FLOWSERVE

Limitorque Actuators

Flow Control Division

TO: US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-001

FROM: Jeff McConkey

DATE: 8/12/2011

SUBJECT: Response to Notice of Violation's and Nonconformance's (99900100/2011-201)

Ref.: Notice of Violation's and Nonconformance's as stated in Nuclear Regulatory Commission Inspection report Number 99900100/2011-201; Flowserve-Limitorque Corporation

Attached are the Flowserve-Limitorque Corporation responses to the NRC's Letter dated 7/14/2011 regarding Notice of violations (NOV) described in the referenced report and Notice of Nonconformance's (NON), also stated in the report.

If you have questions or require further information, please contact me at 434-845-9738

Regards,

Jeff McConkey
Quality Assurance Manager

Cc: Juan Peralta, Chief
Quality and Vendor Branch 1
Division of Construction Inspection and Operational Programs
Office of New Reactors

Attachments

Flowserve
A Unit of Flowserve Corporation
Flow Control Division

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Lynchburg, VA 24502

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IE09
NRO

Reply to Notice of Violation
NRC Inspection Report 99900100/2011-201; Flowserve

Violation VIO 99900100/2011-201-01

The Violation as stated in the referenced Notice of Violation (NOV) is as follows:

Title 10 of the *Code of Federal Regulations* (10 CFR) 21.21(a), "Notification of failure to comply or existence of a defect and its evaluation," requires, in part, that "[e]ach individual, corporation, partnership, or other entity subject to the regulations in this part shall adopt appropriate procedures to -- (2) [e]nsure that if an evaluation of an identified deviation or failure to comply potentially associated with a substantial safety hazard cannot be completed within 60 days from discovery of the deviation or failure to comply, an interim report is prepared and submitted in writing to the Commission. . . within 60 days of discovery of the deviation or failure to comply."

Quality Assurance Procedure (QAP), QAP 13.2, "Reporting of Defects for Safety Related Equipment," Revision 15, states, in part, that "[a]ny defect condition under evaluation which cannot be completed within 60 days from date of discovery shall be reported to the Nuclear Regulatory Commission (NRC) in the form of an Interim Report within 60 days."

Contrary to the above, as of March 4, 2011, Limitorque did not complete an evaluation and failed to prepare and submit in writing to the Commission an interim report within 60 days of discovery of an identified deviation or failure to comply potentially associated with a substantial safety hazard. Specifically, the NRC inspection team determined that Limitorque had not completed its evaluation, nor prepared and submitted an Interim Report to the Commission for an ongoing Part 21 evaluation initially identified on September 28, 2010.

This issue has been identified as Violation 99900100/2011-201-01.

This is a Severity Level IV Violation (Section 6.5).

Reasons for the Violation

Flowserve failed to follow the established timeline in procedure QAP 13.2 "Reporting of Defects for Safety Related Equipment". An active Part 21 file was established and the appropriate evaluation was in process but Flowserve failed to file an interim report to the NRC commission as required after 60 days.

Corrective Actions Taken

Flowserve is still in the process of evaluation of the above potential Part 21 and is in the process of preparing an interim report to submit to the NRC commission by 6/3/11 or before. Flowserve has also retrained all members of the Part 21 committee to the requirements of QAP 13.2 (Reporting of Defects for Safety related Equipment).

Actions to Avoid Future Violations

Flowserve will follow the requirements of existing procedure QAP 13.2. The Quality Assurance manager will also visually track any "open" Part 21 evaluation to make sure all timelines are adhered to and report to upper management as needed of the status.

Additional comments – Flowserve had stated and committed to submit the interim report to the NRC on or before 6/3/11 as part of the corrective action to the above original NRC finding. Flowserve has completed the evaluation of the issue on schedule and has since submitted the final report to the NRC on schedule as stated in the interim report. Flowserve failed to realize that while the evaluation was still in process the interim report should have been submitted immediately after the NRC audit and not as part of our corrective action plan. The Part 21 committee members are now fully aware that we made a mistake in this approach and any future Part 21 report will be filed to the NRC strictly by the procedure QAP 13.2 and the requirement under Title 10 of the Code of Federal Regulations (10CFR) 21.21(a)(2). Flowserve currently has no "open" Part 21 evaluations in process.

Date of Full Compliance

Corrective actions will be completed by 6/3/11.

Reply to Notice of Violation
NRC Inspection Report 99900100/2011-201; Flowserve

Violation VIO 99900100/2011-201-03

The Violation as stated in the referenced Notice of Violation (NOV) is as follows:

10 CFR 21.31 states, in part, that "[e]ach individual, corporation, partnership, dedicating entity, or other entity subject to the regulations in this part shall ensure that each procurement document for a facility, or a basic component issued . . . specifies, when applicable, that the provisions of 10 CFR Part 21 apply."

QAP 6.1, "Purchasing Procedure," states that the procurement documents are to impose the requirements of 10 CFR Part 21 on its qualified suppliers in purchase orders for nuclear safety related materials, items, and services.

Contrary to the above, as of March 4, 2011, Limitorque issued procurement documents for basic components that did not impose the provisions of 10 CFR Part 21. Specifically, safety related services were procured from an approved vendor without imposing 10 CFR Part 21 reporting requirements.

This issue has been identified as Violation 99900100/2011-201-03.

This is a Severity Level IV Violation (Section 6.5).

Reasons for the Violation

Safety related testing services were procured using a blanket purchase requisition form without imposing the requirement of 10CFR Part 21. Exova Testing Services Quality System meets the requirements of 10 CFR50 Appendix B and 10 CFR Part 21.

Corrective Actions Taken

The blanket Purchase Requisition form has been revised as follows: " TESTING SHALL BE DONE IN ACCORDANCE WITH EXOVA QUALITY ASSURANCE MANUAL REV. 2 DATED 2/1/10, 10CFR50 APPENDIX B, 10CFR PART 21, AND NQA-1 ". Also, Revised QAP 6.1 appropriately to state requirements of safety related testing services.

Additional comments- Purchasing procedure QAP-6.1 section 4.6 Purchase Orders for Services was revised by adding section 4.6.3 Safety Related Testing Services shall be in accordance with 10CFR50 Appendix B and 10CFR Part 21. To address the extent of condition for this issue Flowserve has completed a review of PO's for all safety related components purchased and has not found any additional deficiencies. Exova is listed on our approved vendors listing and is audited triennially to the requirements of 10CFR50 Appendix B and Part 21. Exova has not had any Part 21 reportable issues for the material testing services they provide Flowserve.

Actions to Avoid Future Violations

Adhere to requirements of QAP 6.1

Date of Full Compliance

Corrective actions completed as of 6/27/11.

Reply to Notice of Nonconformance
NRC Inspection Report 99900100/2011-201; Flowserve

Nonconformance NON 99900100/2011-201-04

The Nonconformance as stated in the referenced Notice of Notice of Nonconformance (NON) is as follows:

Criterion III, "Design Control," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states, in part, that "[m]easures shall be established to assure that applicable regulatory requirements and the design basis . . . are correctly translated into specifications, drawings, procedures, and instructions . . . . The design control measures shall provide for verifying or checking the adequacy of design . . . . The verifying or checking process shall be performed by individuals or groups other than those who performed the original design."

Flowserve's "Quality Management System Manual" (QMSM), states, in part, that "design and development changes shall be identified and records maintained," and that "changes shall be reviewed, verified, and validated, as appropriate, and approved before implementation."

Contrary to the above, as of March 4, 2011, Limitorque failed to establish measures to assure that applicable regulatory requirements and design basis are correctly translated into specification, drawings, procedures, and instructions; and failed to perform independent reviews of changes to software used in the manufacturing of safety related actuators. Specifically, Limitorque failed to develop guidance for when software reviews are to be performed and to independently verify changes to the "Configurator" software used in the design and assembly of safety related Limitorque actuators.

This issue has been identified as Nonconformance 99900100/2011-201-04.

Reasons for the Nonconformance

The product configurator is not used for the design of the SMB and HBC nuclear product. The configurator is solely used for the selection of the appropriate B/M's to construct the final assembly. When changes are made to the controlling EPS documents an ECN is generated. Subsequently the configurator will also be updated. Only the configurator administrator can make changes to the EPS document and the product configurator itself. Once the product configurator and EPS is updated the configurator administrator will run a sample check configurator to verify that the product configurator output is correct. At this point we were not performing an independent review of the software configurator changes.

Corrective Actions Taken

Flowserve will add an additional step to the product configurator output for SMB and HBC nuclear product that will require the ECN originator and another Engineer for verification. A signed scanned copy of this configuration output will be attached to the ECN. QAP 5.1 has been revised accordingly.

Additional comments- Each change to the configurator is initiated by the ECN/ECO process and is recorded on the EPS standard. Each of these processes all have their own separate approvals. The center of gravity program is a Lotus 1-2-3 spreadsheet application that has not changed in recent years. To address the extent of condition evaluation Flowserve engineering will review the last (2) years of configurator changes, center of gravity calculations, and any other programs used on safety related orders to determine if any deficiencies exist. If any deficiencies are found they will be documented and processed through our corrective action process.

Actions to Avoid Future Nonconformance

Flowserve will verify this process by way of internal audits of the procedure QAP 5.1 and the process. Engineering will perform random hand calculations quarterly on center of gravity calculations.

Date of Full Compliance

Corrective actions and review for extent of condition will be completed by 9/12/11.

Reply to Notice of Nonconformance
NRC Inspection Report 99900100/2011-201; Flowserve

Nonconformance NON 99900100/2011-201-05

The Nonconformance as stated in the referenced Notice of Notice of Nonconformance (NON) is as follows:

Criterion IV, "Procurement Document Control," of Appendix B to 10 CFR Part 50 states, in part, that "[m]easures shall be established to assure that applicable regulatory requirements, design basis and other requirements which are necessary to assure adequate quality are suitably included or referenced in the documents for procurement of material, equipment, and services."

Quality Assurance Procedure (QAP), QAP 6.1, "Purchasing Procedure," states that the procurement documents are to impose the requirements of Appendix B to 10 CFR Part 50 on its qualified suppliers in purchase orders (POs) for nuclear safety related materials, items, and services.

Contrary to the above, as of March 4, 2011, Limitorque failed to impose the requirements of Appendix B to 10 CFR Part 50 in documents for the procurement of safety related equipment and services. Specifically, Limitorque issued POs 179913 and 183027 for the purchase of electrical motors for use in safety related actuators without imposing the requirement of Appendix B to 10 CFR Part 50. In addition, Limitorque used "open" POs to procure calibration services for safety related instrumentation and analyses of lubricants used in safety related actuators without imposing the requirement of Appendix B to 10 CFR Part 50.

