

QUALITY  
ASSURANCE  
MANUAL

Revision: 6 August 24, 2007

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# QUALITY POLICY

## INTRODUCTION

The purpose of this manual is to document NuWaves' quality system, to instruct and guide employees whose actions affect product quality and to inform the company's customers what controls are implemented to assure product quality.

The Quality Policy of NuWaves, Ltd. is based on customer satisfaction. We strive for continuous improvement in our quality systems and meeting the objectives of our company:

- Supplying products that meet or exceed our customer's requirements
- Providing design services that result in customer satisfaction
- Continuous development of a dependable vendor base

We are committed to continuous improvement in quality and the assessment of the quality system to assure its suitability to meet the requirements of our company and the requirements of our customers.

By meeting our objectives defined within this manual we are able to:

- Provide defect free products.
- Provide customer satisfaction by:
  - providing on time deliveries.
  - meeting all contract requirements.
  - delivering exceptional product quality.
  - delivering exceptional service quality.
- Assist vendors and work with subcontractors to reduce late deliveries and delivery of defective products.

# Quality Assurance Manual

For

NuWaves Engineering

## TABLE OF CONTENTS

REVISION HISTORY .....	4
STATEMENT OF OBJECTIVE .....	5
AUTHORITY FOR IMPLEMENTATION .....	6
ORGANIZATIONAL STRUCTURE .....	7
SALES RESPONSIBILITY .....	8
ENGINEERING DOCUMENTATION CONTROL .....	9
DESIGN REVIEWS.....	11
PURCHASING DEPARTMENT MATERIALS MANAGEMENT .....	12
PRODUCTION RESPONSIBILITY .....	13
QUALITY CONTROL RESPONSIBILITIES .....	14
RECEIVING INSPECTION .....	15
IN-PROCESS INSPECTION.....	16
PRE-SHIPMENT INSPECTION.....	17
MATERIAL REVIEW.....	18
CORRECTIVE AND PREVENTIVE ACTION.....	19
INDEX OF FORMS.....	20

## REVISION HISTORY

<b>Revision</b>	<b>Date</b>	<b>Description</b>
1	12/15/03	Initial Release
2	1/24/04	Update
3	6/03/04	Added a Record Retention Time Period
4	1/19/06	Added Design Review References
5	2/22/06	Updated Index of Forms
6	8/24/07	Added ECN Electronic Filing

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## STATEMENT OF OBJECTIVE

The objective of NuWaves' Quality Plan is to clearly define the procedures and responsibilities of a total quality assurance program with the ultimate goal of delivering design engineering services and high value products to our treasured customers that meet or exceed their individual specifications or requirements.

Provide detailed procedures required to accomplish uniform quality assurance for this company's services and products.

Furnish general-purpose information useful in the administration of quality assurance activities.

Any product supplied by NuWaves under contract shall be manufactured under appropriate institutes' and societies' specifications or their supplemental specifications and shall be subject to the quality control standards outlined therein.

A copy of this manual is issued to ALL NuWaves employees, inclusive of part time, seasonal, and contract personnel.

Revisions to this policy will be issued when deemed necessary and shall be recorded and authorized on the revision notice page of this manual. Revisions shall be numbered, dated, and indicate the section revised.

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## AUTHORITY FOR IMPLEMENTATION

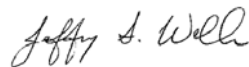
The Managing Director of NuWaves, Ltd. authorizes the policies and procedures contained in this Quality Assurance Manual.

The President delegates to the Quality Control Supervisor the authority to establish, document and administer the necessary guidelines, requirements and controls to effectively implement the Statement of Objective detailed in the previous section.

The Quality Control Supervisor is appointed by the President. The Quality Control Supervisor shall have the responsibility and authority to assume compliance to this manual.

