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INDUSTRIAL
COMMERCIAL
EQUIPMENT
MANUFACTURING LTD.



QUALITY ASSURANCE MANUAL

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INTRODUCTION

This manual describes our quality control system for our customers and employees. The system applies to the items we produce as well as to the materials we buy from our suppliers.

ICE Western believes that it is essential to provide customer satisfaction by providing competitive product of high quality on time.

In order to survive in a rapid changing and competitive market, ICE Western has adapted techniques for managing change. One of these is the development and implementation of a continuous improvement quality management system documented herein. This concentration has been extended beyond production to include all departments and staff. To meet our customer's requirements, ICE Western must consistently supply high quality products, and must continually strive to improve performance, through understanding our customer's needs.

Every function within ICE Western has customer satisfaction as our highest priority at all times. This is maintained through a work environment that provides all employees the training, instructions and procedures to ensure that assigned duties are performed correctly the first time. Moreover implementation of quality and services involves all levels of personnel in the organization.

As dictated by the complexity of product design, manufacturing techniques used, and customer requirements, more specific written procedures may be required to implement the policies set forth in this manual.

Xxxxxx
CEO

Xxxxxx
President

MANAGEMENT RESPONSIBILITIES

1.0 Organization

Responsibility and Authority for the Quality Policy

General

The company shall maintain a Quality Assurance Team under the Quality Assurance Manager and comprised of the personnel described in this section.

While the Company recognizes the autonomy and responsibilities of each individual employee as it relates to Quality Assurance, the Quality Assurance Team will perform a review and monitoring function and will ensure the establishment of appropriate standards and procedures required in the Quality Assurance System.

Each employee has the authority and responsibility to prevent nonconforming products and services from being moved forward in the process or being delivered to the customer until such time as the nonconformity has been disposed of thorough corrective action.

The method for executing these responsibilities is defined by the persons responsible for managing or directing the work being performed and in the procedures specific to each area as described in this manual.

1) President & General Manager

The President is responsible for the appointment of the Quality Assurance Manager and ensuring the performance of the Quality System. He ensures that the resources necessary to implement and maintain the Quality System are available on an ongoing basis and that the Company provides the support required by the related problems not resolved by the Quality Assurance Manager.

The President and General Manager shall also ensure that all policies and associated procedures defined in the Quality Assurance Manual are implemented. He ensures that the Company has qualified personnel in each management position and they are trained to perform the duties assigned to them. He shall also ensure that they have the required documentation and are suitably equipped to their tasks as well as provide leadership and direction in the solution of problems.

Delegation of the Quality System implementation shall be to those departments reporting to him a shown on the Company's organization chart.

2) Controller

The controller reports to the President & General Manger and is responsible for and has the authority for planning, monitoring and maintaining the financial affairs of the corporation. The Controller is the interface between the final customer and the Production Manger as it relates to delivery of the product.

The Controller shall ensure that the corporation has the financial resources necessary to produce, market and distribute products that meet or exceed the customers required levels of quality, durability and reliability.

The Controller works with the President and the operating departments to set operating budgets and to plan the growth of the Corporation.

The Controller is also responsible for ensuring that the purchasing and inventory control systems are maintained and under control at all times via the Purchasing Manager.

3) Quality Assurance Manager

The Quality Assurance Manager reports to the President & General Manager and is responsible for ensuring that the requirements of the Quality System are implemented. He is also responsible for quality systems development, and internal and external audits.

The Quality Assurance Manager has final authority within the Company to determine if produced goods and services meet specified requirements. He shall stop shipment of nonconforming goods and services until the nonconformances are resolved.

The Quality Assurance Manager is also responsible for monitoring the conformance of all departments to those policies and procedures as they affect the quality of the product and services or conformance to the specified requirements.

4) Plant Manager

The Plant Manager reports to the President & General Manager and is responsible for and has the authority for all production activities. This includes the supervision of production foremen. He shall, in conjunction with the Director of Sales & Marketing, determine delivery schedules and ensure that all products are completed on schedule, at competitive costs and to the required quality.

He is also responsible for ensuring that all production equipment is suitably maintained, operational and capable of performing the required tasks at all times.

In addition to the above he shall ensure that all operators are suitably trained to do their jobs and that the plant environment remains harmonious.

5) Engineering Manager

The Engineering Manager reports to the President & General Manger, is responsible and has the authority for the Engineering function.

He shall supervise the engineering staff and ensure that all job packages are accurate, complete and produced or released to schedule. He shall also ensure that product designs are cost effective and certifiable.

He is responsible for ensuring that all engineering staff are suitably trained and have the necessary tools to do their jobs.

6) Director of Sales and Marketing

The Director of Sales and Marketing reports to the President & General Manager is responsible and has the authority for Sales and Marketing as well as product and market development. This includes the preparation and review of tenders, quotations and contracts.

He shall facilitate growth in sales volume and profitability.

He is responsible for setting sales polices, objectives and pricing and ensuring that all customer's needs are met. This includes providing quality technical literature, promotional material and items to customers.

He shall ensure that all Sales Representatives are trained to do their jobs and have up to date pricing for all products.

7) Purchasing / Inventory Control Manager

The Purchasing Manager is responsible to the Controller and has the authority for the timely purchase of all products and services required by the company. This includes purchasing products and services from approved vendors and according to specifications approved by the Engineering and Quality Assurance Team.

He is also responsible for managing the inventory system which includes the receiving function, the picking of orders for transfer to other departments, return of defective product to suppliers and the proper documentation of all transactions related to these options.

He shall ensure that only product which is listed by the approval agencies and /or approved by the engineering is purchased for production. He shall also ensure that all incoming materials, components, services and supplies are delivered on time and have been received in accordance with an approved quality plan and meet the required levels of quality, durability and reliability.

8) Supervisor

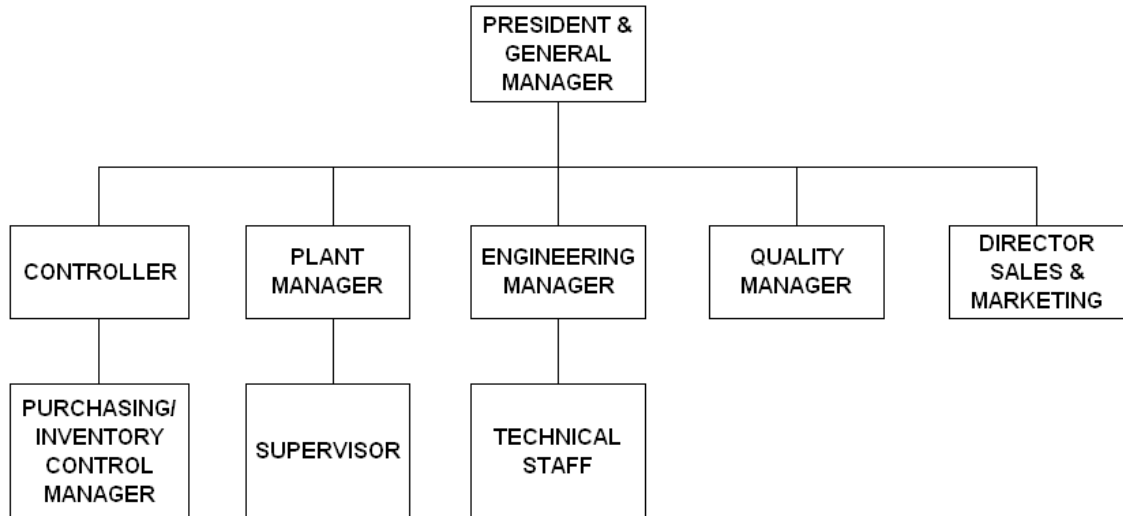
The Supervisor report to the Plant Manager is responsible for and has the authority for supervising production tasks as directed by the Plant Manager. Tasks including shearing, cutting, forming, welding, fastening and assembly of various product parts and components.

He shall ensure that all production operators have the necessary training to do their jobs, suitable tools and equipment and that production instructions as understood and performed without error.

9) Technical Staff

The technical staff report to the Engineering Manager is responsible and has the authority for performing engineering and technical tasks as directed by the Engineering Manager. Tasks include the preparation of job packages, engineering drawings, bills of material and manufacturing instruction.

The interrelationship of the individuals who are involved in the Quality Assurance Program is shown in the following Organizational Chart.



ICE WESTERN SALES LTD. ORGANIZATION CHART

2.0 Statement of Authority and Responsibility

The Quality Assurance Manager is authorized to implement the Quality Program and to ensure that the quality requirements are not subordinated to design, manufacturing, construction or deliver. The customer and jurisdictional authority shall be advised in writing by the President & General Manager of all changes to the Quality Assurance Manager's position.