These issues have been identified as Nonconformance 99900100/2011-201-05

Reasons for the Nonconformance

Purchase notes for electric motors did impose 10CFR Part 21 but did not specifically state 10CFR50 Appendix B. Also, "Open" PO's for services did not specifically state the requirement for 10CFR50 Appendix B.

Corrective Actions Taken

Purchase note (POL 17) for procurement of safety related motors has been revised to state both 10CFR50 Appendix B and 10CFR Part 21 are required. The "open" PO blankets for services have been revised to state the requirement of 10CFR50 Appendix B.

Additional comments- Flowserve PO's for nuclear safety related motors have always been purchased with safety related requirements including 10CFR Part 21 imposed. Flowserve has reviewed a sampling of non-blanket safety related PO's and did not find any deficiencies other than those stated above. Flowserve has also reviewed a sampling of blanket PO's and did not find any deficiencies other than those stated above.

Actions to Avoid Future Nonconformance

Above notes are automatically generated when the buyer procures any of the above nuclear safety related material, equipment, or services.

Date of Full Compliance

Corrective actions completed 7/28/11.

Reply to Notice of Nonconformance
NRC Inspection Report 99900100/2011-201; Flowserve

Nonconformance NON 99900100/2011-201-07

The Nonconformance as stated in the referenced Notice of Notice of Nonconformance (NON) is as follows:

Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50 states, in part, that "measures shall be established to assure that purchased material, equipment, and services whether purchased from a contractor or subcontractor conform to the procurement documents. . . . The effectiveness of the control of quality by contractors and subcontractors shall be assessed by the applicant or designee . . . ."

Contrary to the above, as of March 4, 2011, Limitorque failed to establish measures to assure that the purchase of material, equipment, or services conformed to procurement documents. Specifically, Limitorque accepted material test reports for components and materials used in safety related actuators provided by a non Appendix B subcontractor. In addition, Limitorque failed to identify or reference acceptance criteria for receipt inspection to verify that purchased equipment conform to procurement documents.

These issues have been identified as Nonconformance 99900100/2011-201-07.

Reasons for the Nonconformance

Inspection procedure QCP 10.5 "Inspection of Safety related Nuclear Service Units & Parts Orders" did not give clear reference to the acceptance criteria or where to find the acceptance criteria. Also, Flowserve was performing a spectral analysis on all incoming bar stock steel and was comparing this to the certified material test reports received with the material, but Flowserve failed to realize that the mechanical properties (tensile, yield, elongation, ect..) on the certifications needed to be verified by way of a "commercial grade survey" of the testing lab.

Corrective Actions Taken

The laboratory performing the mechanical testing for Earle M. Jorgenson will be added to the AVL for the requirement of a "Commercial Grade Survey". The 2011 audit schedule will be revised to schedule this commercial grade survey. The appropriate survey check sheets will be developed. Also, QCP 10.5 has been revised to incorporate the acceptance criteria of the engineering drawings.

Additional comments- Flowserve will verify the quality control program of the supplier of the material stated above along with requiring a test sample from each heat received that will be sent to our approved material testing vendor to have the mechanicals and chemicals verified independently. Commercial Grade Dedication procedure QCP 10.10 will be revised appropriately to document these requirements. Flowserve has reviewed a sampling of previous material test reports along with the sprectral analysis performed on each of these received material heats in combination with the hardness checks that are required with the dedication of each part and did not find any deficiencies recorded.

Actions to Avoid Future Nonconformance

See corrective actions

Date of Full Compliance

Corrective action will be completed by 9/23/11

Reply to Notice of Nonconformance
NRC Inspection Report 99900100/2011-201; Flowserve

Nonconformance NON 99900100/2011-201-08

The Nonconformance as stated in the referenced Notice of Notice of Nonconformance (NON) is as follows:

Criterion VII of Appendix B to 10 CFR Part 50, states, in part, that "measures shall be established to assure that purchased material, equipment, and services conform to the procurement documents. These measures shall include provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by a contractor or subcontract, inspection at a contractor or subcontract source, and examination of product upon delivery."

Contrary to the above, as of March 4, 2011, Limitorque performed an external audit of an approved supplier on the Approved Vendors List for safety related components and services that did not evaluate the supplier's compliance with the requirements of Appendix B to 10 CFR Part 50. Specifically, in June 2009, Limitorque performed an audit of a qualified supplier of safety related actuator products and services including testing and calibration services. The audit evaluated the applicable requirements of International Standardization Organization (ISO) 9001:2000 and International Standardization Organization/International Electrotechnical Commission (ISO/IEC) 1725 for calibration services but did not include an evaluation of the applicable requirements for Appendix B to 10 CFR Part 50.

This issue has been identified as Nonconformance 99900100/2011-201-08

Reasons for the Nonconformance

Flowserve maintains Instrument Calibration & Technical Services on our Approved Vendors listing for the purpose of providing commercial grade calibration services. ICTS is audited by Flowserve and meets all requirements of ISO 9001:2000, ISO/IEC 17025:2005 & ANSI/NCSL Z540-1-1994. Flowserve uses the ANSI/NCSL Z540-1-1994 Evaluation checklist to document all audit activities. Flowserve maintains an "open" blanket PO that contains a purchasing note that requires all calibration services to accompany a certificate of calibration that contains any "out of tolerance" conditions found. Flowserve would then take this information and evaluate its effect by way of our 10 CFR50 Appendix B Quality System. Flowserve does not feel that this is a valid nonconformance.

Corrective Actions Taken

Develop a "Commercial Grade Survey" checklist and re-audit to this new criteria.

Additional comments- Flowserve will perform a review of the two previous audits (2006 & 2009) along with a review of the current "commercial grade survey" that was performed to determine if there were any deficiencies noted and determine the impact. If any deficiencies are found they will be documented and evaluated through our corrective action process.

Actions to Avoid Future Nonconformance

See above comments

Date of Full Compliance

Extent of condition review will be completed by 9/16/11

Flowserve

Flow Control Division
Lynchburg, Virginia and Houston, Texas

Quality Management System Manual

Based on Quality Management System Requirements contained within ISO 9001 International Standard

Revision: 4

6-27-2011

FLOWSERVE
QUALITUY MANAGEMENT SYSTEM MANUAL
0.1 Introduction

Facilities and Facts

Flowserve, Flow Control Division (FCD)
Lynchburg, VA

Description:
This facility is a fully equipped manufacturing and assembly facility for the design, machining, assembly, testing, painting, and packaging of Limitorque, Automax, Worcester and Ramcon products. In addition, this facility includes the capabilities for Heat Treatment, and Research and Development Testing (specifically Thrust, Torque, and Life Cycle testing).

Size/No. of Employees:	230 (approximately)
Square Footage:	206,100 sq. ft. (Mfg.) 30,000 sq. ft. (A&E)

Facilities and Facts

Flowserve, Flow Control Division (FCD)
Houston, TX

Description:
This is a fully equipped manufacturing facility for the assembly, testing, painting, and packaging of Limitorque, Automax, Worcester and Ramcon products

Size/No. of Employees:	10 (approximately) in FCD (includes 3 Sales and 2 Service personnel)
Square Footage:	10,000 sq. ft. (Assembly + Warehouse.) 9500 sq. ft. (Office + Training Room)

Flowserve Management is in complete agreement and hereby endorses and approves the Quality Management System policies, practices and standards set forth within this manual.

Lynn White
General Manager

Jeff McConkey
Manager Quality Assurance

Louis Bessiere
Financial Controller

Greg Pence
Manager Engineering Applications

Ray Hawkins
Manager Inside Sales and Service

Earnie Carey
Manager Product Management

Bill Dolenti
Manager Product Development

John Goin
Manager Large Focus Factory

Brian Lowrey
Manager Small Focus Factory

Alice Chicoine
Manager Human Resources

Dick Gilliam
Manager Supply Chain

Ryan Loewe
Shop Coordinator
(Houston, Texas)

Bob Evertson
Facilities Manager

John Thilking
Mech. Engineer Sr. (agency)

Drexel Collins
Manager Shipping & Receiving

Sam Westby
Black Belt

James Erdly
Operations Manager

FLOWSERVE
QUALITY MANAGEMENT SYSTEM MANUAL
1.0 Scope
&
10 CFR 50, Appendix B

1.1 GENERAL Criterion 1, II

This Quality Management System Manual (QMSM) contains information and data, which is considered proprietary and confidential by Flowserve. Accordingly, the receipt of this manual subjects you to the following conditions and guarantees:

- The information contained herein shall be held in strict confidence and will not be used to the detriment of Flowserve nor disclosed to any third party without the written consent of Flowserve.
- The contents of this manual can be disclosed to the recipient's employees who require access to the information in order to carry out their business relating to Limitorque, Automax, Worcester, and Ramcon products. Any recipient employee so involved shall be made aware of the confidential nature of this information.
- This QMSM shall not be reproduced in part or in whole without the written consent of Flowserve.
- Upon the request of Flowserve, this manual and all copies thereof shall be returned to Flowserve.

This manual is designed to ensure compliance with International Organization for Standardization ISO 9001, additionally the Lynchburg facility will also comply with the following: Title 10 of the Code of Federal Regulations Part 21 and Part 50 Appendix B, NQA-1-1994, ATEX EN 13980:2002, IECEx and Military Specification MIL-I-45208A, Amendment 1 - 1981 as imposed contractually in the supply of Limitorque, Automax, Worcester and Ramcon actuators and associated products.

Generally, this manual describes the duties and responsibilities of individuals by position and title. This description of duties and responsibilities allows the necessary delegation of the performance of specific tasks by subordinates under the direction of the designated individual.

The authority for the issuance of this manual and ensuring compliance with the national and international standards committed to is vested in the Manager Quality Assurance as the Management Representative as assigned by the General Manager.

Attachment #1 shows the process flow for plant and Attachment #2 is a procedures matrix and cross reference.

The Quality Management System has been established to serve as a central source of policies, practices and responsibilities and applies to all activities and personnel within Flowserve.

1.2 APPLICATION Criterion 1

It is intended that all requirements specified in the ISO 9001:2008 International Standard and, Title 10 of the Code of Federal Regulations Part 21 and Part 50 Appendix B be applied to provide product that meets customer and applicable regulatory requirements.

FLOWSERVE
QUALITY MANAGEMENT SYSTEM MANUAL
2.0 Normative Reference
&
10 CFR 50, Appendix B

2.0 NORMATIVE REFERENCE Criterion I

Quality Management Systems Requirements (ISO 9001:2008 International Standard), NQA-1 1994, 10CRF50 Appendix B.