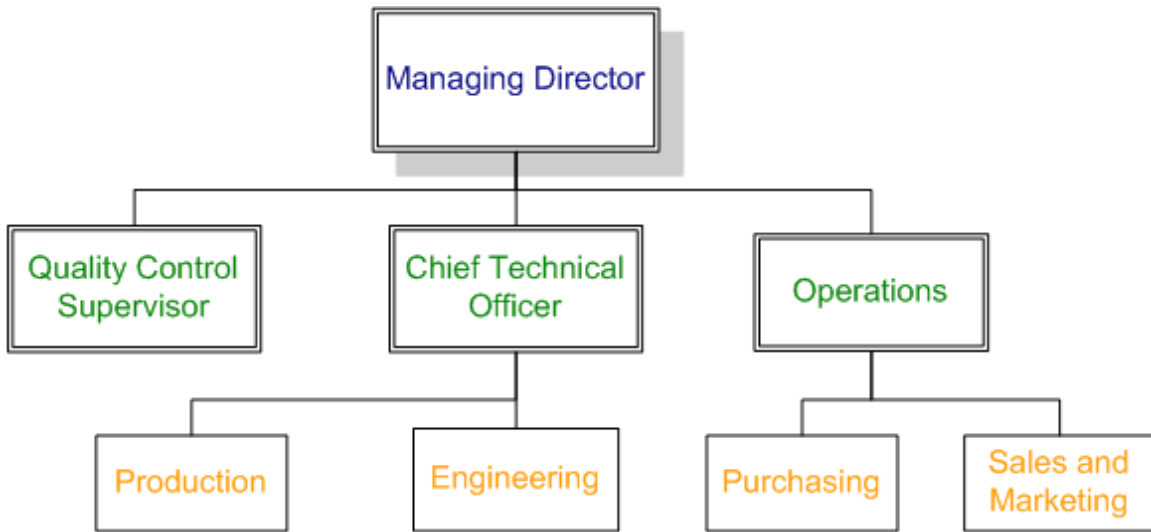
NuWaves, Ltd.

BY:

A handwritten signature in black ink that reads "Jeffrey S. Wells".

Jeffrey S. Wells  
President & Managing Director

## ORGANIZATIONAL STRUCTURE



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## SALES RESPONSIBILITY

The correct interpretation of customer needs and specifications, whether verbal or written, cannot be overemphasized. The sales order (contract and/or purchase order) is the foundation for the complex chain of events leading up to shipment of a finished quality product or service.

All sales orders and specifications must be routed through the Managing Director for approval. The Managing Director will require written customer acceptance of particular specifications prior to a sales order being finalized for all Firm Fixed Price efforts. The purpose of the contract review is to verify that the customer's requirements are adequately defined and documented and have been understood.

Required personnel such as production, chief technical officer, design and development teams, and purchasing shall be consulted regarding unusual customer requests and/or specifications before a delivery date is scheduled. The delivery schedule should include current backlog and materials availability.

Throughout the sales process, customers must be confident that NuWaves is working hard to provide them assured quality in both a product and a reliable delivery schedule.

Copies of the sales order, along with other pertinent information are kept on file. Records of all review activities are maintained as evidence.

All products are identified with the actual product part number or where only a description exists; the company's internal part numbers are assigned.

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## ENGINEERING DOCUMENTATION CONTROL

Any special and pertinent information necessary to manufacture products, such as special processes, dimensional requirements, special materials, schematic, PCB, or build requirements will be kept as a matter of record in the Quality Control Supervisor's and Project Manager's offices. This information is reviewed prior to duplicate order acceptance and production.

Documentation revisions for parts lists, schematics, and printed circuit board files shall follow the letter revision of the Printed Circuit Board (PCB). Changes to the parts list and schematic shall take on number revisions until the next PCB layout, at which time all files will roll with the PCB to the next letter revision. For example, a series of revisions is shown below:

Revision -: Initial Release

Revision 1: Parts list and Schematic Updates

Revision 2: Change to the parts list

Revision A: Revised PCB layout, parts list and schematics are now at this rev.

Revision A1: Parts list or schematic modification

Revision A2: Parts list or schematic modification

Revision A3: Parts list or schematic modification

Revision A4: Parts list or schematic modification

Revision B: Revised PCB layout, parts list and schematics are now at this rev.

It will be the responsibility of Engineering Project Personnel to issue and maintain up-to-date drawings and specifications and other engineering data. The assigned engineering personnel shall deliver the proper documentation to the manufacturing personnel.

All obsolete manufacturing data is returned to the engineering personnel for destruction (or archived). A complete file of all revisions and pertinent information is maintained and kept by the production supervisor for a period of 10 years. This length of time may be extended at the instruction of the Quality Control Manager.

When drawings are revised, they shall be dated and marked as such by the project engineer prior to release, thus signifying an up-to-date print. Changes to the engineering design shall be documented and implemented through the use of Engineering Change Notices (ECN).

The complete ECN shall be generated electronically and filed in the ECN sub folder under the project folder on NuWaves file server. The paper copy master form shall be placed in a binder and stored in the manufacturing project cabinet.

The project engineer is responsible for the complete documentation of the change and how the method for implementation. No one is allowed to use any print not clearly legible or with hand written changes or notes unless prior approval is received from the quality control supervisor and the project's assigned manager.

It shall be the responsibility of the Quality Control and Production Control Departments to insure that all manufacturing data is kept clean and legible.

All products are identified by a part number or description correlated to corresponding drawings, specifications and other technical documents. Documents of external origin are to be properly identified, registered and controlled by the Quality Management System.