The Quality Assurance Manager is responsible for:

1. Ensuring that trained personnel for verification activities are assigned to each task performed within the Company.
2. Ensuring that personnel for quality verification have the organizational freedom and authority to:
 - a) Initiate action to prevent the occurrences of products, process, and quality system nonconformity,
 - b) Identify and record any quality problems related to product, process, and quality system.
 - c) Initiate, recommend or provide solution through designated channels.
 - d) Verify the implementation of solutions.
 - e) Control further processing, delivery or installation of nonconforming products or services until the deficiencies or unsatisfactory conditions have been resolved.
3. Calling and chairing meetings of the Quality Assurance Team on a quarterly basis or more frequently as required in order to review the operations of the Quality Assurance System and ensuring that Team Members make any corrective changes or improvements required in order to meet a mandate on constant refinement of the system.

Personnel assigned to perform inspection, testing and monitoring of the production and installation processes and/or products shall be conversant with the Company's operation, and have good working knowledge of QA/QC systems, and the appropriate technical background.

Annually, the Quality Assurance Manger, in conjunction with the Controller, Engineering Manger and Director of Sales & Marketing, shall prepare a report on the status and effectiveness of the Quality Assurance Program, which shall be reviewed by the President & General Manger.

President & General Manager

Quality Assurance Manager

3.0 Quality Management Review

To ensure continuing suitability and effectiveness of the Company's Quality Assurance Program in satisfying the company's quality policy and objectives, the Controller, Plant Manager, Engineering Manager and the Director of Sales & Marketing, will review, analyze and give feedback to the Quality Assurance Manager, annually. Their respective reviews will be based on, but not limited to, internal audit reports, customer complaint records, field service complaints (if any), corrective and preventative action programs and major item nonconformances as well as actions taken with respect to these. The Quality Assurance Manager is responsible for analyzing all the results, and for forwarding a summary report, including the internal audit findings, to the President & General Manager for review and feedback. This review cannot be delegated. A copy of the results of the President & General Manager's review and feedback shall be distributed to all Managers and Supervisors within the Company.

Records of the management reviews shall be maintained by the Quality Assurance Manager.

QUALITY SYSTEM

1.0 Scope

The Company has established a Quality System outlining the quality policies, organizational structure, responsibilities, procedures, processes and resources for implementing Quality Assurance Management.

2.0 Development of the Quality System

2.1 The Company has established and maintained a documented Quality System as a means of ensuring that the product and services conform to specified requirements. This includes:

- a) The preparation of a documented Quality Policy Manual, Quality System procedures, instructions, and forms in accordance with the requirements of the company's stated quality policy.
- b) The effective implementation of the documented Quality Assurance Manual, procedures and instructions.

2.2 Note: In meeting specified requirements, timely consideration has been given to the following activities:

- a) the preparation of quality plans and a Quality Assurance Manual in accordance with the specified requirements **below**;
- b) the identification and acquisition of any controls, processes, inspection and testing equipment, total production resources and skills that may be needed to achieve the required quality;
- c) the updating, as necessary, of quality control, inspection and testing techniques, including the development of specifications, and the acquisition of new instruments, such as software;
- d) the identification of any measurement requirements involving capability that exceeds the current abilities of the Company in sufficient time for the needed capability to be developed or acquired from outside sources;
- e) the clarification of standards of acceptability for all features and requirements, including those which contain a subjective element;
- f) the compatibility of the production process, installation, inspection, and test procedures and the applicable documentation;
- g) the identification and preparation of the quality records.

3.0 Quality Manual

2.1 The Quality Assurance Manger is responsible for the preparation, implementation, and maintenance of this manual.

2.2 The Quality Assurance Manger shall distribute the manual and maintain records of issuance of all controlled manuals. Records shall list the name of the individual, company, copy number and date on which the original copy and the subsequent revisions are issued.

2.3 Review

The manual shall be reviewed in its entirety by the Quality Assurance Manager at least annually.

4.0 Quality System Element Descriptions

4.1 Quality System Descriptions

- Contract Review
- Design Control
- Document & Data Control
- Purchasing
- Control of Customer Supplied Product
- Product Identification & Traceability
- Process Control
- Inspection and Testing
- Control of Inspection, Measurement & Test Equipment
- Inspection and Test Status
- Control of Nonconforming Product
- Corrective & Preventative Action
- Handling, Storage, Packaging, Preservation & Delivery
- Control of Quality Audits
- Training

4.2 When necessary, the Quality System Descriptions shall be updated.

4.3 The Quality System Descriptions referred to in this section shall provide an outline of purpose, scope, responsibilities and full details of how, what, when and where all relevant activities shall be performed.

4.4 All sample forms referenced in this Quality Assurance Manual are functional.

5.0 Quality Planning

5.1 The President in conjunction with the Quality Assurance Manager and other department supervisors, as applicable, shall define and document the quality plan in order to ensure that the requirements for quality will be met.

5.2 The quality planning shall be embodied in the content of the system elements, section 4.0, applicable documented procedures and shall include consideration of the following activities:

- a) The preparation of quality plans;
- b) The identification and acquisition of any controls, processes, equipment, fixtures, resources and skills that may be needed to achieve the required quality;
- c) Ensuring the compatibility of the production process, inspection and test procedures and the applicable documentation;
- d) The updating, as necessary, of quality control, inspection and testing techniques, including the development of new instrumentation;
- e) The identification of any measurement requirement involving capability that exceeds the known state of the art, in sufficient time for the needed capability to be developed;
- f) The identification of suitable verification at appropriate stages in the realization of product;
- g) The clarification of standards of acceptability for all features and requirements, including those which contain a subjective element;
- h) The identification and preparation of quality records.

CONTRACT REVIEW

1.0 Purpose

1.1 The purpose of this procedure is to ensure that all contacts are reviewed before acceptance and determine if requirements of the product are adequately defined, that differences from the tender are resolved prior to production and the Company has the capability to meet the requirements.

2.0 Scope

2.1 This procedure applies to all orders both verbal and written as well as formal tender and contracts.

3.0 Responsibility

3.1 The Director of Sales & Marketing has the primary responsibility for Contract Review. Additional department managers and supervisors may be involved as required by the nature of the product.

3.2 The Director of Sales & Marketing is also responsible for the preparation of quotations and tenders.

4.0 Policy

4.1 Before submission of a tender, quotation, or the acceptance of a contract or order (statement of requirement) by ICE Western Sales Ltd., the tender, contract or order shall be reviewed by the Director of Sales & Marketing to ensure that:

- a) the requirements are adequately defined and documented; where no written statement of requirement is available for an order reviewed by verbal means, ICE Western Sales Ltd. Shall ensure that the order requirements are agreed before their acceptance.
- b) any differences between the contract or order requirements and those in the tender are resolved;
- c) ICE Western Sales Ltd. has the capability to meet the contract or order requirements.

4.2 Amendments to contracts made by the Director of Sales & Marketing are transferred to the applicable department supervisors or managers. He shall fax or e-mail a confirmation of the amendment to the customer.

4.3 Amendments to contacts made by customers are faxed or e-mailed to the Director of Sales & Marketing. The Director of Sales & Marketing transfers the amendment to the appropriate department supervisor or manager.

4.4 Records of contract review shall be retained for a minimum of five years on site. After this time the records shall be warehoused off site for minimum of fifteen years.

5.0 Procedure

5.1 When quotations/pricing are prepared for a customer by sales staff they are reviewed by the Director of Sales & Marketing for correctness. Correctness includes the following:

- a) the requirements are adequately defined and documented; where no written statement of requirement is available for an order reviewed by verbal means, ICE Western Sales Ltd. Shall ensure that the order requirements are agreed before their acceptance.
- b) ICE Western Sales Ltd. has the capability to meet the contract or order requirements.

The Director of Sales & Marketing signs and dates the document to show that it has been reviewed and checked.

Once complete the Director of Sales & Marketing or his delegate shall assign a QUOTE number to the job and enter it into the Company data base, as evidence of his review.

5.2 All quotations that are sent to customers are filed in the ICEDATA quotation filing system. Quotes are filed by QUOTE #/DATE.

RESEARCH & DEVELOPMENT DESIGN CONTROL

1.0 Purpose

1.1 The purpose of Design Control is to control, verify and validate research and development, products and ensure that they are in compliance with specified requirements. The function is to prevent the development and production of nonconforming product designs and thereby avoid redesign costs as well as potential liability claims.

2.0 Scope

2.1 This element applies to research and development, designs developed and produced by ICE Western Sales Ltd.

3.0 Responsibility

3.1 The President and General Manager is responsible for all design, development and certification of design products.

3.2 The Quality Manager or his delegate is responsible for validating all design products and/or installations.

4.0 Policy

4.1 The General Manager shall prepare research and development design plan for each new design and development activity. The plans shall describe or reference the new design or development activity as well as define the responsibility for their implementation.

4.2 The President and General Manager shall ensure that all new design and development activities are assigned to qualified personnel equipped with suitable resources.

4.3 All new design and development plans shall be updated as the design evolves.

4.4 **Design Review**, the President and General Manager shall plan, conduct and document formal design reviews at appropriate stages of design.