3.0 Terms and Definitions
&
10 CFR 50, Appendix B

3.0 TERMS AND DEFINITIONS Criterion I

For the purposes of this Quality Management System manual the terms and definitions given in ISO 9001:2008 apply. Flowserve related terms and definitions are defined in other areas of this manual as required for clarity of understanding. The term "associated products" encompasses all Flowserve, Lynchburg and Houston products and services offered for sale, such as but not limited to controls, engineering, and/or testing services.

FLOWSERVE
QUALITY MANAGEMENT SYSTEM MANUAL
4.0 Quality Management System
&
10 CFR 50, Appendix B

4.1 General Requirements Criterion 1 & II

Flowserve shall establish, document, implement, and maintain a Quality Management System and continually improve its effectiveness in accordance with the requirements of the ISO 9001:2008 International Standard and the needs of Flowserve.

This Quality Management System has been established to serve as a central source of policies, practices and responsibilities and applies to all activities and personnel within Flowserve.

Flowserve shall:

a) identify the processes needed for the Quality Management System and their application throughout the organization;
b) determine the sequence and interaction of these processes;
c) determine criteria and methods needed to ensure that both the operation and control of these processes are effective;
d) ensure the availability of resources and information necessary to support the operation and monitoring of these processes;
e) monitor, measure, and analyze these processes, and
f) implement action necessary to achieve planned results and continual improvement of these processes.
g) comply with product with EC type Examination certificate/IECEx TR

Where Flowserve chooses to outsource any process that affects product conformity to requirements, Flowserve shall ensure control over such processes.

Outsourcing of processes will be controlled by but not limited to the following:
1. Supplier Audits
2. Receiving Inspection

4.2 DOCUMENTATION REQUIREMENTS Criterion I, II, V, XVII

4.2.1 General

Flowserve's Quality System is documented in the following documents:

a) Quality Policy and Quality Objectives
b) Quality Manual
c) Inter-Departmental and Intra-Departmental procedures and records required by the standard.
d) Documents including records, determined by Flowserve to be necessary to ensure the effective planning, operation and control of the processes
e) Records required by the ISO 9001 International Standards or by Flowserve to support the completion of required activities.

Flowserve reserves the right to require additional documentation or training that is necessary to control our processes and the Quality Management System beyond the ISO 9001 International Standard requirements

These documents shall be maintained and controlled in such a manner as to ensure that only the latest approved copies are available for use.

4.2.2 Quality Manual Criterion I, II

SCOPE: Design, manufacture and servicing of valve actuators and controls

Exclusions: None

a) this Quality Management System Manual includes the scope of Flowserve business processes without exclusions to any of the ISO 9001:2008 International Standard requirements.
b) this QSM contains documented procedures established for the Quality Management System or references them (see Implementing Procedure Matrix and Cross Reference Attachment 2).
c) a description of the interactions between the processes of the Quality Management System.

4.2.3 Control of Documents Criterion VI

The documentation and data used to ensure the quality of Flowserve and/associated products and services shall be controlled.

Documented procedures are established to define the controls needed

a) to approve documents for adequacy prior to issue;
b) to review and update as necessary and re-approve documents;
c) to ensure that changes and the current revision status of documents are identified;
d) to ensure that relevant versions of applicable documents are available at points of use;
e) to ensure that documents remain legible and readily identifiable,
f) to ensure that documents of external origin are identified and their distribution controlled, and
g) to prevent the unintended use of obsolete documents and to apply suitable identification to them if they are retained for any purpose

4.2.4 Control of Records Criterion XVII

Records shall be established and maintained to provide evidence of conformity to requirements and the effective operation of the Quality Management System.

Records shall remain legible and readily identifiable and retrievable.

A documented procedure is established to define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of quality records.

FLOWSERVE
QUALITY MANAGEMENT SYSTEM MANUAL
5.0 Management Responsibility
&
10 CFR 50, Appendix B

5.1 Management Commitment Criterion I, II, V

This manual, supported by the implementing procedures, is consistent with the intent of the applicable portions of the following industry consensus codes and standards: International Organization for Standardization ISO 9001, Title 10 of the Code of Federal Regulations Part 21 and Part 50 Appendix B, NQA-1-1994 and, Military Specification MIL-I-45208A Amendment 1-1981.

All UL (Underwriters Laboratories), CSA (Canadian Standards Agency), Factory Mutual (FM), Cenelec (European Union), ANZEX (Australia), Inmetro (Brazil), FTZU (Czech Republic), BKI (Hungary), GOST (Russia, or FSU,) JIS (Japan) SIRA/ATEX 94/9/EC, IECEx and NEPSI (China). These requirements will be closely adhered and implemented when determined to be required.

In some cases; Military Specifications and Standards, ANSI parent and daughter, or other industry consensus standards have been used as guidelines in establishing methods by which Flowserve assures compliance with Quality Management Systems codes and standards referenced above. These guideline documents include, but may not be limited to: ANSI N45.2.2-1978, ANSI N45.2.9-1979, ANSI N45.2.13, Rev. 1-1997, ANSI N45.2.23-1978, EPRI NP 5652-1998, ASNT-SNT-TC-1A-1980, MIL-STD-271F-1986 and ANSI Z540-1994.

The Quality Management System policies and supporting implementing procedures represent the Total Quality Plan for the manufacture, assembly, test, and delivery of standard products and services offered for sale by Flowserve.

Where services or products are sold, which are outside the scope of this management system; separate plans or procedures shall be developed, approved, issued, and implemented to ensure compliance with customer specified requirements.
Each manual section shall contain as a minimum, definition of functional responsibilities and the programmatic policy. The inclusion of the governing requirements is provided for information only; complete copies of these standards are maintained on file at Flowserve. The Implementing Procedures Matrix delineates the subtier procedures utilized to implement each programmatic element. This matrix is provided for information only and need not be updated as implementing procedures are revised, deleted, or added.

5.2 Customer Focus Criterion I, II, V

Flowserve's Top Management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction (see sections 7.2.1 and 8.2.1 of this manual).

Customer focus starts with the Customer requirements at the quotation stage to ensure Flowserve understands the customers' needs and has the capabilities to fulfill the contract. Further focus on customer requirements is facilitated through the contract review process.

A Sales Team member shall translate customer requirements onto the Flowserve order acknowledgement/shop order. Special requirements such as hold/witness points, documentation, special painting, and packaging requirements shall be noted on the order acknowledgement/shop order and/or Bill of Material.

The following policies and practices have been established to ensure compliance with 10 CFR 50 Appendix B and NQA-1-1994 for Nuclear Safety related products and services:

- review incoming order(s) requirements for insufficient, erroneous data, or requirements which have not been previously reviewed.
- interpretation and clarification of any requirements which appear to be outside the scope of Flowserve Qualification Data Report(s).
- outline all quality and technical requirements for the proper handling of the customer's order which fall beyond the scope of this manual.
- review all Bills of Material (BOM) for Nuclear Class 1E unit orders for completeness and accuracy before they are issued to manufacturing, and initial or sign the B/M.
- Records of Bill of Material review for Nuclear Class 1E unit orders are maintained in the appropriate Sales Order file.

5.3 Flowserve's Quality Policy: Criterion I, II

Flowserve's Top Management shall ensure that the quality policy:

a) Is appropriate to the purpose of Flowserve;
b) Includes a commitment to comply with requirements and continually improve the effectiveness of the Quality Management System;
c) Provides a framework for establishing and reviewing quality objectives;
d) Is communicated and understood within Flowserve;
e) Is reviewed for continuing suitability.

It is the goal of Flowserve- Limitorque to consistently deliver products and services that meet or exceed our customer's expectations in quality, timeliness, and overall value. We work to achieve this by actively involving all employees in continuously improving our Quality Management System.

The Quality Policy will be posted throughout the organization to help promote the importance of our quality policy and quality objectives in our commitment to comply with requirements and continually improve the effectiveness of the Quality Management System.

5.4 PLANNING

5.4.1 Quality Objectives Criterion I, II

Flowserve's Top Management shall ensure that quality objectives, including those needed to meet requirements for product :

- Are established at relevant functions and levels within Flowserve.
- The quality objectives shall be measurable and consistent with the quality policy.

The Flowserve Management System defines the major Quality and Operational objectives of Flowserve and they are:

- Provide a safe work environment for all employees.
- Consistently meet or exceed customer OTD commitments by managing and reducing cycle time from customer order receipt to shipment.
- Reduce Warranty as a % of Sales
- Optimize inventory dollars and turns via effective inventory management processes and disciplines.
- Meet or exceed financial plan commitments.
- Maintain and improve employee communications to support an informed and motivated workforce.

To comply with requirements and continually improve the effectiveness of the Quality Management System.

The strategy to achieve the Quality Objectives is through implementation and maintenance of the Quality System described in this manual and associated sub-tier implementing procedure(s) or instruction(s).

5.4.2 Quality Management System Planning Criterion I, II

Flowserve's Top Management shall ensure that:

a) the planning of the Quality Management System is carried out in order to meet the requirements given in section 4.1, as well as the quality objectives, and
b) the integrity of the Quality Management System is maintained when changes to the Quality Management System are planned and implemented.

The method for ensuring requirements are met, is through the implementation of the quality system defined in the referenced manuals and procedures. Planning to meet the continuous improvement objectives of the quality system will be conducted as described in the "Management Review" section of this manual.

5.5 Responsibility, Authority and Communication Criterion I, II

5.5.1 Responsibility

Flowserve's Top Management has ensured that responsibilities and authorities are defined and communicated within Flowserve as depicted in the Organizational Charts documented and maintained by Human Resources.

Quality Assurance is responsible for the establishment and maintenance of the Quality Management System Program and the control of this manual. In addition, the overall authority for the implementation and enforcement of the Quality Management System Program standards, policies, and practices, including verifying implementation of solutions, has been delegated to Quality Assurance.

Quality Assurance is also delegated the authority to stop any activity which is suspected to be in violation of the provisions of this manual or of the associated implementing procedures. In addition, Quality Assurance shall ensure that all materials, component parts, and assemblies used in the manufacture of Flowserve products meet the standards and specifications of applicable engineering documents. The independence and authority necessary for the identification, recommendation of solutions, and/or the correction of quality problems identified by Flowserve quality organizations are assured through the defined reporting responsibilities as outlined by the organizational charts and maintained in Human Resources. The resumption of an activity which had a stop work order placed against it shall not be permitted until the discrepancies have been resolved, corrected, and documented to the satisfaction of the Manager Quality Assurance.

