, software, processed materials or software) should be commensurate with the level of criticality.

**Table 1
Levels of Criticality ***

Level of Criticality	Definition
1.	Has a potential effect upon health, safety or environment
2.	Has a potential effect upon product installation, operations and/or service
3.	No potential impact upon health, safety, environment, installation, operations and/or service, but has a potential effect upon form, fit or function
4.	Aesthetic value only

* **Note:** Depending upon your specific needs another simpler or more complex system of weighted values could be used.

Supplier Evaluation Examined

Supplier evaluation should be determined in conjunction with the criticality of the product being purchased (i.e., hardware, software, processed materials or services). The question “how much?” also applies to this activity. The key is to specify the level of assurance necessary to ensure that your offering to the customer functions as desired once you have incorporated the purchased product into your offering.

A variety of methods could be used, depending upon the criticality of the application. Shown below are some methods, which could be used individually or combined with the others to obtain the necessary level of control. For example, an on-site audit could be used as the primary means of evaluating a supplier. Once the audit results have been approved, the supplier could submit process and/or personnel qualification records for review prior to initiating activities. Upon starting the activities, source surveillance could be used to monitor specific activities at appropriate times throughout the contract with the supplier.

These same considerations should be passed-down to each and every level of subcontractor any particular supplier may use..

Sample Methods of Supplier Evaluation

1. On-site audit of the supplier's quality system
2. A documented review of the supplier's quality manual
3. A documented review and approval of the supplier's documented procedures, process and/or personnel qualifications, including subsequent modifications
4. A documented review of material test results (e.g., chemical, mechanical, etc.)
5. A documented review of a supplier's historical performance for the material, product and/or service provided
6. A documented review of a functional demonstration of the product's capability
7. Evidence that a supplier holds an industry certification/license (e.g., an API Monogram, UL Product Certification, ASME Certificate of Authorization, ISO 9000 certification, etc.)
8. Periodic surveillance at the supplier's or subcontractor's facility
9. A documented comparison to a similar product, including justification
10. A documented examination of previous compliance of the product used for another customer and/or application
11. Review of a supplier's past delivery on-time performance
12. Supplier capability questionnaire

Sole suppliers or customer-specified suppliers sometimes represent a dilemma in that the purchaser may feel that they have no control or limited control over a specific product. The ultimate question remains; "who has the ultimate responsibility to ensure that the offering to the customer meets specified requirements?"

If it is your company, then you should determine the level of criticality and specify accordingly.

Receipt Verification

Likewise the method of receipt verification should be determined in conjunction with the criticality and supplier evaluation method(s). Regardless of the supplier evaluation method used, a receipt verification should be performed to determine if purchased products conform to the requirements specified by your purchasing documents.

Receipt verification is considered to be the evaluation of a purchase whether the purchase is for product (processed materials or hardware), software or services. Receipt verification could include one or a combination of the below listed combinations.

Sample Methods of Receipt Verification

1. Verification of description/quantity
2. Visual inspection
3. Dimensional inspection
4. Test
5. Functional or performance verification
6. Analysis
7. Other examination methodologies
8. Review of documentation and/or objective results (e.g., certificates of compliance, certificates of analysis, material test reports or similar inspection and/or test results, qualification reports, etc.)
9. Review of calibration records, particularly the as-found versus as-left data

The method of receipt verification could parallel a specific level of criticality and/or product type to ensure that critical items are scrutinized more thoroughly than non-critical items. Often some of the following items/activities are excluded from receipt verification:

- Contracted engineering services (e.g., off-site design work or drawings)
- Design qualification services
- Software purchases, for off-the-shelf software used in the offering to a customer
- Programming services (for software either incorporated into the offering to the customer or for software to be used in critical process/quality system applications)
- Packaging, delivery and transportation services
- Storage services (off-site)

- Calibration services (on-site or off-site)

Table 2 illustrates a simple matrix or plan for procurement and/or related activities. This matrix combines criticality, supplier evaluation and receipt verification activities. Depending upon the commodity, sometimes the supplier evaluation method and the receipt verification method may be similar.

Clarifying Requirements to the Supplier

Depending upon your business type and the criticality of your offering to your customer, purchase order content could be very detailed or could merely make reference to an industry standard for a specific commodity.

When it is necessary to include specific information, considerations should be given to some of the below listed points.