4.5 **Design Verification**, the Production Manager in conjunction with the Director of Sales, Marketing, and Engineering shall verify each design at appropriate stages to ensure the design stage output meets the design stage input requirements. The design verification measures shall be recorded and may include:

- a) performing alternative calculations;
- b) comparing the new design with a similar proven design, if available;
- c) undertaking tests and demonstrations, and;

d) reviewing the design stage documents before release.

4.6 **Design Validation**, the Quality Manager shall validate all standard, modified standard, or custom designs by obtaining documented evidence of customer approval to ensure that product conforms to defined user needs and/or requirements.

4.7 **Design Changes**, the Director of Sales, Marketing, and Engineering shall identify, document, review and approve all design changes to ensure that product function performance are not compromised, prior to their implementation.

DOCUMENT & DATA CONTROL

1.0 Purpose

To control specific documents and data in the quality system, by reviewing the documents and/or data for adequacy before issue, and by controlling changes to the documents and/or data in the same manner as the original issue.

In addition, a record of changes must be maintained, as well as identifying the change in the document or data.

2.0 Scope

This procedure describes the responsibility and method used to ensure that all essential documentation and data affecting quality, is reviewed for adequacy by authorized personnel before being released. This includes documents of external origin such as standards and customer drawings.

3.0 Responsibility

3.1 All essential documentation and data affecting quality is prepared, reviewed, approved and distributed by the responsible personnel.

4.0 Policy

4.1 The documents and data to be reviewed and approved for adequacy by authorized personnel prior to issue shall consist of the following:

- a) Quality Assurance Manual
- b) Engineering Drawings
- c) Specification Sheets including Check Lists
- d) Audit Checklists
- e) Job Files
- f) Engineering Design Manual, includes items such as motor charts, blower charts, shaft charts, drive selection tables etc.
- g) Price Lists – product and components
- h) Warranty Forms, Returned Goods Forms
- i) Purchase Orders

4.2 The current revision status of documents shall be indicated on each document. A master file of the current documents shall be maintained and be readily available to preclude the use of invalid and/or obsolete documents.

4.3 Any obsolete documents retained for legal and/or knowledge-preservation purposes shall be suitably identified.

4.4 Any changes to controlled documents and data shall be reviewed and approved by the same authorized personnel that performed the original review and approval, unless specifically designated otherwise. The designated personnel shall have access to all pertinent background information upon which to base their review and approval.

4.5 Documents which are changed shall be annotated with the reason and nature of the change on the revised document.

PURCHASING

1.0 Purpose

1.1 To control the quality of purchased product through the use of sub-contractor assessment and selection, purchasing document data and inspection of the product.

2.0 Scope

2.1 This procedure describes the responsibilities and method used to ensure that all procured components and sub-contracted services are in accordance with specified requirements.

3.0 Responsibility

3.1 The Purchasing/Inventory Manager has the prime responsibility to co-ordinate and control the quality of purchased product.

4.0 Policy

4.1 Subcontractors and suppliers shall be evaluated and selected on the basis of their ability to meet subcontract requirements including the quality system and any specific quality assurance requirements.

4.2 Subcontractors shall be controlled via quality questionnaire and any other means deemed suitable by the Quality Assurance Manager depending upon the impact of the material on the quality of final product. Other suitable means may include quality audit reports and/or quality records of the previously demonstrated capability and performance of subcontractors.

4.3 A list of acceptable subcontractors shall be developed and maintained by the Purchasing/Inventory Manager.

4.4 Purchase Orders shall contain data clearly describing the product ordered, including, where applicable:

- a) the type, class, grade or other precise identification;
- b) the title or other positive identification, and applicable issues of specifications, drawings, process requirements, inspection instruction and other relevant technical data, including requirements for approval or qualification of product, procedures, process equipment and personnel;
- c) the title, number and issue of the quality system standard to be applied;
- d) All purchase orders shall contain the quoted/negotiated price, delivery terms and the required delivery date.

4.5 The Purchasing/Inventory Manager shall review and approve purchasing documents for adequacy of the specified requirements prior to release.

4.6 Should the need arise where the Purchasing/Inventory Manager is required to verify purchased product at the subcontractor's premises, he shall specify verification arrangements and the method of product release in the purchasing documents, or via revision to purchasing documents prior to ship date.

4.7 When specified by contract, the customer of ICE Western Sales Ltd. or the customer's representative shall be afforded the right to verify at the subcontractor's premises and ICE Western Sales Ltd. premises that subcontracted product conforms to specified requirements. Such verification shall not be used by ICE Western Sales Ltd. as evidence of effective control of quality to the subcontractor.

Verification by the customer shall not absolve ICE Western Sales Ltd. of the responsibility to provide acceptable product, nor shall it preclude subsequent rejection by the customer.

CONTROL OF CUSTOMER-SUPPLIED PRODUCT

1.0 Purpose

1.1 The purpose of this procedure is to ensure that customer supplied products are controlled from receipt, through to shipment. This includes verification, storage and maintenance of customer supplied products.

2.0 Scope

2.1 This procedure covers all material provided by the customer for processing.

3.0 Responsibility

3.1 The Purchasing/Inventory Manager has the prime responsibility to co-ordinate and control customer-supplied product.

4.0 Policy

4.1 All customer-supplied products provided for incorporation to ICE Western Sales Ltd. products shall be verified, stored and maintained by authorized personnel.

4.2 Customer-supplied product which is lost, damaged or otherwise unsuitable for use shall be recorded and reported to the customer.

4.3 Verification by ICE Western Sales Ltd. does not absolve the customer of the responsibility to provide acceptable product.

5.0 Procedure

5.1 The purchase order or documented information shall be sent to the Receiver by the Purchasing/Inventory Manager for receiving inspection purposes.

5.2 Incoming customer supplied product will be identified by job number. Identification will be taken off the packing slip or cross referenced to the customer purchase order in the receiving office. If the material cannot be identified to a specific job it will not be received.

5.3 Once received, the material will be stored by the Receiver in a way appropriate for the material and with the job identification clearly visible.

5.4 Any discrepancies between the purchase order or product information and the receipt shall be recorded on a nonconformance report in accordance with section, "Control of Nonconforming Product" and reported to the customer by the Purchasing /Inventory Manager. This also applies to Customer-supplied product which is lost, damaged or otherwise unsuitable for use.

PRODUCT IDENTIFICATION AND TRACEABILITY

1.0 Purpose

1.1 To identify product where appropriate from receipt through manufacturing, delivery and to provide traceability when required by contract.

2.0 Scope

2.1 This procedure describes the responsibility and method used to ensure all products is identifiable and traceable when applicable during all stages of production.

3.0 Responsibility

3.1 The Plant Manager is responsible for defining, co-ordinating and controlling the method of identification of product when and where deemed appropriate. This includes traceability when required by contract.

3.2 The Receiver is responsible for identifying all raw materials and ensuring products purchased or supplied by the customer are suitably identified.

3.3 The Plant Manager is responsible for ensuring that each product or component in the production process is either labeled , tagged or identified in an appropriate manner.

3.4 The Shipper is responsible for ensuring that all completed products are identified with a rating plate.

4.0 Policy

4.1 Where appropriate, the Receiver, shall identify incoming raw materials and ensure products and/or components received are suitably identified. The production Manager shall ensure that all products and components are identified during all stages of production, delivery and initial use by the customer. Installation is not applicable at this time.

4.2 Where and to the extent that traceability is a specified requirement, ICE Western Sales Ltd. shall provide for unique identification of individual product or batches as well as establish and maintain documented procedures for same. This identification shall be recorded.

5.0 Procedure

5.1 The Plant Manager shall review the methods of identification used in the production process on an ongoing basis and ensure that all raw materials, parts, components, subassemblies and final assemblies are suitably identified.

5.2 The Receiver shall either ensure that all incoming raw materials are identified or identify them with a part number when received. This can be written directly on the material with a black felt pen or via tag. He shall also ensure that all parts and products are identified by the supplier and can be readily identified and compared to the items on the packing slip.

5.3 All parts, components, subassemblies and final assemblies shall be identified in production by the Work Order/shop file. Operators shall ensure that the Work Order/shop file remains with the work throughout the production process.

5.4 Completed units shall be identified with a rating plate subsequent to testing.

PROCESS CONTROL

1.0 Purpose

1.1 The purpose of this procedure is to ensure that all production processes at ICE Western Sales Ltd., which directly affect quality, are identified, planned and carried out under controlled conditions.

2.0 Scope

2.1 This procedure covers all production processes which directly affect quality.

3.0 Responsibility

3.1 The Plant Manager in conjunction with the Quality Assurance Manager is responsible for developing production processes, production methods and the associated quality assurance techniques for monitoring and controlling them.

3.2 The Plant Manager & Engineering Manager or his delegate is responsible for preparing Work Orders and planning the production work load.

4.0 Policy

4.1 It is the policy at ICE Western Sales Ltd. that all production processes, which directly affect quality, have been identified, planned and carried out under controlled conditions.