Product Development is responsible for the execution of this program as it impacts the activities associated with Design Control for Development of New Products.

Sales & Service is responsible for the execution of this program as it impacts the sales organization and the entry of customer orders into the Flowserve Order Processing System.

Operations is responsible for the execution of all aspects of this program as it relates to the Lynchburg Facility. This authority may be delegated as necessary to assure compliance with the requirements of this program and equipment Bills of Material (BOM).

Application Engineering is responsible for the execution of this program as it relates to Design Control for existing products, Document Control of engineering documents, and the disposition of Nonconforming Material in conjunction with Quality Assurance. Application Engineering is also responsible for the coordination communication and liaison for ATEX/IECEx products. A member of Application Engineering is appointed as the ATEX/IECEx authorized person.

Human Resources is responsible for the indoctrination of new personnel upon employment with Flowserve, evaluating/assessing the training needs and researching training materials and conducting training as appropriate

ATEX and IECEx Authorized Person(s) are responsible for the following:

a) the effective co-ordination of activities with respect to products intended for use in potentially explosive atmospheres;
b) the need to liaise with the notified body or ExCB responsible for the issue of the EC-Type certificate or ExTR with respect to any proposed change to the design defined in the EC-Type certificate or Ex TR and the technical documentation;
c) the need to liaise with the notified body or, ExCB responsible for issuing the IECEx Cof C with respect to intended updating of the quality system;
d) the authorizing of initial approval and changes to related drawings, where appropriate;
e) the authorizing of concessions;
f) informing its customer of any applicable special conditions for safe use and any schedules of limitations.

Each Department is responsible for establishing procedures / instructions and training as necessary to implement the policies of this manual. Training records shall be kept within each department.

Each Flowserve Employee is responsible for compliance to the requirements of this document as it relates to his/her activities.

5.5.2 Management Representative Criterion I, II

Top Management shall appoint a member of the management who, irrespective of other responsibilities, shall have responsibility and authority that includes:

a) ensuring that processes needed for the Quality Management System are established, implemented and maintained;
b) reports to Top Management on the performance of the Quality Management System, and any need for improvement; and
c) ensuring the promotion of awareness of customer requirements throughout Flowserve.

The General Manager of Flowserve Lynchburg has appointed The Manager Quality Assurance as Flowserve's Management Representative for the Lynchburg Facility and has appointed the Shop Coordinator for the Houston QRC as the Management Representative for that facility.

5.5.3 Internal Communication Criterion II

Flowserve's Top Management shall ensure that appropriate communication processes are established within Flowserve and that communication takes place regarding the effectiveness of the Quality Management System.

Internal Communication methods are:

- Management Review
- Performance metrics
- Quarterly all employee meetings
- Daily production meetings
- Weekly department meetings
- Quality Team Meetings

All the above methods are considered as but are not limited to forms for employee feedback and two-way communication.

5.6 Management Review Criterion II

5.6.1 General Criterion II

Flowserve's Top Management shall review the Quality Management System, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. The review shall include assessing opportunities for

improvement and the need for changes to the Quality Management System. This will be accomplished through the examination of the quality system performance measurements resulting from the implementation of the Quality Management System, Quality Policy, Quality Objectives and the results of internal audits. Records from the management review shall be maintained in accordance with Management Review Procedure, QAP-1.1.

5.6.2 Review Input Criterion II

The input to management review shall include information on:

a) Audit Results,
b) Customer Feedbacks,
c) Process performance,
d) Product conformity,
e) Status of preventive and corrective actions,
f) Follow up from previous management reviews,
g) Changes that could effect the Quality Management System and,
h) Recommendations for improvement.

5.6.3 Review Output Criterion II

The output from the management review shall include any decisions and actions related to:

a) Improvement of the effectiveness of the Quality Management System and its processes,
b) Improvement of product related to customer requirements,
c) Resource needs.

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QUALITY MANAGEMENT SYSTEM MANUAL
6.0 Resource Management
&
10 CFR 50, Appendix B

6.1 Provision of Resources Criterion II

Flowserve shall determine and provide the resources needed:

a) To implement and maintain the Quality Management System and continually improve its effectiveness.
b) To enhance customer satisfaction by meeting customer requirements.

Resource assessment is accomplished through management meetings and is based on the needs of the business and the achievement of the Quality Policy and Quality Objectives.

Procedures exist to ensure resource requirements are identified and resources are supplied, including the assignment of trained personnel for management, performance of work, and verification activities.

6.2 Human Resources Criterion II

6.2.1 General

Human Resources is responsible for the following: Criterion II

Personnel performing work affecting product quality shall be competent on the basis of appropriate education, training, skills and experience.

The competent requirements for personnel in the performance of management, production work and verification activities are described in the job descriptions maintained by Human Resources.

Additional education or training needs are determined with the employee during the annual employee review by the managers. Additional skills and experience are obtained through on the job training or outside training courses.

The indoctrination of new personnel upon employment with Flowserve, evaluating/assessing the training needs and researching training materials and conducting training as appropriate

6.2.2 Competence, Awareness and Training Criterion II

Flowserve shall:

a) determine the necessary competence for personnel performing work affecting product quality;
b) provide training or take other actions to satisfy these needs;
c) evaluate the effectiveness of actions taken;
d) ensure that its employees are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality policy and quality objectives, and;
e) maintain appropriate records of education, training, skills and experience.

Procedures are established and shall be maintained for determining training needs and providing the training of all personnel performing activities affecting quality. Human Resources shall maintain the records of training in

accordance with the Training Procedure, QAP-18.1.

Where the qualification and certification of individuals to the requirements of an industry standard or other such regulation is required by contract, a separate procedure shall be written to address this process.

6.3 Infrastructure Criterion II

Flowserve shall determine, provide and maintain the infrastructure needed to achieve conformity of product requirements, infrastructure includes, as applicable:

a) buildings, workspace and associated utilities,
b) process equipment, (both hardware and software), and
d) supporting services (such as transport or communication).

Significant changes required by customer contract to the infrastructure to meet customer requirements will go through an evaluation period unique to the anticipated change and involve planning by management.

A structured maintenance program shall be established for maintaining the building and machinery to ensure continuing process capabilities.

6.4 Work Environment Criterion II

Flowserve shall determine and manage the work environment needed to achieve conformity to product requirements by creating a suitable working environment through a combination of human and physical factors and consideration of work methods and opportunities for the people in the organization to meet customer requirements.

Process control measures are also established and maintained to identify the work environment needed to achieve conformity to product requirements. The following areas are evaluated to determine the impact on existing processes:

Physical factors affecting the work environment include heat, noise, light, cleanliness, pollution, airflow, etc.

Human factors include such things as safety rules and guidance, ergonomics, special facilities for people in the organization

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7.0 Product Realization
&
10 CFR 50, Appendix B

7.1 Planning of Product Realization Criterion XI, III, XVII

Flowserve shall plan and develop the processes needed for product realization. Planning of product realization shall be consistent with the requirements of the other processes of the Quality Management System.

In planning product realization, Flowserve shall determine the following, as appropriate:

a) quality objectives and requirements for the product;
b) the need to establish processes, documents, and provide resources specific to the product;
c) require verification, validation, monitoring, inspection and test activities specific to the product and the criteria for product acceptance;
d) records needed to provide evidence that the realization processes and resulting product meets requirements.

The output of this planning shall be in a form suitable for Flowserve's method of operation.

Documents specifying the processes of the Quality Management System (including the product realization processes) and the resources needed to be applied to a specific product, project or contract can be referred to as a quality plan.

Flowserve may also apply the requirements given in Design and Development, to the development of product realization processes.

7.2 Customer-Related Processes Criterion III, IV, XVII

7.2.1 Determination of Requirements Related to the Product Criterion III, IV

Flowserve shall determine:

a) requirements specified by the customer, including the requirements for delivery and post-delivery activities, requirements not stated by the customer but necessary for specified or intended use, where known,
b) statutory and regulatory requirements related to the product, and any
d) additional requirements determined by Flowserve,
e) stated requirements are compatible with EC type-examination certificate/IECEx TR.

Procedures and/or instructions are established and maintained to delineate the order entry, contract review and processing of customers' purchase orders. Once the product has been released for production and is considered a commercial product design, the design input information shall be considered the customer order requirements and the results from contract reviews.

7.2.2 Review of Requirements Related to the Product Criterion I, III, XVII

Flowserve shall review the requirements related to the product. This review shall be conducted prior to Flowserve's commitment to supply a product to the customer (e.g. submission of tenders, acceptance of contracts or orders, acceptance of changes to contracts or orders) and shall ensure that:

a) product requirements are defined;
b) contract or order requirements differing from those previously expressed (e.g. in a tender or quotation) are resolved; and
c) Flowserve has the ability to meet the defined requirements.

Records of the results of the contract review and actions arising from the review shall be maintained in the appropriate sales order file.

Where the customer provides no documented statement of requirements, the customer requirements shall be confirmed by Flowserve before acceptance.

Where product requirements are changed, Flowserve shall ensure that relevant documents are amended and that relevant personnel are made aware of the changed requirements.

Note: In some situations, such as Internet sales, a formal review is impractical for each order. Instead, the review can cover relevant product information such as catalogues or advertising material.

The customer states requirements through Bid Requests, Purchase Orders/ Requisitions, and/or Verbal Orders. Procedures are established and shall be maintained to ensure that:

- customer requirements are adequately delineated and agreed upon.
- exceptions are resolved and clarifications provided where requirements are different from those tendered or exceed Flowserve's capabilities.
- the mechanisms for accomplishing the interfacing, both internally and externally, are provided.
- contract reviews are documented and maintained.
- accurate translation of customer order requirements is provided.

7.2.3 Customer Communication Criterion III, XVII

Flowserve shall determine and implement effective arrangements for communicating with customers in relation to:

a) product information;
b) inquiries, contracts or order handling, including amendments; and
c) customer feedback, including customer complaints.

Flowserve communicates with our customers on product information through the use of sales catalogues, advertising material, web site and technical information bulletins.

Inquiries, contracts or order handling, including amendments are communicated through the Sales, Service or Engineering departments depending on the nature of the inquiry, contract, order or amendments. Records of this is documented in the sales order files through contract acknowledgment and contract amendments correspondence

Changes to a contract are approved and communicated through appropriate personnel in accordance with Order Entry and Processing Procedure, QAP-3.1.

Procedures and/or instructions are established and maintained, which address the availability of product information inquiries, contracts or order handling, including amendments and any customer concerns with product and delivery, this information is used to determine customer satisfaction. All customer complaints are documented, with feedback to the customer when requested on any corrective and preventive action taken.