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## DESIGN REVIEWS

Peer reviews of designs will be conducted on all designs when the schematic design phase has been completed and is ready to be transitioned to the printed circuit board (PCB) layout phase. The purpose of the design review is to prevent oversights from progressing into the PCB layout and the final product. In preparation for the schematic design review, the designer will complete the Design Review Checklist (QAF-05) to ensure all the required materials and data have been collected and are ready for the review.

Another design review will be conducted upon completion of the PCB layout phase. The purpose of this review is to check the routing of critical signals and verify that the physical aspects of the design meet all of the specifications before the design is released for fabrication. Similar to the schematic design review, the PCB designer must complete all portions of the PCB Release Checklist (QAF-06) except for the Gerber files section.

Upon a successful PCB review and Gerber file creation, the Gerber files will be reviewed and the PCB Release Checklist completed.

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## PURCHASING DEPARTMENT MATERIALS MANAGEMENT

The company assesses its vendors and subcontractors and purchases only from those that can satisfy the company's quality requirements. Purchasing documents clearly and completely describes the ordered products, including quality requirements and conditions of terms and conditions of sale.

The Purchasing Department prepares all purchasing documents. The documents clearly and completely describe ordered products. The Managing Director reviews and approves all purchasing document templates. Furthermore, the Managing Director approves all purchases for contract services, capital equipment, and purchases exceeding \$500.

All requisitions for materials that require milling or fabrication require drawings that have been approved by the project's assigned manager. All Non-Cancelable and Non-Returnable purchase orders must be approved by the Managing Director.

For all raw materials and outside processes only those sources, which have been approved by the Quality Control Department as having an adequate quality assurance program or an alternate program to insure a quality product, will be used.

Quality performance of all subcontractors is monitored. Those showing inadequate performance are asked to implement corrective actions and are discontinued if there is no improvement or desire to improve.

If it is deemed desirable or necessary to develop new sources for parts (i.e. component vendors) or outside process, then the Quality Control Supervisor will initiate a survey of sources to determine the adequacy of their quality assurance system and their ability to deliver to NuWaves' high quality standards and specifications. The Quality Control Supervisor shall have the authority to disapprove any vendor not conforming to NuWaves' requirements.

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## PRODUCTION RESPONSIBILITY

It is the prime responsibility of the Production Supervisor to coordinate all efforts in manufacturing a product to all applicable standards and customer requirements.

Strict adherence to applicable and engineering specifications is mandatory in all manufacturing operations.

All work orders must be accompanied by Quality Control approved paperwork necessary to assure product is manufactured to stated requirements and guidelines.

No one is allowed to use a drawing not clearly legible or with handwritten changes or notes not authorized by Quality Control, Production Supervisor, and the Project Manager.

No production worker is to undertake any job operation without a clear understanding of the work to be performed.

All components and products in process must be clearly identified at all times. This includes the use of Control Tags and Serial Numbers.

It is the Production Manager's responsibility to ensure that every production worker understands what is expected.

The production supervisor shall take all necessary steps to meet the scheduled production dates.

When a specific manufacturing process requires an inspection, the Quality Control Supervisor is to be notified.

If any person notices any discrepancy on a work order, schematic, PCB layout artwork, or contract, the Quality Control Supervisor and the Project Manager is to be notified.

A schedule of periodic tool inspection and maintenance is to be in effect. All Production personal will give their full cooperation to the Quality Control Supervisor and its designated personnel.

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## QUALITY CONTROL RESPONSIBILITIES

The Quality Control Supervisor is responsible for planning, developing, initiating, coordinating, implementing and maintaining the most effective and cost efficient procedures for optimum assurance and control, in accordance with QAP-001.

The Quality Control Supervisor shall interface between NuWaves' management and the manufacturers to solve quality-related problems that may occur.

The quality control supervisor is responsible for maintaining accurate and complete inspection records, documentation, and specifications necessary for a complete quality program.

The quality control supervisor shall provide or aide with the information and analysis and use of records as a basis or foundation for any action deemed necessary by management.

The quality control supervisor shall provide or aide with the inspection of all tooling, materials, and procedures.

Personnel performing quality control functions shall have sufficient training, defined responsibilities, authority, and the organizational freedom to identify and evaluate quality related problems.

For best and unrestricted performance, the Quality Control Supervisor and staff personnel will be directly responsible to the Managing Director of NuWaves.

To insure the continuing top performance of the quality control department, the management of NuWaves may at any time conduct an audit to guarantee the status and adequacy of the "Quality Control System."

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## RECEIVING INSPECTION

All materials (i.e. components) and outside processes may be subjected to inspection directed by the Quality Control Supervisor. These inspections may take the form of electrical, mechanical, and/or visual inspections.

Upon arrival of all products from outside sources, whether product for processing from a customer, raw material, or any item which may affect a product for any customer the goods may not be removed from the receiving area until receiving inspection is conducted.