Purchase Order Content Considerations

1. Actual product description – where possible, specify an industry standard, type or grade, including revision level. At times, a part number may be sufficient if it is traceable back to controlled documents which illustrate specific information
2. Attach your specifications, bills of materials and/or drawings where necessary and make reference to these documents on the cover of the purchase order, including their revision level
3. Include requirements for the physical identification of the product (using steel stamping or other marking methods, etc.), including its packaging, where applicable – be sure to specify the type of steel stamping or marking method/materials to be used. Sometimes low stress or low impact steel stamping is required or the use of low sulfur marking materials so as not to cause damage to materials in the future
4. Identify hold points for source surveillance to witness inspections, tests and/or specific processes
5. Include specific requirements for the supplier to notify you if he plans to use subcontractors and/or or if his subcontractors plan to use any other subcontractors. Ensure that the supplier and subsequent subcontractors understand that your purchase order requirements must be passed down
6. Include the possibility of for you or your customer wanting to visit the supplier's or the subcontractor's facility
7. Include specific requirements for cleaning, preservation, packaging, handling and shipping, including protection of the product to your destination where applicable
8. Include requirements to submit specific procedures, personnel qualifications and/or process qualifications for review and approval prior to performing specific activities

9. If applicable, include requirements to submit nonconformity reports issued against the products being made for your specific order
10. Include requirements to notify your company if there have been any changes in the status of their ISO 9000 or 14000 certification (or similar industry quality or product certification programs)
11. Include requirements to submit quality records (e.g., inspection/test reports such as, material test reports, chemical analyses, hydrostatic testing, etc.)
12. Include requirements to submit sample product for testing

Table 3 illustrates some of the products (commodities) your company may use to manufacture and/or assemble a hypothetical piece of equipment, including some purchase order content considerations and quality criteria that could be applied to the applicable commodity/commodity group.

The clearer the description, the less chance for your supplier or intermediaries (e.g., freight forwarder chosen by your supplier) to make an error. The key to purchase order content is to identify, in writing and to the extent needed, a concise description of what you are ordering, including a description of related requirements, needs or activities.

Depending upon your company's practice, details which enhance purchase order line item descriptions could be included in: specifications, drawings, catalogs, through part number descriptions, through a bill of materials, terms and conditions (although this is normally reserved for legal conditions) or purchase order attachment forms.

It is important to remember that anything, which becomes an attachment to a purchase order, must have a revision level or issue date. This may be the only way for the supplier to know that something has or has not changed from a previous order. For example: specifications can be used for parts, components, handling, packaging, shipping, plating, welding or a wide variety of other commodities and/or activities. Depending upon your business, it may be possible to order the same part number from a supplier at different revision levels.

Standardized purchase order attachments could be created in a check sheet format to address all of the possible contingencies of your business purchasing needs. The attachments could be several pages long or could be subdivided into specific check sheets for commodities, activities or services. When necessary the applicable attachment clauses could be checked (✓) and the blank sections filled-in. Completed attachments could then be affixed to the purchase order. Attachments, including their revision level, should be clearly stated on the purchase order and conversely the attachment itself should include a reference to the purchase order number and date.

Also, depending upon your specific needs and industry, you may wish to include the names, identifiers and revision level of specific codes, standards and/or specifications, including quality system requirements. It is not always necessary to ask a supplier to fully comply with a quality system standard – quality system requirements could include an entire standard such as ISO 9001 or it could include a reference to a specific clause within a standard to specifically illustrate a particular point.

The key factor will be the criticality of your supplier's offering to you and the level of control necessary to ensure you receive what you ordered.

Remember; be specific and concise in your purchase order content and line item descriptions. Depending upon the criticality of the products (hardware, software, processed materials or services) being purchased and its potential impact upon your offering, requirements may be more or less detailed.

*** Footnotes:**

1. Process machinery, operated through a controller (which includes software) forms the basis for the examples illustrated herein.

Table 2

Simple Matrix or Plan for Procurement and/or Related Activities

Commodity	Level of Criticality	Supplier Evaluation Method	Receipt Verification Method
1. Raw materials	1	7	1, 2, 3 & 8
2. Parts	2	7	1, 2, 3 & 8
3. Components	2	7	1, 2, 3 & 8
4. Assemblies	1	7	1, 2, 3 & 5
5. Subassemblies	1	7	1, 2, 3 & 8
6. Consumables (e.g., welding rod, flux, etc.)	1		1 & 8
7. Welding	1	3	2, 3 & 7 (Nondestructive Examination)
8. Heat treating	1	3	2, 3, & 7 (mechanical testing)
9. Nondestructive examination	1	3	1 & 8
10. Coatings or plating	4	3	1, 2 & 3
11. Mechanical testing or chemical analysis	1	2 and 4	8
12. Calibration	3	1 and 4	9
13. Packager, Shipper, Freight Forwarder	2	2 or 11	8 (shipping manifest or bill of lading)
14. Engineering services	1	1	8
15. Software	2	1	8 See Note 1