7.3 Design and Development Criterion III, IV, V, VII, IX, X, XI, XII, XVII

General

Procedures are established and shall be maintained to control and verify design of products to ensure that the specified requirements are met, and to maintain product uniformity and performance.

Responsibility

Product Development is responsible for:

- compliance with the policies established in this manual as it relates to the assignment and performance of new products.
- directing in the development and prototype testing of new product designs prior to production release.

Engineering and Applications is responsible for:

- the basic product design including changes to the basic design.
- the approval of all changes to basic product designs.

7.3.1 Design and Development Planning Criterion III

Procedures are established and shall be maintained to identify or require the development of plans which describe the activities necessary to evaluate new product developments. The completion of the activities specified in the plan shall be documented.

Product Development shall evolve the basic product design and obtain acceptance in accordance with the Design Control Procedure, QAP-4.1 prior to release for production and sales as a standard product. Once released; Engineering and Applications shall apply, maintain, modify, and/or re-qualify the standard product design, as necessary, to satisfy customer requirements.

Design and verification activities established by procedure or plan shall be assigned to qualified personnel with adequate resources necessary to perform the design verification and/or activity identified.

Flowserve shall manage the interfaces between different groups involved in design and development to ensure effective communication and clear assignment of responsibilities. Planning output shall be updated as appropriate, as the design and/or development progresses.

Organizational and Technical Interfaces

Product Development shall establish and maintain procedures which delineate the organizational and technical interfaces necessary for product development and the standard product design configuration, maintenance, and/or modification.

7.3.2 Design and Development Input Criterion III, XVII

The design inputs necessary for product development shall be identified. Once the product has been released for production and is considered a standard product design, the design input information shall be considered the customer order requirements. In both instances, design input requirements shall be documented and their selection reviewed for adequacy. Incomplete, ambiguous, or conflicting requirements will be resolved with those responsible for imposing these requirements.

Note: Design Input documentation shall include; but may not be limited to customer order, customer specification for the sale of standard products and market survey, test, evaluation of similar products used for product development, and applicable statutory and regulatory requirements.

Inputs relating to product requirements shall be determined and records maintained. These inputs shall include:

a) functional and performance requirements;
b) applicable statutory and regulatory requirements;
c) where applicable, information derived from previous similar designs, and
d) other requirements essential for design and development.

7.3.3 Design and Development Output Criterion III

The design output requirements shall be documented. This information shall meet the design input requirements contained or referenced.

Note: Design Output documentation shall include, but may not be limited to, engineering drawings, standards, and Bills of Material (BOM).

Acceptance criteria conforms to the applicable regulatory industry consensus standard requirements and identifies the characteristics of the design necessary to ensure proper functioning of the product.

The Bill of Material (BOM) identified with a unique production order number is the primary design output document for standard product construction, assembly, and test.

The current master BOM for each product is maintained by Engineering and Applications. The master BOM tabulates all standard components by drawing and/or part number.

The specific production order BOM prepared by Engineering and Applications or Sales and Service, as applicable, shall define the particular arrangement of gear ratio and other standard options or variable components.

The BOM shall contain (where necessary) instructions on special tests, procedures, or arrangements of standard options unique to a particular purchase order requirement. Production Engineering and/or Order Processing shall verify that special instructions are contained on the BOM as necessary to meet contractual requirements.

Special components will be listed by appropriate description and drawing and/or part number on the production BOM

The outputs of the design and development shall be provided in a form that enables verification against the design and development inputs and shall be approved prior to release.

Design and development outputs shall:

a) meet the input requirements for design and development;
b) provide appropriate information for purchasing, production and for service provisions;
c) contain or reference product acceptance criteria; and
d) specify the characteristics of the product that are essential for its safe and proper use.

7.3.4 Design and Development Review Criterion III, XVII

At suitable stages, systematic reviews of design and development criteria and progress shall be performed in accordance with planned arrangements:

a) to evaluate the ability of the results of design and development to meet requirements; and
b) to identify any problems and propose necessary actions.

Design and Development Review meetings will be held to review product design criteria and progress. Participants at each design review shall include representative(s) of all functions concerned with the design stage being reviewed, as well as other personnel as required.

Product Development maintains records of Design and Development Review meetings.

7.3.5 Design and Development Verification Criterion III, XI, XII, XVII

Verification shall be performed in accordance with planned arrangements to ensure that the design and development outputs have met the design and development input requirements, including but not limited to:

- Undertaking qualification or performance tests
- The performance of alternate or spot check calculations
- Similarity analysis with a proven similar design

7.3.6 Design and Development Validation Criterion III, IX, X, XI, XVII,

Design and/or development validation shall be performed in accordance with planned arrangements to ensure that the resulting product is capable of meeting the requirements for a specified application or intended use, where known. Wherever practicable, validation shall be completed prior to the delivery or implementation of the product.

Project and or Product Management shall maintain records of the results of validation and any necessary actions.

7.3.7 Design and Development Changes Criterion III, V, XI, XVII

Procedures are established and shall be maintained to ensure that all design changes are reviewed and approved in the same manner as the original. Any special considerations with regard to product qualification or performance or other such design input information is considered in the approval of the changes or modifications.

No changes will be made to the BOM except as outlined in Engineering Change Notice (ECN) procedure and under the control responsibility of the Department Manager issuing the change. This procedure insures that changes are reviewed and approved in the same manner as the original approval of that document.

Engineering Change Notices (ECN's) on production orders are initiated by Sales & Marketing. Approval of ECN's for production orders shall be in accordance with the procedure for Engineering Change Notices, QAP-5.1.

Design and development changes shall be identified and records maintained. The changes shall be reviewed, verified, and validated, as appropriated, and approved before implementation. The review of design and development changes shall include evaluation of the effect of the changes on constituent parts and products already delivered.

Project and or Product Management shall maintain records of the results of the review of changes and any necessary actions.

The following additional policies and practices have been established to ensure compliance with 10 CFR 50 Appendix B.

Procedures are established and shall be maintained that ensure the standard SMB, SMC, SB, SBD, and HBC qualified product design is maintained and that changes are reviewed for impact on Equipment Qualification.

7.4 Purchasing Criterion III, IV, VII, XVII

7.4.1 Purchasing Process Criterion III, IV, VII, XVII

Flowserve shall ensure that purchased product conforms to specified purchase requirements.

The type and extent of control applied to the supplier and the purchased product shall be dependent upon the effect of the purchased product on subsequent product realization or the final product.

Flowserve Shall evaluate and select suppliers based on their ability to supply product in accordance with Flowserve's requirements.

Criteria for selection, evaluation and re-evaluation shall be established. Records of the results of evaluations and any necessary actions arising from the evaluation shall be maintained.

7.4.2 Purchasing Information Criterion III, IV, VII, VIII

Purchasing information shall describe the product to be purchased, including where appropriate:

a) requirements for approval of product, procedures, processes and equipment;
b) requirements for qualification of personnel, and;
c) Flowserve's Quality Management System requirements.

Flowserve Shall ensure the adequacy of specified purchase requirements prior to their communication to the supplier.

7.4.3 Verification of Purchased Product Criterion III, IV, VII, VIII

Flowserve shall establish and implement the inspection or activities necessary for ensuring that purchased product meets specified purchase requirements.

Where Flowserve or its customer intends to perform verification at the supplier's premises, Flowserve shall state the intended verification arrangements and method of product release in the purchasing information.

7.5 Production and Service Provision Criterion V, VII, VIII, IX, XI, XIV, XVII

7.5.1 Control of Production and Service Provision Criterion V, XIV, XVII

Flowserve shall plan and carry out production and service provision under controlled conditions: Controlled conditions shall include, as applicable

a) the availability of information that describes the characteristics of the product;
b) the availability of work instructions, as necessary;
c) the use of suitable equipment;
d) the availability and use of monitoring and measuring devices;
e) the implementation of monitoring and measurement, and
f) the implementation of release, delivery and post-delivery activities.

Process control measures shall be established and maintained for the processes used in manufacture, assembly, delivery, installation and servicing of Flowserve's commercial products.

Product servicing shall as a minimum include:

- Performance and documentation of both warranty and contracted service work.
- Service work reporting, follow-up and in-house activities.

Where customer servicing needs exceeds the original contractual requirements, an alternate action plan shall be developed during the service visit; documented in the applicable service report; approved by the customer and implemented to ensure compliance with customer requirements and needs.

Flowserve shall arrange for the release and delivery of products after acceptance of the product to ship. Any post delivery requirements shall be included in the customer contract.

7.5.2 Validation of processes for Production and Service Provision Criterion VII, VIII, IX, XIII, XIV, XVII

Flowserve shall validate any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measuring. This includes any processes where deficiencies become apparent only after the product is in use or the service has been delivered.
Validation shall demonstrate the ability of these processes to achieve planned results.

Flowserve shall establish arrangements for these processes including, as applicable:
a) defined criteria for review and approval of the processes;
b) approval of equipment and qualification of personnel;
c) use of specific methods and procedures;

d) requirements for records and
e) re-validation.

Flowserve's processes where deficiencies may become apparent only after the product is in use or the service has been delivered; include painting, heat treatment, nondestructive testing, and welding.

The instructions or the associated drawings for these processes shall specify acceptance criteria needed to determine the acceptability.

In addition, procedures are established and shall be maintained (and/or qualified, where appropriate) to control special processes. Special processes shall, as a minimum, include painting, nondestructive testing, and heat treatment. The procedures or the associated drawings for these processes shall specify necessary acceptance criteria and determine the acceptability.

Special welding (performed to other industry consensus standards or specifications) shall be performed by a Qualified Vendor using qualified procedures. These requirements shall be specified in the Engineering Drawing.

Records shall be maintained by Quality Assurance for the special process delineated by this section to the extent necessary to demonstrate that the process was satisfactorily performed, and show the qualification of personnel performing the activity.

7.5.3 Identification and Traceability Criterion VII, VIII, XIV, XVII

Where appropriate, Flowserve shall identify the product by suitable means throughout product realization. The methods used shall include, but need not be limited to:

- The identification of materials, parts and components by part number, Bill of Material, shop/work order or other appropriate means (i.e., bar stock color coding, work order number or heat number, if applicable).
- The method used to identify items shall be of a non-detrimental means appropriate for the item being identified. These methods may include tagging, stamping, indelible marking, bagging and tagging, or color-coding.

7.5.4 Customer Property Criterion XVII, XIII

Flowserve shall exercise care with customer property, while it is under Flowserve's control or being used by Flowserve.