The Receiving Manager is to inspect the arriving goods against the associated Purchase Order, Service Order, or other affiliated documents indicating the quantity and criteria of the goods or services ordered.

After acceptance of the received product, the Receiving Manager is to acknowledge receipt in the fashion required by the shipper. The product is to be properly identified as to its quantity and content (i.e.: material type, size, etc.) and placed into the proper storage or process staging area depending on the nature of the item.

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## IN-PROCESS INSPECTION

To assure that the proper quality level and all contractual obligations are met, all parts, processes, and work-affecting items are subject to inspection.

It is the Quality Control Supervisor's responsibility to establish inspection points wherever and whenever it is necessary to guarantee compliance with NuWaves' Quality policy.

The preparation, maintenance of, and compliance with work instructions shall be monitored as a function of the Quality Control Supervisor.

Any tooling or fixtures being used to produce products are subject to periodic inspection.

Roving inspections will be executed during the duration of the operation to assure compliance.

The Quality Control Supervisor will provide specific inspection procedures in coherence with any special contractual requirements.

Any parts or material determined to be scrap must be permanently marked and placed in a special holding area and disposed of as quickly as possible.

Discrepancies that recur either with vendor parts or materials of NuWaves manufactured assemblies will trigger a "Trouble Investigation Report." Purchasing (with the assistance of Quality Control) and /or the manager will take the necessary steps for corrective action.

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## PRE-SHIPMENT INSPECTION

Prior to the shipment of an order, all customer products will be subjected to pre-shipment inspection on a lot sample basis.

The Quality Control Inspector will ensure that parts are packaged properly according to customer requirements and that all outside labels, packing lists, or tags list necessary and pertinent information.

All pre-shipment inspections shall include a full documentation review for each serial number being shipped. This includes review of test data, inspection data, Engineering Change Notice Break in Points (ECN BIP), and proper documentation of the control.

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## MATERIAL REVIEW

The purpose of the material review is to determine the future use of any nonconforming raw material or component (parts).

In the case nonconforming material is received or produced by mistake the case will be brought to a Material Review Board. The board is to consist of the Managing Director, Quality Control Supervisor, Production Test, Chief Technical Officer, and the Purchasing Department.

The basis for a material review shall be to determine a course of action for the discrepancy in question and the Material Review Board may suggest a corrective action.

In normal cases the decision would be; use as is, rework, return to vendor or scrap.

If the discrepancy in question is in violation of a customer requirement the decision of the review board must be approved by the customer and the decision must be in writing.

Until any such decision is made the parts or material will be on "hold" in a pre-designated area.

Material review personnel shall have the authority and responsibility to stop production when unsatisfactory corrective action measures are present.

NuWaves shall not delegate Material Review Board authority to sub-tier suppliers without customer approval.

Disposition of customer owned parts must be approved by the customer.

Adequacy of procedures, Quality Control Documents, Inspection Procedures, Testing Procedures, Controls and Certifications shall be audited by an impartial team of members of management of NuWaves.

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## CORRECTIVE AND PREVENTIVE ACTION

Corrective action is taken to help assure nonconformances are resolved and permanent solutions are implemented. Corrective actions are issued, recorded and verified in accordance with documented procedures.

Everyone in the organization is responsible for instituting, monitoring, or requesting corrective / preventive actions. Problems are evaluated for potential impact on production processes, safety, quality, performance, reliability and customer satisfaction. Sources of data and information used in the evaluation may come from failure analysis results, manufacturing operations, or customer feedback.

Problems are analyzed to determine whether immediate corrective action is required. Action may include production stoppage, shipping hold, stock purge, supplier hold, or product recall. Once immediate control action has been taken, the cause is analyzed to determine required corrective action. Short-term corrective actions may include customer notification, rework, or product screening. Long-term corrective actions may include product redesign or production process revision.

After the cause of the problem has been identified, measures are taken to prevent its recurrence. Nonconforming items are properly disposed of or corrected. The effects of these measures are audited to assure the desired goals are met and the permanent changes are in place, documented and communicated.

Preventive actions plans are created to address longer-term trends as represented by quality related data.

## INDEX OF FORMS

<b>FORM ID</b>	<b>DESCRIPTION</b>
QAF-01	Project Charter
QAF-02	Engineering Change Notice
QAF-03	Process Control / Inspection Record
QAF-04	Requisition Request Form
QAF-05	Design Review Checklist
QAF-06	PCB Release Form
QAF-07	ECN Log
QAF-09	Returned Material Report
QAF-10	Product Non-Conformity Report
QAF-11	Received Government Material
QAP-001	Procedure for Quality Management System
QAP-002	Procedure for Control of Records
QAP-003	Procedure for Receiving Inspections