4.2 Controlled conditions include the following:

- a) documented Work Orders, Drawings, and Specification Sheets defining the manner of production
- b) use of suitable production equipment and working environment
- c) monitoring and control of specific suitable process parameters and product characteristics
- d) the approval of processes and equipment, as appropriate
- e) criteria for workmanship, which shall be stipulated in the clearest practical manner on either the Engineering Drawings and/or sample product
- f) suitable maintenance of equipment to ensure continuing process capability
- g) compliance with reference standards/codes, quality plans, and/or documented procedures.

4.3 All processes can be fully verified by subsequent inspection and testing of the product.

4.4 Records of the qualified processes, equipment and personnel shall be maintained by the Plant Manager, as appropriate.

5.0 Procedure

5.1 The Director of Sales & Marketing shall submit Orders to the Plant Manager or his delegate for processing.

5.2 Modified products or new products shall be tabled and reviewed at a General Product Meeting by the Director of Sales & Marketing Prior to processing.

5.3 Should the modified product or new product require new equipment or tooling, a feasibility study shall be done by the Plant Manager. Investment cost, pay back and justification will be considered.

5.4 Expenditures required for the above shall be initiated by the Plant Manager via a Request For Capital Expenditure Form. All expenditures shall be approved and signed off by the Controller and the President. Subsequent to this the items shall be purchased and the form filed.

5.5 Stores

- a) Trial kiting lists shall be issued to the stores personnel by the purchasing/Inventory Control Manager. The Stores Lead Hand shall ensure that they are two full weeks ahead of production with their issue orders.
- b) Parts shall be withdrawn and placed in a job box. The job number shall be located on the job box. These shall be later issued to final assembly personnel as required.
- c) Large items such as motors/coils/burners and shafts shall be located in the stores holding area with the job numbers attached.

5.6 Weld – Structural Steel

- a) Subsequent to receipt and review by the Director of Sales, Marketing and Engineering the Weld Shop Lead Hand shall review engineering customer orders.
- b) All components are obtained from stores and welded as required by the design and marked with the applicable Job Number and/or description.
- c) All heat exchangers are light tested for leaks and visually inspected for weld penetration.
- d) Welded parts, components and assemblies shall be routed to the applicable departments.
- e) Qualification of Welding Personnel – Welding Personnel must have related welding experience and/or be able to complete the following test:
 - turn on the welding machine
 - check that the gas valves are open and set the gas regulator pressure to the proper setting
 - adjust the wire speed and current controls to the required settings for the material being welded. The operator can test his setup on scrap material.
 - pass the inspection of horizontally butt-welding 18 gauge colourbond, 14 gauge colourbond, and 14 gauge stainless steel in a T-type joint

- pass the inspection of horizontally fillet and butt – welding two pieces of 2"x3"x1/4" structural steel angle
 - pass the inspection of horizontally welding a corner joint between two pieces of 4" structural steel channel
 - inspection involves visually checking the weld bead (smoothness, size and porosity) and visually checking weld penetration
- f) Welding Procedure – Argoshield Light welding gas and .045 solid wire are to be used. The welding Personnel shall adjust the welder settings as follows: gas pressure regulator (35 cfh*), current and voltage setting (16v, 155a*) and wire feed speed (180 ipm*). Following a welding blueprint of the assembly the welder will retrieve all necessary pre-cut to length material. The welder must measure the pre-cut to length material before any operations are performed. If the materials pass measurement inspection, the welder follows the blueprint to arrange and clamp all pieces on a welding table with a 1/16" gap between each piece. The layout is inspected by measuring against the blueprint and tackwelded. The pieces are then squared and retackwelded to lock them in position. All clamps are removed and the pieces are finish welded. Welding assemblies should lie in a horizontal or downward vertical position whenever possible. Upon completion the welder visually inspects his work for missed welds, weld penetration and smoothness/size/porosity of the weld bead.

*- Please note these settings are approximations and will vary according to machine performance, material and welder's skill.

5.7 Painting

- a) All materials requiring painting are to be cleaned with paint thinners and or wirebrush.
- b) A painted sample board on the paint booth shows acceptable paint quality.
- c) All structure steel members are primed with red oxide primer or zinc rich primer before painting.
- d) All non-access panels are caulked.
- e) Paint mild steel with one coat zinc rich primer 2-3 mils on baseframe and all other structural steel. Then (3) coats of ICE (2) part epoxy for 6-9 mils. The exterior casing is satin coat steel, paint satin coat with (3) coats of ICE (2) part epoxy for 6-9 mils.

5.8 Wiring

- a) Wiring personnel shall inspect materials to ensure electrical components conform to electrical wiring schematics and customer order information.
- b) Material and parts found to be non-conforming with respect to the electrical wiring schematics, customer order information, or issued incorrectly are to be disposed of with section: "Control of Non-Conforming Product".

- c) Throughout wiring, each process shall be checked to ensure conformance with specified requirements in accordance with *I.C.E. Electrical Standards Implementing JIC and CSA Wiring Practices*.
- d) Subsequent to assembly, wired remote and control panels shall be tagged with date, wired by, and checked by. Each remote panel shall also include a corresponding CGA sticker with the appropriate voltage as indicated on electrical schematics and customer order information.
- e) Information applicable to *I.C.E. Electrical Standards Implementing JIC and CSA Wiring Practices*, shall be made readily available to all wiring personnel with common practices posted for quick reference.

5.9 Final Assembly

- a) All final assembly work on a specific unit is defined by the Customer Order Package.
- b) The components required for final assembly shall be located in a holding area with the job numbers clearly marked on them. The Assembly Lead Head shall draw hardware from this area to initiate final assembly.
- c) As unit are built the job number and any special instructions shall be marked on the unit.
- d) The customer order shall travel with the unit from assembly and testing to final packaging. Test reports shall be submitted to the Engineering Manager or his delegate for rating plate preparation and manual issue. He or she shall sign and date the test form as evidence of this activity. The rating plate and manual are then sent to the Store Keeper who verifies the accuracy of the plate and signs and dates the test reports as evidence of this review. The rating plate and manual are then sent to the Shipper for plate application and manual packaging. Once the unit has been shipped the Order Package shall be given to the Purchasing/Inventory Control Manager by the Shipper.

5.10 Preventive Maintenance Program

- a) The Production Manager or his delegate shall inspect and repair equipment before, rather than after it's sudden breakdown impairs production, quality, safety or cost performance. He shall decide what equipment is to be taken out of service periodically, which components of that equipment are to be repaired and how often it is to be done.
- b) His decision shall be targeted to:
 - Fewer unplanned outages of equipment
 - Better control of repair costs
 - Improved safety conditions
 - Extended equipment life
 - Better product quality

5.11 Scheduling Preventive Maintenance

- a) The Plant Manager shall convene a weekly meeting with the Maintenance Person and Supervisors. The meetings shall be held late in the week to take advantage of the latest possible information regarding equipment.
- b) They shall schedule all required maintenance work for the following week.
- c) The schedule shall be duplicated and distributed to the Maintenance Person and Supervisors by the Plant Manager or his delegate.
- d) Records of the maintenance activity shall be kept for each piece of equipment.
- e) The Plant Manager, working from the established schedule, shall generate either:
 - Major work order form
 - Minor work order form
- f) The Plant Manager and Maintenance Person shall each keep a copy of the form. As the work orders are complete the Maintenance Person shall sign and date the order and submit to the Plant Manager.
- g) The Preventive Maintenance Program shall include but not be limited to the following:
 - Boiler, unit heaters
 - Fabrication equipment/tooling
 - Threading units
 - Paint shop/exhaust fans
 - Welding machines
 - Overhead cranes
 - Test stations
 - General Lighting

INSPECTION AND TESTING

1.0 Purpose

1.1 The purpose of inspection and testing is to verify that the specified requirements for the product are met.

2.0 Scope

2.1 This section covers the development of the quality plan, required inspection and testing, records to be kept as well as inspection and testing procedures.

3.0 Responsibility

3.1 The Quality Assurance Manager in conjunction with the Plant Manager and Engineering Manager is responsible for developing and documenting the quality plan.

3.2 The Quality Assurance Manager in conjunction with the Plant Manager is responsible for developing and documenting all inspection procedures.

4.0 Policy

4.1 The Quality Assurance Manager with assistance from the Plant Manager and Engineering Manager will develop and document the quality plan.

4.2 The quality plan will cover receiving, in-process and final inspection.

4.3 The quality plan will be reviewed on an ongoing basis to ensure that it is suitable for the Company's manufacturing system. At the very least the plan should be reviewed annually for effectiveness and suitability.

4.4 The quality plan will be approved by the Quality Assurance Manager and the President.

4.5 Quality records are to be kept as defined in this Policy Manual and associated procedures.

RECEIVING INSPECTION AND TESTING

1.0 Purpose

1.1 The purpose of receiving inspection and testing is to ensure that incoming product is not used or processed until it has been inspected or otherwise verified as conforming to specified requirements.