Flowserve shall identify, verify, protect, and safeguard customer property provided for use or incorporation into the product.

If any customer property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to the customer and records maintained.

NOTE: Customer property can include intellectual property.

7.5.5 Preservation of Product Criterion VII, XIII

Flowserve shall preserve the conformity of product during internal processing and delivery to the intended destination.

This preservation shall include identification, handling, packaging, storage and protection.

Preservation shall also apply to the constituent parts of a product.

Shelf life restricted items shall be maintained in such a manner as to ensure that expired or obsolete items are not inadvertently used for production.

When required by customer's purchase order/contract, records for traceability to raw materials, test reports, etc. are maintained by Quality Assurance.

7.6 Control of Monitoring and Measuring Devices Criterion XII, XVII

Flowserve shall determine the monitoring and measurement to be undertaken and the monitoring and measuring devices needed to provide evidence of conformity of product to determined requirements.

Flowserve Shall establish processes to ensure the monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements.

Where necessary to ensure valid results, measuring equipment shall:

a) be calibrated or verified at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; where no such standards exist, the basis used for calibration or verification shall be recorded;
b) be adjusted or readjusted as necessary;
c) be identified to enable the calibration status to be determined;
d) be safeguarded from adjustments that would invalidate the measurement result;
e) be protected from damage and deterioration during handling, maintenance and storage.

In addition, Flowserve shall assess and record the validity of the previous measuring results when the equipment is found not to conform to requirements. Flowserve shall take appropriate action on the equipment and any product affected. Records of the results of calibration and verification shall be maintained.

When used in the monitoring and measurement of specified requirements, the ability of computer software to satisfy the intended application shall be confirmed. This shall be undertaken prior to initial use and reconfirmed as necessary.

Where appropriate, technical data pertaining to inspection, measuring and test equipment shall be made available to the customer's representative for verification that the equipment is functionally adequate.

Standards used for the calibration of Inspection, Measuring and Testing Equipment shall be maintained, calibrated, and used in an environment that is suitably controlled

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8.0 Measurement, Analysis and Improvement
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10 CFR 50, Appendix B

8.1 General Criterion IX, X, XI, XIV

Flowserve shall plan and implement the monitoring, measurement, analysis, and improvement processes needed

a) to demonstrate conformity of the product,
b) to ensure the conformity of the Quality Management System, and
c) to continually improve the effectiveness of the Quality Management System.

This shall include determination of applicable methods, including statistical techniques, and the extent of their use.

When required Flowserve's measuring and testing equipment shall be made available for use by the customer' representative to determine conformance of product with contract requirements. In addition, if conditions warrant, Flowserve personnel shall be made available for operation of such devices and for verification of their accuracy and condition.

8.2 Monitoring And Measurement

8.2.1 Customer Satisfaction Criterion II, V, XVI, XVII, XVIII

As one of the measurements of the performance of the Quality Management System, Flowserve shall monitor information relating to customer perception as to whether Flowserve has met customer requirements. The methods for obtaining and using this information shall be determined.

This measurement will include feedback from the Customer by the use of a Customer Survey. A customer feedback form is available on Flowserve's website. Customer issues are also recorded and monitored through the Customer Complaint process. Additionally any Flowserve employee who has contact with a customer may initiate a customer complaint feedback on behalf of the customer in the electronic customer complaint database.

8.2.2 Internal Audit Criterion V, XVII, XVIII

Flowserve shall conduct internal audits at planned intervals to determine whether the Quality Management System:

a) conforms to the planned arrangements, to the requirements of the International Standard and to the Quality Management System requirements established by Flowserve and;
b) is effectively implemented and maintained.

An audit program shall be planned, taking into consideration the status and importance of the processes and areas to be audited, as well as the results of previous audits.

The audit criteria, scope, frequency, and methods shall be defined.

The selection of auditors and conduct of audits shall ensure objectivity and impartiality of the audit process.

Auditors shall not audit their own work.

The responsibilities and requirements for planning and conducting audits, and for reporting results and maintaining records shall be defined in a documented procedure.

The management responsible for the area being audited shall ensure that actions are taken without undue delay to eliminate detected non-conformities and their causes.

Follow up activities shall include the verification of the actions taken and the reporting of verification results.

8.2.3 Monitoring and Measurement of Processes Criterion II, V, IX, X, XI

Flowserve shall apply suitable methods for monitoring and, where applicable, measurement of the Quality Management System processes.

These methods shall demonstrate the ability of the process to achieve planned results.

When planned results are not achieved, correction and corrective action shall be taken, as appropriate, to ensure conformity of the product.

8.2.4 Monitoring and Measurement of Product Criterion VIII, X, XI, XVI, XVII

Flowserve shall monitor and measure the characteristics of the product to verify that product requirements have been met.

This shall be carried out at appropriate stages of the product realization process in accordance with the planned arrangements.

Evidence of conformity with the acceptance criteria shall be maintained. Records shall indicate the person(s) authorizing release of product.

Product release and service delivery shall not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority, and where applicable, by the customer.

Flowserve shall make available to the government representative reports of any nonconformance found on government source-inspected supplies and shall (when requested) require Flowserve to coordinate with the government representative on corrective action.

8.3 Control of Non-conforming Product Criterion V, XV, XVII

Flowserve shall ensure that product which does not conform to requirements is identified and controlled to prevent unintended use or delivery

Flowserve shall process any Fraudulent or Counterfeit Material in accordance with the appropriate established procedures.

Flowserve shall deal with Non-conforming product by one or more of the following ways:

a) by taking action to eliminate the detected nonconformity;
b) by authorizing its use, release or acceptance under concession by a relevant authority and, where applicable, by the customer;
c) by taking action to preclude its original use or application.

Records of the nature of non-conformities and any subsequent actions taken, including concessions obtained, shall be maintained.

When non-conforming product is corrected it shall be subject to re-verification to demonstrate conformity to the requirements.

When non-conforming product is detected after delivery or use has started, Flowserve shall take action appropriate to the effects, or potential effects, of the non-conformity.

8.4 Analysis of Data Criterion X, IX, XI, XV, XVI, XVII

Flowserve shall determine, collect, and analyze appropriate data to determine the suitability and effectiveness of the Quality Management System and to evaluate where continual improvement of the effectiveness of the Quality Management System can be made. This shall include data generated as a result of monitoring and measurement and other relevant sources.
Analysis of data shall provide information on:

a) customer satisfaction,
b) conformity to product requirements,
c) characteristics and trends of processes and product including opportunities for preventive action, and
d) suppliers.

8.5 Improvement V, X, XI, XVI, XVII, XVIII

8.5.1 Continual Improvement Criterion X, XI, XVII

Flowserve shall continually improve the effectiveness of the Quality Management System through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review.

8.5.2 Corrective Action Criterion V, XVI, XVII, XVIII

Flowserve shall take action to eliminate the cause of non-conformities in order to prevent recurrence. Corrective action shall be appropriate to the effects of the non-conformities encountered.A documented procedure shall be established to define requirements for:

a) reviewing non-conformities (including customer complaints);
b) determining the causes of nonconformity;
c) evaluating the need for actions to ensure that non-conformities do not recur;
d) determining and implementing action needed;
e) records of the results of action taken, and
f) reviewing corrective action taken.

8.5.3 Preventive Action Criterion V, XVI, XVII, XVIII

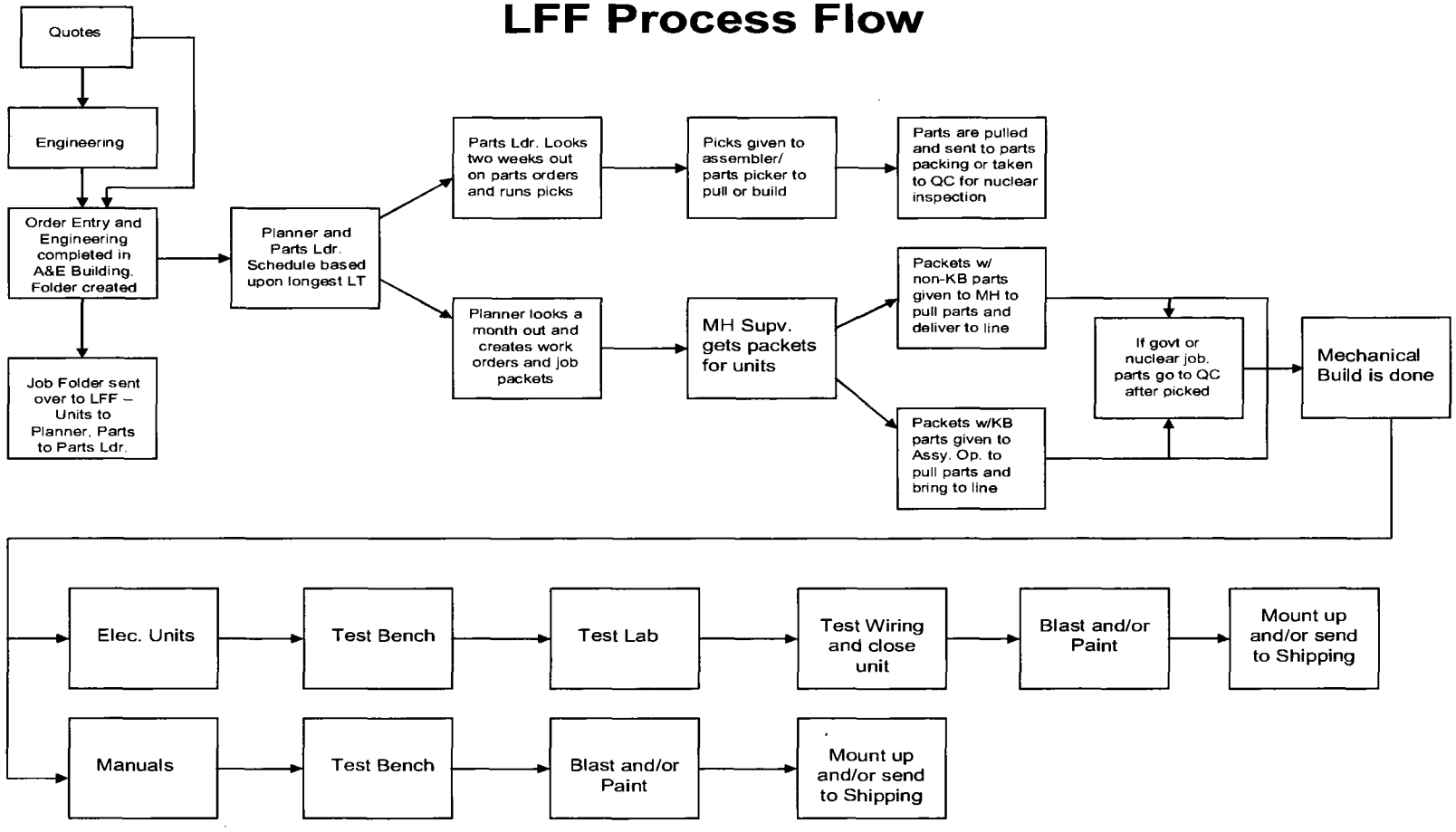
Flowserve shall determine action to eliminate the causes of potential non-conformities in order to prevent their occurrence. Preventive actions shall be appropriate to the effects of the potential problems.