Notes:

1. Consideration should be given to the following stages of software development:
 - Project Outline
 - Specification
 - Design
 - Construction/Development
 - Testing
 - Installation

Table 2 Criteria

Levels of Criticality

1. Has a potential effect upon health, safety or environment
2. Has a potential effect upon product installation, operations and/or service
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4. Aesthetic value only

Supplier Evaluation Methods

1. On-site audit of the supplier's quality system
2. A documented review of the supplier's quality manual
3. A documented review and approval of the supplier's documented procedures, process and/or personnel qualifications, including subsequent modifications, for a specific activity
4. A documented review of material test results (e.g., chemical, mechanical, etc.)
5. A documented review of a supplier's historical performance for the material, product and/or service provided
6. A documented review of a functional demonstration of the product's capability
7. Evidence that a supplier holds an industry certification/license (e.g., an API Monogram, UL Product Certification, ASME Certificate of Authorization, ISO 9000 certification, etc.)
8. Periodic surveillance at the supplier's or subcontractor's facility
9. A documented comparison to a similar product, including justification
10. A documented examination of previous compliance of the product used for another customer and/or application
11. Review of a supplier's past delivery on-time performance
12. Supplier capability questionnaire

Receipt Verification Methods

1. Verification of description/quantity
2. Visual inspection
3. Dimensional inspection
4. Test
5. Functional or performance verification
6. Analysis
7. Other examination methodologies
8. Review of documentation and/or objective results (e.g., certificates of compliance, certificates of analysis, material test reports or similar inspection and/or test results, qualification reports, etc.)
9. Review of calibration records, particularly the as-found versus as-left data

Table 3

Sample Purchase Order And Quality Related Requirements

COMMODITY	SAMPLE (Purchase Order Descriptions)	ISO 9001 CLAUSE (Possible Reference – Purchaser to specify actual requirement)
Materials		
1. Raw materials	Raw Material: 1-3/4" Diameter Bar Stock, 10,000 feet minimum/+ 500 feet Standard: ASTM A 193 – 1999, Alloy-Steel & Stainless Steel Bolting Materials for High-Temperature Service Testing: ASTM A 370 – 1999, Methods and Definitions for Mechanical Testing Steel Bolts, Studs, and Other Externally Threaded Fasteners	4.8 - for bar identification 4.10 - for material test reports 4.15 – for preservation, handling and shipping
2. Parts		
3. Components		
4. Assemblies		
5. Subassemblies		
Materials/Processed Materials		
6. Consumables (e.g., welding rod, flux, etc.)	Weld Rod: 150 pounds, AWS Class E7018H4R, Polarity DC+/AC, include MSDS's and manufacturer storage and re-drying fact sheets	4.5 – Manufacturer storage and re-drying fact sheets 4.8 – for electrode identification
Services		
7. Welding	Welding: Weld pressure vessel assemblies shown in drawing PV583, Rev. 3 attached (2 pages) to ASME Section VIII, Division 1. Welders shall be qualified to the requirements of ASME Section IX. ASME Codes shall be the latest edition and addenda. Qualification Records: Supplier required to submit welder qualification records prior to	4.5 – document control of ASME Codes 4.9 – special process considerations 4.16 – record submittal requirement 4.18 – welder qualification
8. Heat treating		
9. Nondestructive examination		
10. Coatings or plating		
11. Mechanical testing or chemical analysis		

COMMODITY	SAMPLE (Purchase Order Descriptions)	ISO 9001 CLAUSE (Possible Reference – Purchaser to specify actual requirement)
12. Calibration	beginning work.	
13. Packager, Shipper, Freight Forwarder	Hold Point: Supplier shall provide 3 days advance notification to Purchaser's Quality Department for inspection after fit-up.	
Professional Services		
14. Engineering services	Assembly Drawing Development and Control: Supplier to have an in-house quality system. Key elements of the quality system shall focus on ISO 9001-1994, clauses 4.4 (design control), 4.5 (document control) and 4.16 (record control).	4.4 – design 4.5 – document control and issuance 4.16 – record control 4.18 – personnel qualifications
Software		
15. Software	Process Equipment Software: Supplier to furnish RunGood Software, Version 3.20 as modified by Purchaser specification S423, Revision 3.	4.4 – software coding and modifications 4.5 – software version control 4.10 – software testing 4.16 – record control