2.0 Scope

2.1 This procedure covers all raw material, purchased components and customer supplied products brought in to the Company.

3.0 Responsibility

3.1 The Receiver/Stores Keeper is responsible for performing and recording the results of receiving inspection and testing.

3.2 The Quality Assurance Manager is responsible for determining the amount and nature of receiving inspection.

3.3 The Purchasing/Inventory Manager is responsible for filing and maintaining records of receiving inspection.

4.0 Policy

4.1 It is the policy of the Company that incoming material or products will not be used or processed until it has been inspected or otherwise verified as conforming to specified requirements. This applies to purchased goods as well as customer supplied product.

4.2 Receiving inspection will verify conformance to the specified requirements of the Purchase Order or Customer Supplied Product documentation in accordance with the Quality Plan and Receiving Inspection and Testing procedure.

4.3 The Quality Assurance Manager in conjunction with the Plant Manager shall determine the amount and nature of receiving inspection. They shall determine the amount of control exercised at the subcontractor's premises and the recorded evidence of conformance provided.

4.4 The completed Receiving Inspection and Tests shall be noted and the contents of the Packing Slip entered into the computer by the Receiver as evidence that they conformed to the Purchase Order or customer supplied product requirements.

4.5 Incoming products which fail to meet specified requirements shall be processed in accordance with section, "Control of Nonconforming Product".

5.0 Procedure

5.1 The receiver or his delegate shall receive incoming materials and unload the truck.

5.2 All incoming product shall be visually inspected and verified for conformance with the packing slip.

5.3 Subsequent to the above the Receiver shall enter the packing slip information into the computer to verify conformance with the Purchase Order.

5.4 The Receiver shall move the goods to the stores area or storage area.

5.5 Stores personnel shall count the goods and match the quantity to the packing slip and the hard copy of the purchase order.

5.6 The matched paper work shall be sent to accounts payable.

5.7 No product will be released for urgent production purposes without first having been inspected.

5.8 Orders or incoming goods which are found to disagree with the original Purchase Order or Customer Supplied Product documentation shall be processed in accordance with section, "Control of Nonconforming Product".

5.9 The receiver or his delegate shall receive incoming materials and unload the truck.

5.10 Shipments that are short shipped, damaged or incomplete in any way, shall be documented and processed in accordance with section, "Control of Nonconforming Product". Short shipments shall be so noted directly onto the packing slip by the Receiver or his delegate and forwarded to the Inventory/Purchasing Control Manager for follow-up and resolution.

5.11 When product or services are ordered from Sub-Contractors it shall be subject to the same receiving inspection as all other products. No special controls or inspections will be utilized at the Subcontractor's premises.

IN-PROCESS INSPECTION AND TESTING

1.0 Purpose

1.1 The purpose of in-process inspection is to ensure that only product or material conforming to specified requirements is processed and to detect and remove nonconforming product from the process as early in the process as possible and thereby minimize the potential for its use.

2.0 Scope

2.1 This applies to all products, materials and components processed by the Company.

3.0 Responsibility

3.1 The Operator's are responsible for in-process inspection of their work.

3.2 The Plant Manager is responsible for ensuring that all required in-process inspections are performed by qualified operators using suitable calibrated equipment.

4.0 Policy

4.1 The Operators shall inspect and/or test the product as required by the quality plan and/or the Work Order/shop file. The Operator(s) shall verify that the inspections and/or tests have been completed by signing and dating the Work Order/shop file opposite each task or work item listed on the work order.

4.2 The Operators shall hold product until they have completed the required inspections and tests or necessary reports have been received and verified that the product meets specified requirements. They may not permit material to proceed to the next step in the production process (on a positive-recall basis) when required for urgent production requirements without completing their in-process inspections.

4.3 The Plant Manager shall monitor and ensure that all in-process inspections and tests required by the quality plan and Work Order are performed, that the Operators are qualified to perform the inspections and that they have suitable calibrated measuring and test equipment.

4.4 Products which fail to meet specified requirements shall be processed in accordance with section, "Control of Nonconforming Product".

4.5 In-Process Inspection and Test Records are embodied in the Work Order which moves on to Final Inspection. Records are not filed during in-process inspection and testing.

5.0 Procedure

Weld

5.1 Fabricated parts shall be inspected to ensure conformance to:

- a) Customer drawing
- b) Weld drawing (tolerance is $\pm 1/16$ "

5.2 Weld drawings shall be inspected to ensure conformance to the customer drawing by the Weld Supervisor or his delegate.

5.3 Material, parts found to be nonconforming with respect to the drawings shall be processed in accordance with Section, "Control of Nonconforming Product".

5.4 Throughout the production process the Plant Manager shall monitor all activities and ensure that all operators have the required qualifications and training to do their jobs as well as have or use suitable calibrated measuring and test equipment.

5.5 Upon completion of the task, the welders shall sign off the weld assembly drawing(s) for inclusion in the job file as evidence of their inspection. Standard product drawings will normally be filed and maintained by the Weld Supervisor and as such will not be signed off. Sign off on general arrangement drawing in the shop file.

Sub-Assembly/Final Assembly

5.6 Materials shall be inspected by the operator(s) to ensure parts conform to the customer drawing. Tolerance on fabricated parts is $\pm 1/16$ ".

5.7. Material, parts found to be nonconforming with respect to the drawings shall be processed in accordance with Section, "Control of Nonconforming Product".

5.8 Throughout the sub-assembly/final assembly, each process shall be checked to ensure conformance with specified requirements. Operators shall complete the applicable checklists as well as sign and date them. Checklists include:

- a) Blower
- b) Motor
- c) Specification sheet
- d) Unit configuration with respect to customer drawing and order form

5.9 All electrical parts issued shall be checked by bench wiring personnel. Subsequent to assembly wired panels shall be tagged with the date, wired by, and checked by.

5.10 Upon completion of the unit wiring the control panel tag shall be signed and dated by the applicable operator as evidence of their inspection.

FINAL INSPECTION AND TESTING

1.0 Purpose

1.1 The purpose of final inspection and testing is to complete the evidence of conformance of the finished product to specified requirements and to prevent nonconforming product from being shipped to the customer.

2.0 Scope

2.1 This applies to all products produced by the Company.

3.0 Responsibility

3.1 The testing personnel are responsible for performing final inspections and testing as delegated to them by the Quality Assurance Manager through the Plant Manager.

3.2 The Quality Assurance Manager in conjunction with the Plant Manager is responsible for ensuring that final inspections and test are performed as required herein.

4.0 Policy

4.1 The testing personnel shall carry out all final inspection and tests in accordance with the Quality Plan and/or Work Order to complete the evidence of conformance of the finished product to the specified requirements.

4.2 The Tester shall ensure that all specified inspections and tests defined in the quality plan and/or documented procedures, including those specified either on receipt of the product or in-process, have been carried out and that the data meets specified requirements.

4.3 The Plant Manager shall ensure that all inspections and tests have been performed in accordance with the Quality Plan and/or Work Order by qualified persons using suitable calibrated equipment.

4.4 The Plant Manager shall ensure that no product is dispatched until all the activities specified above have been completed satisfactorily and the completed Work Order including any associated data and documentation are available and authorized.

4.5 The Plant Manager or his delegate shall collect the completed Work Orders, Test Forms, Packing Slips and any other associated data and documentation which provide evidence that the product has been inspected and submit them to the Controller or his delegate for filing in a job file in the administration office. The Work Order shall show clearly whether the product has passed or failed the inspections and/or tests according to defined acceptance criteria.

4.6 The completed Work Order shall be signed off by the person authorized by the Quality Assurance Manager to perform the final inspection.

4.7 Products which fail to meet specified requirements shall be processed in accordance with Section, "Control of Nonconforming".

5.0 Procedure

5.1 The testing personnel shall inspect the completed unit for conformance to the customer's order.

5.2 The blower, motor and drivers shall be inspected visually.

5.3 All applicable components shall be connected to the unit for testing.

5.4 All units shall be tested for function and performance and the results recorded on the applicable test forms. All listed tests are visual – with the following exceptions;

- a) Limits – Ensure they make/break at the specified settings.
- b) Manifold leakage test – Connect the gas manifold to the gas supply and open all manual valves. With the unit firing apply a water/soap solution to all pipe fittings and check for bubbles. If bubbles exist retighten piping.
- c) Di-Electric test – Disconnect all electrical power and solid state devices. With the di-electric tester check for continuity between the electrical components and ground Di-electric voltage setting are as follows:
 - 120 VAC circuits – 1500 volts for 1 second
 - 24 VAC circuits -1250 volts for 1 second
 - 208/250 VAC circuits – 2000 volts for 1 second
 - 460 VAC circuits – 2500 volts for 1 second
 - 600 VAC circuits – 2500 volts for 1 second
- d) Belts – Adjust for 3/16" deflection per foot of belt span.