A documented procedure shall be established to define requirements for:

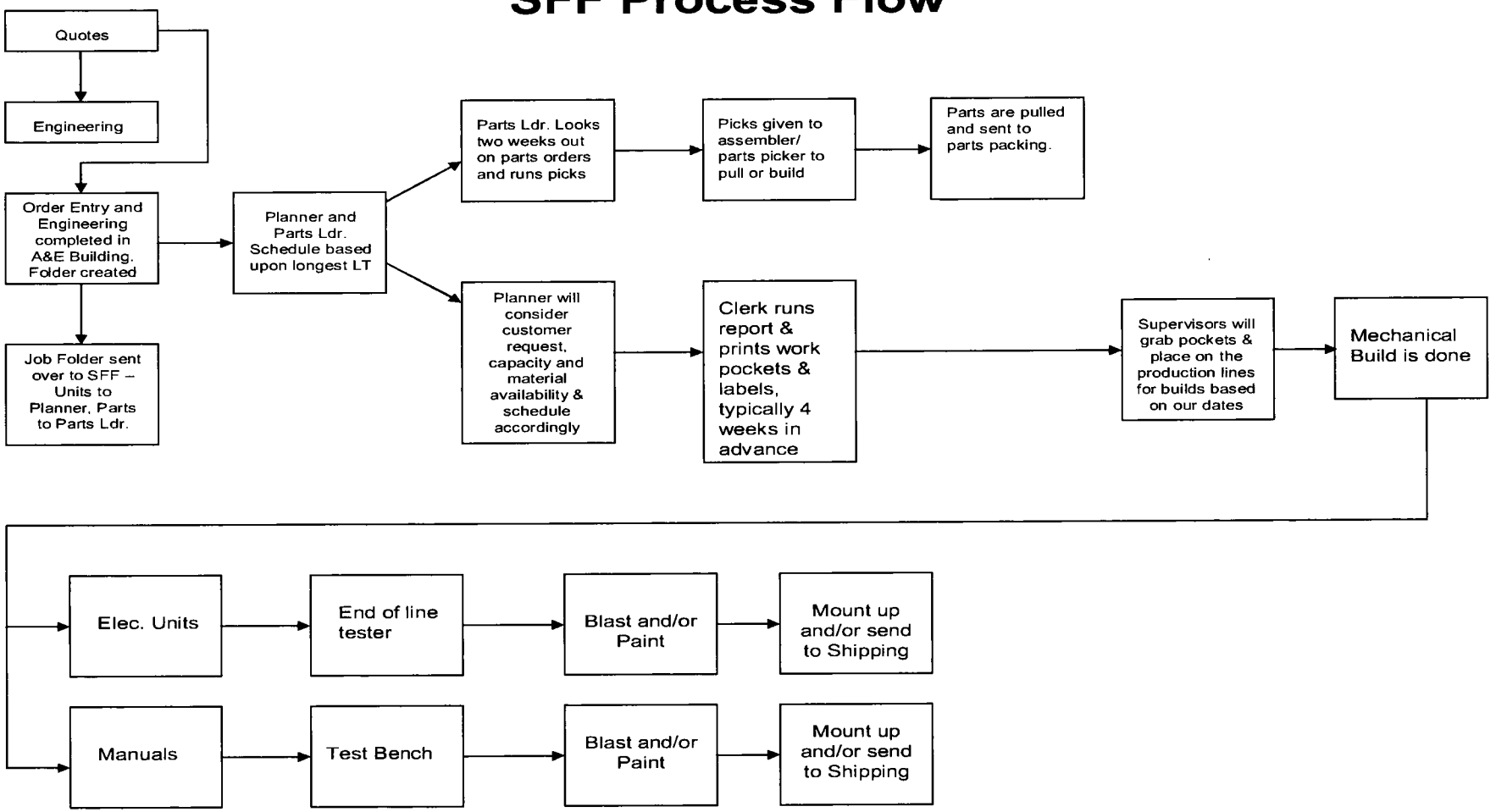
a) determining potential non-conformities and their causes,
b) evaluating the need for action to prevent occurrence of non-conformities,
c) determining and implementing action needed,
d) records of results of action taken
e) reviewing preventive action taken

Sequence and process interaction listed below:

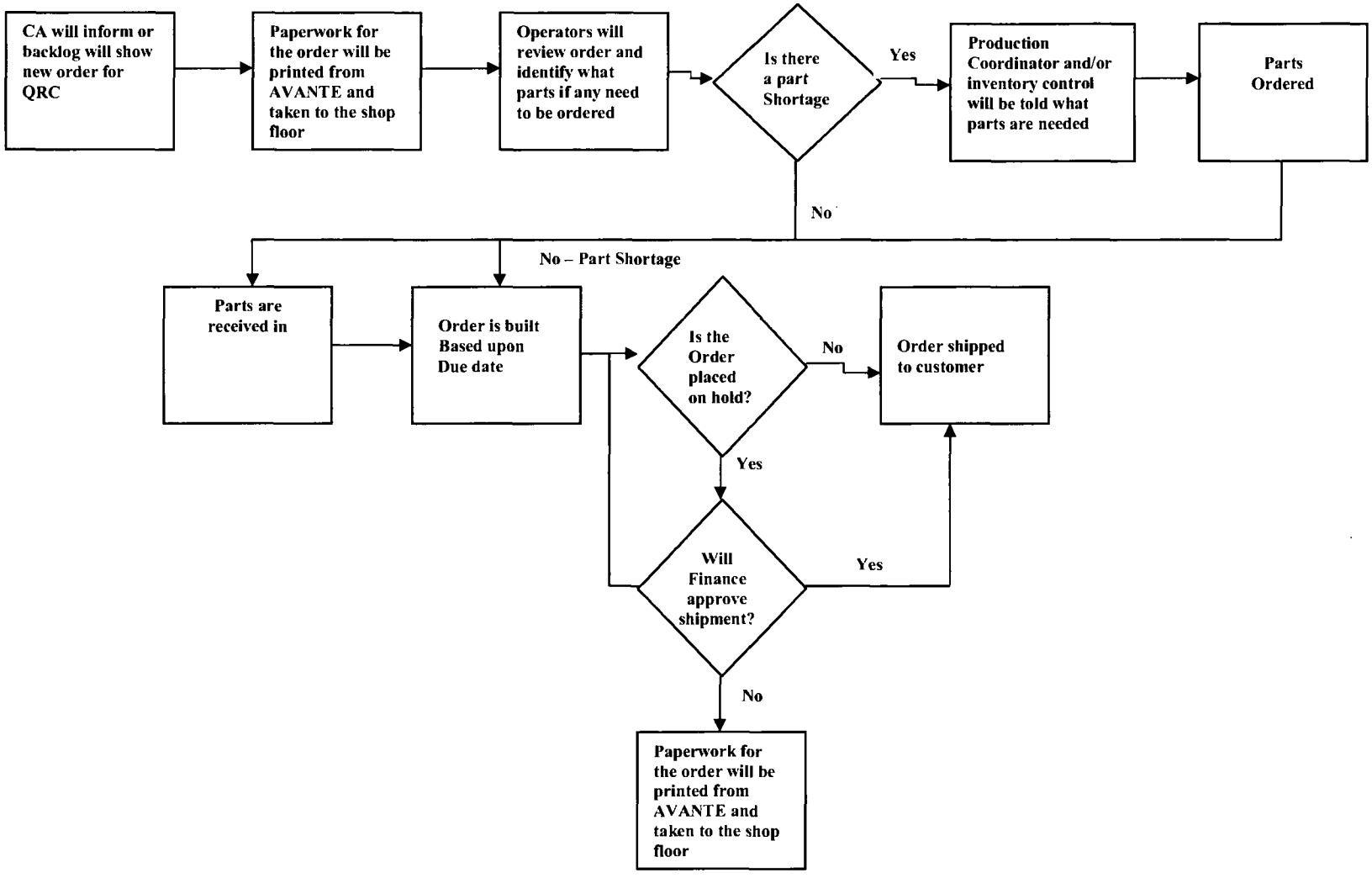
ATTACHMENT #1



SFF Process Flow



Houston QRC – Order Placement to Shipment



FLOWSERVE
QUALITY MANAGEMENT SYSTEMS MANUAL
PROCEDURES MATRIX CROSS REFERENCE

ATTACHMENT 2

ISO 9001:2008	Inter-Departmental Procedures	Intra-Departmental Procedures	10 CFR 50 Appendix B	ATEX EN 13890	MIL-I-45208A	IECEx
Procedures Matrix and Cross Reference						
0.1 INTRODUCTION				**Foreword & Introduction**		
0 SCOPE			Criterion I, II	1		
1.1 General			Criterion I, II			
1.2 Application			Criterion I			
2.0 NORMATIVE REFERENCE			Criterion I	2		
3.0 TERMS AND DEFINITIONS			Criterion I	3		
4.0 QUALITY MANAGEMENT SYSTEM (Title Only)				4		
4.1 General Requirements	QAP-1.1		Criterion I, II	4.1		4.1
4.2 Documentation Requirements (Title Only)				4.2	3.1	
4.2.1 General	QAP-1.1, QAP-2.1		Criterion I, II, V, XVII	4.2.1		
4.2.2 Quality Manual	QAP-1.1, QAP-2.1		Criterion I, II	4.2.2		
4.2.3 Control of Documents	QAP-5.1, QAP-5.2, QAP-5.3, QAP-5.4, QAP-2.1	QCP-5.1, QCI-5.1, ISP-5.2, EDP-3.1, EDP-5.1, EEP-5.1, PP-6.1	Criterion VI	4.2.3	3.2.1, 3.2.4	4.2.3
4.2.4 Control of Records	QAP-16.1	QCI-16.1	Criterion XVII	4.2.4	3.2.2	4.2.4
5.0 MANAGEMENT RESPONSIBILITY (Title Only)				5		
5.1 Management Commitment	QAP-2.1, QAP-1.1		Criterion I, II, V	5.1		
5.2 Customer Focus	QAP-3.1, QAP-3.2, QAP-14.2	QAI-3.2, SAP-3.0, SAP-3.2, SAP, 3.3, SAP-3.4, EDP-1.1	Criterion I, II, III	5.2		
5.3 Quality Policy	QAP-1.1		Criterion I, II	5.3		
5.4 Planning (Title Only)			Criterion I, II, V	5.4		
5.4.1 Quality Objectives	QAP-1.1		Criterion II	5.4.1		
5.4.2 Quality Management System Planning	QAP-1.1		Criterion II, V	5.4.2		5.4.2
5.5 Responsibility, Authority, and Communication (Title Only)			Criterion I, II	5.5		

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5.5.1 Responsibility and Authority	QAP-1.1		Criterion I, II	5.5.1		5.5.1
5.5.2 Management Representative	QAP-1.1		Criterion I, II	5.5.2		5.5.2
5.5.3 Internal Communication **NEW**	QAP-1.1		Criterion II	5.5.3		
5.6 Management Review (Title Only)			Criterion II	5.6		5.6
5.6.1 General	QAP-1.1		Criterion II	5.6.1		5.6.1
5.6.2 Review Input	QAP-1.1		Criterion II	5.6.2		5.6.2
5.6.3 Review Output	QAP-1.1		Criterion II	5.6.3		
6.0 RESOURCE MANAGEMENT (Title Only)			Criterion II	6		
6.1 Provision of Resources	QAP-18.1		Criterion II	6.1		6.1
6.2 Human Resources (Title Only)			Criterion II	6.2		
6.2.1 General	QAP-18.1		Criterion II	6.2.1		
6.2.2 Competence, Awareness and Training	QAP-18.1	MDP-18.1, TRP-18.3, TRP-18.4, SAP-18.0	Criterion II	6.2.2		6.2.2
6.3 Infrastructure	QAP-9.1, QAP-9.2, QAP-9.3		Criterion II	6.3		
6.4 Work Environment	QAP-9.1, QAP-9.2, QAP-15.3, QAP-1.1	QCP-11.1, LWI-001, LWI-002, SEP-9.1 thru 9.4 & 9.6 thru 9.8	Criterion II	6.4		6.4
7.0 PRODUCT REALIZATION (Title Only)			Criterion III, VI, XVII	7		
7.1 Planning of product Realization	QAP-3.1, QAP-3.2		Criterion III, VI, XVII	7.1		
7.2 Customer-related Processes (Title Only)			Criterion I, III, XVII	7.2		
7.2.1 Determination of Requirements Related to the Product	QAP-3.1, QAP-3.2	QAI-3.2, SAP-3.0, SAP-3.2, SAP, 3.3, SAP-3.4, EDP-1.1, SAP-3.1	Criterion III, IV	7.2.1		7.2.1
7.2.2 Review of Requirements Related to Product	QAP-3.1, QAP-3.2	QAI-3.2, SAP-3.0, SAP-3.2, SAP,3.3, SAP-3.4, EDP-1.1, SAP-3.1	Criterion I, III, XVII	7.2.2		7.2.2
7.2.3 Customer Communication	QAP-3.1, QAP-3.2, QAP-14.2	QAI-3.2, SAP-3.0, SAP-3.2, SAP, 3.3, SAP-3.4, EDP-1.1	Criterion III, XVII	7.2.3		

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7.3 Design and Development (Title Only)			Criterion III, IX, X, XI, XII, XVII	7.3		
7.3.1 Design and Development Planning	QAP-4.1 & QAP-4.1.1	SAP-4.0	Criterion III			
7.3.2 Design and Development Inputs	QAP-4.1 & QAP-4.1.1	SAP-4.0	Criterion III, XVII			
7.3.3 Design and Development Outputs	QAP-4.1 & QAP-4.1.1		Criterion III, XI, XII, XVII			
7.3.4 Design and Development Review	QAP-4.1 & QAP-4.1.1		Criterion III, IX, X, XI, XVII			
7.3.5 Design and Development Verification	QAP-4.1 & QAP-4.1.1		Criterion III, V, XI, XVII			
7.3.6 Design and Development Validation	QAP-4.1 & QAP-4.1.1		Criterion III			
7.3.7 Control of Design and Development Changes	QAP-4.1 & QAP-4.1.1		Criterion III			
7.4 Purchasing (Title Only)			Criterion III, IV, VII	7.4		
7.4.1 Purchasing Process	QAP-6.2	QAI-3.2, PP-6.1, PP-6.2, MDPI-6.1, PP-9.1, TRP-6.2	Criterion III, IV, VII, XVII	7.4.1	3.11.1, 3.11.2, 3.11.3	7.4.1
7.4.2 Purchasing Information	QAP-6.1	PP-6.1, PP-6.2, PP-9.1	Criterion III, IV, VII	7.4.2	3.11.1, 3.11.2, 3.11.3	7.4.2
7.4.3 Verification of Purchased Product	QAP-6.1, QAP-6.4, QAP-6.5	PP-6.2, TRP-6.2, QCI-10.1, QCI-10.4, QCI-10.2, QCI-10.3, QCI-10.5, QCI-10.6, QCI-10.7, QCI-10.8, QCI-10.9, QCI-10.11, QCI-10.12	Criterion III, IV, VII, VIII	7.4.3	3.11.1, 3.11.2, 3.11.3	7.4.3
7.5 Production and Service Provision (Title Only)			Criterion V, VIII, IX, XIV, XVII	7.5		

ISO 9001:2008	Inter-Departmental Procedures	Intra-Departmental Procedures	10 CFR 50 Appendix B	ATEX EN 13890	MIL-I-45208A	IECEx
7.5.1 Control of Production and Service Provision	QAP-19.1, QAP-19.2, QAP-19.3,QAP-19.4, QAP-19.5, QAP-19.6	AP-9.1, AP-9.2,AP-9.3,AP-9.4, AP-9.5, AP-9.7, AP-9.8, AP-9.9, AP-9.10, AP-9.11 AP-9.12, AP-9.13 AP-9.14, AP-9.15, AP-9.18, AP-9.22, AP-9.24, AP-9.25, AP-9.27, AP-28, COPP-9.1, COPP-9.2, EEP-9.0, EEP-9.1, ISP-9.1, ISP-9.2, ISP-9.3, ISP-9.4, ICP-9.3, TRP-9.2, MEP-9.1, MEP-9.3, MEP-9.8, MEP-9.9, PP-9.1, QCI-9.1, Series 75 & 36.	Criterion V, XIV, XVII	7.5.1	3.4	
7.5.2 Validation of Processes for production and Service Provision	QAP-19.1, QAP-19.2, QAP-15.3	QCP-10.6, LWI-001, LWI-002	Criterion VII, VIII, IX, XI, XVII	7.5.2	3.4	
7.5.3 Identification and Traceability	QAP-15.1, QAP-10.3	QAI-8.1, ICP-10.1, ICP-15.1, SCP-8.2, SCP-8.1, QCI-10.6	Criterion VI, VIII, XIV, XVII	7.5.3	3.5	7.5.3
7.5.4 Customer Property	QAP-7.1, QAP-7.2	QCP-10.1, COPP-9.1, ICP-7.1	Criterion XVII	7.5.4	3.6, 3.6.1	7.5.4
7.5.5 Preservation of Product	QAP-15.1, QAP-15.2, QAP-15.3	ICP-7.1, SCP-8.2, LWI-001, LWI-002, ICP-15.2, ICP-15.4, ICP-15.1, MDP-15.1, ICP-15.3	Criterion VII, XIII	7.5.5		
7.6 Control of Monitoring and Measuring Devices		QCP-11.1, QCI-11.1, QCI-11.2, QCI-11.3, QCI-11.4 & all CP's	Criterion XII, XVII	7.6	3.3	7.6
8.0 MEASUREMENT, ANALYSIS AND IMPROVEMENT (Title Only)			Criterion XIV, IX, X, XI, XVI, XVII, XVIII	8		
8.1 General	QAP-17.1, QAP-10.1		Criterion XIV, IX, X, XI	8.1		
8.2 Monitoring and Measurement (Title Only)				8.2		
8.2.1 Customer Satisfaction **NEW**	QAP-14.1, QAP-14.2		II, V, XVI, XVII, XVIII	8.2.1		

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8.2.2 internal Audit	QAP-17.1		Criterion V, XVII, XVIII	8.2.2		8.2.2
8.2.3 Monitoring and Measurement of Processes	QAP-17.1, QAP-9.1, QAP-9.2 QAP-18.1	QCI-17.1	Criterion II, V, IX, X, XI,	8.2.3		8.2.3
8.2.4 Monitoring and Measurement of Product	QAP-10.1, QAP-10.2, QAP-10.3, QAP-10.4, QAP-18.1	QAI-20.1, QCP-10.1, QCP-10.5, QCP-10.6, QCP-10.9, ICP-10.1, QCI-10.1, QCI-10.2, QCI-10.3, QCI-10.4, QCI-10.5, QCI-10.6, QCI-10.7, QCI-10.8, QCI-10.9, QCI-10.11, QCI-10.12	Criterion VIII, V, XIV, X, XI, XVI	8.2.4	3.1, 3.2.1, 3.2.2, 3.8, 3.10, 3.12	8.2.4
8.3 Control of Nonconforming Product	QAP-13.2, QAP-13.3, QAP-10.3		Criterion V, XV, XVII	8.3	3.7	8.3
8.4 Analysis of data	QAP-14.1, QAP-14.2, QAP-13.2, QAP-13.3, QAP-19.2, QAP-19.4		Criterion IX, X, XI, XV, XVI, XVII	8.4	3.9	
8.5 Improvement (Title Only)			Criterion XVI	8.5		
8.5.1 Continual Improvement **NEW**	QAP-1.1		Criterion XVI	8.5.1		
8.5.2 Corrective Action	QAP-14.1, QAP-14.2, QAP-13.3		Criterion XVI	8.5.2	3.2.3	
8.5.3 Preventive Action	QAP-14.1, QAP-14.2		Criterion XVI	8.5.3		

APPLIES TO ATEX ONLY	
ATEX Annex A (Informative)	Information relevant to particular types of protection
ATEX Annex B (Informative)	Verification criteria for sintered components used as an integral part of a type of protection
ATEX Annex ZA (Informative)	Clauses of this European Standard addressing essential requirements or other provisions of EU Directives
ATEX Bibliography	