The specifications and wiring diagrams shall be signed and dated by the tester. Subsequent to this he shall send the customer order to the Controller or his delegate, to request a rating plate and service manual from the Engineering manager or his delegate.

5.5 Units which do not function properly shall be processed in accordance with Section, "Control of Nonconformance Product". Nonconformance reports shall form a part of the Work Order to complete the documentation package.

5.6 Upon receipt of the rating plate, the tester shall check them against the specification sheet to confirm that the information on the plate is correct and apply the plate to the unit. Service manuals shall be sent to the shipper for packaging with the unit.

Packaging

5.7 The Packing List located with the customer order shall list all of the components required to be packed with the unit.

5.8 Once the packing is complete the shipper shall sign and date the packing list as verification that the order has been packed in accordance with the customer's requirements and the Inspection and Test plan. He shall submit it to the Controller or his delegate for filing in the job file.

Short shipments shall be noted on the packing slip and copied to the Production Manager.

5.9 The Quality Assurance Manager shall monitor on an ongoing basis, all inspections and tests and ensure that they are completed in accordance with specified requirements and the Inspection and Test Plan. He shall also ensure that all inspections and tests are performed by qualified personnel with suitable calibrated equipment.

CONTROL OF INSPECTION, MEASURING AND TEST EQUIPMENT

1.0 Purpose

1.1 The purpose of this procedure is to control, calibrate and maintain inspection, measuring and test equipment (software is not applicable) used by the Company to demonstrate the conformance of product to the specified requirements.

2.0 Scope

2.1 This applies to all inspection, measuring and test equipment used at ICE Western Sales Ltd. for verifying conformance to specifications.

3.0 Responsibility

3.1 The Quality Assurance Manager is responsible for the calibration of all inspection, measuring and test equipment.

4.0 Policy

4.1 The Quality Assurance Manager will make sure that all inspection, measuring and test equipment is used in a manner which ensures that the measurement uncertainty is known and is consistent with the required measurement capability.

4.2 When required by contract, the technical data pertaining to the inspection, measuring and test equipment shall be made available to the customer or customer's representative, for verification that the inspection, measuring and test equipment is functionally adequate.

4.3 The Quality Assurance Manager in conjunction with the Plant Manager shall:

- a) determine the measurements to be made and the accuracy required, and select the appropriate inspection, measuring and test equipment that is capable of the necessary accuracy and precision;
- b) identify all inspection, measuring and test equipment that can affect product quality, and calibrate and adjust them at prescribed intervals, or prior to use, against certified equipment having a known valid relationship to internationally recognized standards. Where no such standard exists, the Quality Assurance Manager will define the basis used for calibration and document accordingly;
- c) define the process employed for the calibration of inspection, measuring and test equipment, including but not limited to the following:
 - Equipment type
 - Unique identification
 - Location in shop
 - Frequency of checks

- Method of checking
- Acceptance of criteria
- Action to be taken when results of checking are unsatisfactory;
- d) identify inspection, measuring and test equipment with an adhesive sticker either on the equipment or its box which shows the calibration status;
- e) maintain calibration records for inspection, measuring and test equipment;
- f) assess and document the validity of previous inspection and test results when inspection, measuring or test equipment is found to be out of calibration;
- g) ensure that the environmental conditions are suitable for the calibrations, inspections, measurements and tests being carried out;
- h) ensure that the handling, preservation and storage of inspection, measuring and test equipment is such that the accuracy and fitness for use are maintained;
- i) safeguard inspection, measuring and test facilities, including both test hardware and test software, from adjustments which would invalidate the calibration setting.

5.0 Procedure

5.1 The Quality Assurance Manager in conjunction with the Production Manager shall review the workload on an ongoing basis and assess whether or not the existing measuring, inspection and test equipment is satisfactory and capable of measuring or testing as required by the Work Orders. When new circumstances arise where the existing equipment will not perform, they shall determine the measurements to be made, the accuracy and precision required as well as identify and acquire suitable inspection measuring and test equipment to measure them.

5.2 All micrometers or calipers will be calibrated using calibrated gauge blocks or gauge standards which in turn have been calibrated or verified for accuracy by a nationally recognized calibrating agency.

5.3 The Quality Assurance Manager or his delegate shall perform the calibration checks in house. Calibrations shall be performed within the required temperature range noted on the applicable calibration records.

5.4 The extent and frequency of such checks shall be documented on calibration records as evidence of control.

5.5 All micrometers, gauge blocks, measurement standards, shall be logged on the inspection, measuring and test equipment log and each piece of equipment recorded on the specific calibration record form.

5.6 Gauge blocks and measurement standards shall be sent to nationally recognized calibration agencies and verified for accuracy or alternatively a certificate of conformance shall be acquired from the supplier.

5.7 The calibration record sheet provides for the following and shall be completed accordingly:

- Frequency of calibration
- Applicable gauge blocks and/or measurement standards having a known valid relationship to internationally or nationally recognized standards or where sent for calibration.
- Equipment type, unique identification, location, frequency of checks, check method, acceptance criteria, and the action taken when results are unsatisfactory;
- Storage location
- Range
- Capability
- Stability

5.8 All inspection measuring equipment will be identified with a sticker which shows the next due date for calibration. Gauge blocks and measurement standards may have identification labels on their storage containers.

5.9 All master gauges will be secured in the Quality Assurance Manager's office. All other equipment will be stored in the locations indicated on the calibration sheets. The locations will be so selected as to safeguard the equipment from adjustments which would invalidate the calibration setting as well as prevent damage or deterioration to the equipment.

5.10 Calibration records shall be stored and maintained by the Quality Assurance Manager and will be easily accessible to the customer or customer's representative for verification that the inspection, measuring and test equipment is functionally adequate.

5.11 When equipment is found to be out of calibration the applicable operator will advise both the Quality Assurance Manager and the Plant Manager. The Quality Assurance Manager and the Plant Manager will review all work previously inspected with the equipment and assess whether or not it must be re-inspected or take whatever corrective action they deem necessary.

INSPECTION AND TEST STATUS

1.0 Purpose

1.1 The purpose of inspection and test status is to identify the inspection status and conformance or nonconformance of product with regard to inspection and tests performed and prevent parts from proceeding to the next production process without suitable verification that preceding steps have been completed satisfactorily.

2.0 Scope

2.1 This procedure applies to all products processed or manufactured by ICE Western Sales Ltd.

3.0 Responsibility

3.1 The Operators are responsible for recording the inspection status on in-process parts and components.

3.2 The Purchasing/Inventory Control Manager is responsible for recording the inspection status of received goods and material and the Plant Manager final inspection status.

3.3 The Quality Assurance Manager shall monitor this activity on an ongoing basis and ensure that all inspection and test status is recorded in accordance with the requirements described herein.

4.0 Policy

4.1 The Purchasing/Inventory Control Manager or his delegate will identify by suitable means, the inspection and test status of all incoming materials or products prior to receipt and subsequent movement into inventory in accordance with the Quality Plan and Inspection Status procedure.

4.2 The Operators will identify and record the inspection and test status of all parts being manufactured on the Work Order and in accordance with the Quality Plan.

4.3 The Supervisor/Lead Hands will identify and record the final inspection status of all products manufactured by ICE Western Sales Ltd.

4.4 The Plant Manager will ensure that all product or material being produced by the Company has passed the required inspections and tests before being dispatched to the next production process step or shipment to the Customer.

5.0 Procedure

5.1 The Purchasing/Inventory Control Manager or his delegate shall indicate the status of receiving inspection by completing the invoice and comparing it to the purchase order. Non acceptable product shall be tagged and processed in accordance with Section, "Control of Nonconforming Product". Material will not be sent to stores or production until the Purchasing/Inventory Control Manager has completed his inspection.

5.2 The inspection and test status of products during manufacture shall be as indicated by the employee sign-offs and dating on the applicable Work Order as well as the final sign-off and dating by the Supervisor/Lead Hands on all piece work and final assemblies. Each sign-off and date is the means which indicates the conformance of product with regard to the inspection and test performed.

5.3 Components, piece work and final assemblies will not be moved to the next operation until the applicable sign-off has been done.

5.4 The Supervisor/Lead Hands will not sign-off or date the piece work or final assembly Work Orders unless they are complete and all inspection and tests have been performed satisfactorily.

5.5 The Shipper will not ship piece work or final assemblies if the applicable Work Order has not been completely signed off and all inspections and tests verifying conformance to requirements have been completed. The signatures on the Work Order serve as the method of identification for inspection and test status.

CONTROL OF NONCONFORMING PRODUCT

1.0 Purpose

1.1 The purpose of controlling nonconforming product is to prevent its further processing or unintended use or installation by the Customer.

2.0 Scope

2.1 The control of nonconforming product applies to all products processed or manufactured by the Company.

3.0 Responsibility

3.1 All personnel are responsible for reporting nonconformance that they encounter or perceive to be their immediate supervisor.

3.2 The Plant Manager or other supervisor as applicable is responsible for ensuring that the nonconformance is documented, a disposition is proposed and communicated to the Quality Assurance Manager.

3.3 The Quality Assurance Manager is responsible for ensuring that the nonconforming material is handled and processed as described herein.

4.0 Policy

4.1 Any employee who encounters a nonconforming product or perceives a nonconformance will document it on a nonconformance report and submit to his/her immediate supervisor.

4.2 The Plant Manager or immediate supervisor/Lead Hand, as applicable will, in conjunction with the employee and Quality Assurance Manager, evaluate and propose a disposition and submit the completed nonconformance form to the Quality Assurance Manager.

4.3 The Plant Manager or immediate supervisor will identify the nonconforming part with a tag or other suitable means and segregate from the production area.

4.4 The Plant Manager shall advise all other affected department supervisors or management personnel that the nonconformance has occurred and provide a copy of the nonconformance report if required.

4.5 The Plant Manager shall review the nonconformance with the Quality Assurance Manager and dispose as follows:

- rework to meet specified requirements,
- accept with or without repair by concession,

- regrade for alternative application, or
- reject or scrap.

4.6 Where required by contract, nonconforming product or material which is proposed for use or repair shall be reported to the customer or customer's representative for concession by the Director of Sales & Marketing.

4.7 The Quality Assurance Manager shall ensure that the description of the nonconformance, and of repairs, is recorded on the nonconformance report to denote the actual condition.

4.8 The Quality Assurance Manager shall ensure that the Plant Manager re-inspects all repaired and/or reworked product in accordance with the quality plan and that it conforms to specified requirements and/or concessions.

5.0 Procedure

5.1 Nonconforming product or perceived nonconforming product must be documented on a nonconformance report by the operator or person and submitted to the Plant Manager or his/her immediate supervisor for review and assessment. During the preparation of the nonconformance report, the part name or description, quantity nonconforming, batch size or total quantity, Customer or Sub-Contractor as applicable, Purchase Order, Customer Purchase Order, Work Order and/or drawing etc. shall be noted on the form.

5.2 The Plant Manager or applicable supervisor, will in conjunction with the employee and Quality Assurance Manager, evaluate and propose a disposition and submit the completed nonconformance to the Quality Assurance Manager. The disposition must be cost effective and justified on the basis of economics as well as meeting the Customer's requirements. Disposition is a short term corrective action designed to keep production flowing while isolating the part or material for examination etc. Customer complaints will similarly be copied to the applicable personnel for disposition.

5.3 The Plant Manager, or applicable supervisor, will segregate nonconforming product from the production area and hold in a secure area until disposition has been determined. Where the part or material is too large for the quarantine area then it shall at least be segregated from production or repair in order to preclude its accidental use or reintroduction into the production stream.

5.4 The Plant Manager, or applicable supervisor, shall advise all other affected management personnel that the nonconformance has occurred and provide a copy of the nonconformance report if required. Any work process which may be affected or parts in the field which require correction shall be identified and documented on the Nonconformance report.

5.5 The Plant Manager, or applicable supervisor, shall review the nonconformance with the Quality Assurance Manager and dispose as follows:

- rework to meet specified requirements,

- accept with or without repair by concession,
- reject or scrap.

5.6 The disposition shall be noted on the nonconformance report by the Quality Assurance Manager, Plant Manager or Engineering Manager.

5.7 If of a significant nature or if it is specified on the order, nonconforming product or material which is proposed for use or repair shall be reported to the customer or customer's representative for concession by the Plant Manager. Concessions must be requested in writing from the Customer or alternatively annotated on the Nonconformance Report by the Plant Manager.

5.8 The Quality Assurance Manager shall monitor nonconformance reports and ensure that the actual condition of repaired parts, etc. is denoted on the nonconformance report.

5.9 The Plant Manager will re-inspect all repaired and/or reworked product in accordance with the quality plan and ensure that it conforms to specified requirements and/or concessions. Re-inspection shall be documented on the nonconformance report as well as notified to the Plant Manager and/or Quality Assurance Manager.

5.10 Once complete and the parts or material cleared the completed nonconformance reports shall be submitted to the Quality Assurance Manager for filing, ongoing review and maintenance.

CORRECTIVE AND PREVENTIVE ACTION

1.0 Purpose

1.1 The purpose of corrective and preventive action is to eliminate the causes of actual or potential nonconformities.

2.0 Scope

2.1 The elimination of causes of actual or potential nonconformities shall be to a degree appropriate to the magnitude of problems and commensurate with the risks encountered.

3.0 Responsibility

3.1 The Quality Assurance Manager or his delegate is responsible for determining, initiating, implementing and ensuring successful, all corrective and preventive action. This includes recording any changes to the documented procedures resulting from corrective and preventive action.

3.2 The departmental supervisors are, in conjunction with the Quality Assurance Manager, responsible for implementing the corrective and preventive action.

4.0 Policy

4.1 The Quality Assurance Manager or his delegate shall do the following when performing corrective action:

- a) Effectively handle, collect and review all customer complaints and reports of product nonconformities;
- b) investigate the cause of nonconformities relating to product, process and quality system, and record the results of the investigation;
- c) determine the corrective action needed to eliminate the cause of nonconformity;
- d) apply suitable controls to ensure that corrective action is taken and that it is effective.

4.2 The Quality Assurance Manager or his delegate shall do the following when detecting, analyzing and eliminating potential causes of nonconformities:

- a) Review the following sources;
 - process and work operations which affect quality,
 - concessions,
 - audit results,
 - quality records,
 - service reports,
 - customer complaints,
 - other as appropriate
- b) determine the steps needed to deal with any problems requiring preventive action;

- c) initiate preventive action and apply controls to ensure that it is effective;
- d) ensure that relevant information on actions taken is submitted for management review.

5.0 Procedure

Corrective Action

5.1 To prevent reoccurrence the Department Manager or his delegate shall review the non-conformances and complete Part “C” Cause and Corrective Action of the Nonconformance / Corrective Action Form before the product is shipped.

5.2 A copy of the corrective action shall be retained in an active file by the Quality Assurance Manager.

5.3 The Quality Assurance Manager in conjunction with the applicable manager shall audit the implementation of the corrective action and ensure that it is effective. Corrective action found to be ineffective shall be discontinued and a better or amended action devised and implemented until reoccurrence or the non-conformance is eliminated.

5.4 Once the corrective action has been effectively implemented, Part “D” of the Corrective Action Form shall be signed and the form filed by the Quality Assurance Manager as evidence that the action was taken and was successfully implemented. The appropriate procedures shall be reviewed and amended accordingly to fully reflect that the corrective action has been taken and is effective.

Preventive Action

5.5 To eliminate potential causes of nonconformances, the Quality Assurance Manager shall no less than monthly review the following quality records and operations:

- a) Production, Process and Work Operations
- b) Subcontractor Reports
- c) Quality Records
- d) Customer’s Complaints
- e) Internal Audit Findings
- f) Concessions

5.6 The Quality Assurance Manager, in conjunction with the Production Manager shall, monthly, review raw material handling and manufacturing processes and determine what preventive action might be taken to prevent nonconformances.

5.7 the Production Manager, or applicable supervisor, shall monthly review all items a) to f) in 5.5 associated with their respective processes and in conjunction with the Quality Assurance Manager determine the preventive action required to prevent occurrence of a nonconformance.

5.8 The Quality Assurance Manager shall document the respective preventive action plans on a Preventive Action Form and distribute to the appropriate departments for review, response and implementation.

5.9 A copy of the Preventive Action Form shall be filed and maintained by the Quality Assurance Manager for review and follow-up.

5.10 The Quality Assurance Manager in conjunction with the Production Manager shall audit the implementation of the preventive action and ensure that it is effective.

5.11 Once the preventive action has been effectively implemented, the Preventive Action Form shall be signed off and filed by the Quality Assurance Manager as evidence that the action was taken, was successfully implemented and the applicable procedures amended. He shall confirm that relevant information on actions taken is submitted for management review.

HANDLING, STORAGE, PACKAGING, PRESERVATION AND DELIVERY

1.0 Purpose

1.1 The purpose for handling, storage, packaging, preservation and delivery is to ensure that product continues to meet specified requirements from receiving inspection, through production, final inspection until such time as the customer is in receipt of the product.

2.0 Scope

2.1 This applies to all products manufactured or processed by ICE Western Sales Ltd.

3.0 Responsibility

3.1 The Plant Manager or his delegate is responsible for handling, storage, packaging, preservation and delivery.

3.2 The Quality Assurance Manager is responsible for monitoring handling, storage, packaging, preservation and delivery and ensuring that product is shipped and received by the customer F.O.B. ICE or driver.

4.0 Policy

Handling

4.1 The Plant Manager shall ensure that all products and materials are handled in such a manner as to prevent damage or deterioration.

Storage

4.2 The Plant Manager shall designate an area in the plant for storage of raw materials and completed product. The areas shall be secure and prevent damage or deterioration of product, pending use or delivery.

4.3 The Plant Manager shall devise and implement appropriate methods for authorizing receipt to and dispatch from the storage areas.

4.4 The Plant Manager shall monitor the condition of material and product on stock annually or more frequently as required by class and kind of product to ensure that deterioration is not taking place and if so take appropriate corrective action. Annual inventory counts will identify defects and obsolescence.

Packaging

4.5 The Plant Manager or his delegate shall control packing, packaging and marking of products and material to the extent necessary to ensure conformance to specified requirements.

Preservation

4.6 The Plant Manager shall apply appropriate methods for preservation and segregation of product when the product is under ICE Western Sales Ltd. control.

Delivery

4.7 The Plant Manager or his delegate shall arrange for the protection of the quality of product after final inspection and test. Where contractually specified, this protection shall be extended to include delivery to destination.

5.0 Procedure

5.1 The Plant Manager or his delegate shall use wheeled wagons, overhead crane, and/or fork lift for handling material. They shall be used by the Plant Manager as he deems appropriate for the specific task in order to prevent damage and deterioration of parts and product, etc.

5.2 Skids will normally be used to support or handle completed products and cardboard boxes for small or lightweight parts.

5.3 Aspenite panel covers will be employed to protect product from damage or deterioration as deemed necessary by the Plant Manager.

5.4 Skids and steel racks will be used for the storage of materials and parts, pending use or delivery. The Plant Manager will ensure that the placement of skids is in a secure location and readily available to the Shipper or Stores Keeper.

5.5 Material to be stored shall be delivered to the Store Keeper complete with packing slip. The receiver shall enter the receipt into the Job file and the Stores Keeper shall place the material in the applicable stores area. Control of receipt of product to storage shall be by comparing the packing slip with the Job file and signing off, if it matches. Dispatches from storage shall be controlled via Packing List or Work Order.

5.6 When required by contract or as deemed necessary by the Plant Manager, specific parts may be packed in or coated with grease or preservatives to control or prevent rust and corrosion. All other parts will be packed in cardboard boxes or strapped to skids (complete with aspenite covers if applicable) in accordance with contractual requirements or a deemed appropriate by the Plant Manager.

5.7 Units handled and stored on skids shall be tagged and identified via the job number. Parts in cardboard boxes shall be identified by marking the part number or description on the box using a suitable felt pen.

5.8 All product shall be inspected by crating to ensure product quality is maintained. This is done by completion of the packaging check list by crating personnel.

5.9 Unless specified by contract delivery will be to the shipping dock F.O.B. ICE Manufacturing Ltd.. Where shipping and delivery are the responsibility of Company all product will be via open truck and covered with a tarpaulin or closed van for rain protection. All skids and boxes will be suitably restrained on the truck to prevent movement and subsequent damage during transportation. The controller or his delegate shall prepare a Packing List and provide to the Shipper and customer.

CONTROL OF QUALITY RECORDS

1.0 Purpose

1.1 The purpose of quality records is to demonstrate conformance to specified requirements and the effective operation of the quality system.

2.0 Scope

2.1 Quality records apply to all records specified herein.

3.0 Responsibility

3.1 The Quality Assurance Manager or his delegate is responsible for collecting and filing, quality records (ie: manual), inspection, measuring and test equipment records, nonconformance reports and corrective action records, internal quality audit reports, as well as records identifying inspection authority responsible for the release or product.

3.2 The Purchasing/Inventory Control Manager is responsible for collecting and filing purchasing records, acceptable subcontractor records, customer-supplied product records.

3.3 The Controller is responsible for filing and maintaining job files as well as training records.

3.4 The President is responsible for collection and filing management review records.

3.5 The Plant Manager is responsible for collecting filing records of qualified processes, equipment and personnel.

4.0 Policy

4.1 The Quality Assurance Manager shall ensure that all quality records are identified, collected, indexed, are accessible, filed, stored, maintained and disposed in accordance with documented procedures by those listed above in 3.0.

4.2 The subcontractor quality questionnaire, purchase orders and customer-supplied product documentation if applicable shall be collected and filed by the Purchasing/Inventory Control Manager.

4.3 The Controller shall file and maintain all completed Job Files and personnel records. Job files include pick lists, order form, dimensional drawings, wiring diagrams, bills of material, change notices, packing lists, invoice, fabrication drawings (if required) (ie: identification and traceability records, process control records, positive recall records, inspection and test records) rating plate and test forms

4.4 The President shall collect and file management review reports.

4.5 The Quality Assurance Manager shall maintain and keep on file Quality Manual. He shall also maintain a log of inspection, measuring and test equipment as well as calibration history record for every article of inspection equipment. In addition to this he shall collect and maintain a file of nonconformance reports, corrective action reports and internal quality audit reports, he shall also file and maintain records identifying inspection authority responsible for the release of product.

4.6 The Plant Manager will collect and maintain on file all employee training records as well as qualified processes, equipment records.

4.7 All quality records shall be maintained and kept on file for a period of five years with the exception of purchasing records which shall be kept for 7 years and job files which shall be kept for 10 years in the office and thereafter off site for an undetermined period of time (warehoused).

4.8 The Quality Assurance Manager shall ensure that all quality records are legible and are stored and maintained in such a way that they are readily retrievable from their filing cabinets or secure storage room. He shall ensure that the storage locations do not damage or allow to deteriorate or permit loss of the quality records.

4.9 The Quality Assurance Manager shall, where required by contract, make specific quality records available for evaluation by the customer or the customer's representative for an agreed period.

5.0 Procedure

5.1 Each person listed in the Table shall file their assigned records numerically, in steel filing cabinets. The filing system shall enable ready retrieval by those requiring the material. When the cabinets are full, the excess material will be moved and filed in a secure area or room in storage boxes. The rooms or areas shall be dry and free of water, rodents or any other thing or condition which might lead to loss or deterioration. The records include the quality questionnaire for subcontractors as well as any other quality document deemed necessary by the Quality Assurance Manager.

5.2 Each person shall ensure that their respective quality records are legible and when documents are found to be illegible they shall be returned to the sender for clarification. Once complete they will be stored and retained in steel filing cabinets as well as readily retrievable for review when required.

5.3 All quality records shall be retained for five years with the exception of Purchase Orders (seven years) and the Job Files (10 years in office and unlimited off site storage). Job files shall be identified by a job number or product serial number. When records are found which have been stored for five years or more the applicable personnel shall contact the Quality Assurance Manager for disposition instructions.

5.4 When required by contract, quality records shall be made available by the applicable personnel for evaluation by the Customer or the Customer's representative for an agreed period. The details of the agreement will be noted on the applicable Work Order.

CONTROL OF QUALITY RECORDS

RECORD	RESPONSIBLE PERSON
Management Review	President
Quality Assurance Manual	Quality Assurance Manager
Acceptable Contractors (list)	Purchasing / Inventory Manager
Pick List	Controller (job file)
Order form (Contract reviews)	Controller (job file)
Dimensions, drawings & Wiring diagrams	Controller (job file)
Bills of Material	Controller (job file)
Change Notices	Controller (job file)
Packing List	Controller (job file)
Invoice(s)	Controller (job file)
Fabrication Package	Controller (job file)
Rating Plate	Controller (job file)
Test Forms	Controller (job file)
Nonconformance Reports / Cust. Complaints	Quality Assurance Manager
Corrective Action Requests	Quality Assurance Manager
Internal Quality Audit Records	Quality Assurance Manager
Sub-Contractor Records	Purchasing / Inventory Manager
Inspection Authority for release of product	Quality Assurance Manager
Qualification of Processes and Equipment	Plant Manager
Training Records	Production Controller

INTERNAL QUALITY AUDITS

1.0 Purpose

1.1 The purpose of internal quality audits is to verify whether quality activities and related results comply with planned arrangements and to determine the effectiveness of the quality system.

2.0 Scope

2.1 Internal quality audits apply to management system as specified in this quality manual.

3.0 Responsibility

3.1 The Quality Assurance Manager or his delegate is responsible for performing quality audits.

4.0 Policy

4.1 The Quality Assurance Manager shall perform quality audits on an as required basis or no less than once every year which ever is less.

4.2 Special audits may be performed as deemed necessary by the Quality Assurance Manager or his delegate on the basis of the status and importance of the activity to be audited.

4.3 Personnel delegated to perform audits shall be independent of those having to direct responsibility for the activity being audited.

4.4 The Quality Assurance Manager shall develop and implement standard audit checklists for routine audits of the quality assurance system. The completed checklists will clearly indicate conformance or nonconformance of the quality system.

4.5 The results of audits shall be recorded on the checklists and these in turn shall be brought to the attention of the personnel having responsibility in the area affected.

4.6 The Quality Assurance Manager shall ensure that timely corrective action is taken by the applicable Department Manager, Supervisor or Plant Manager on all deficiencies found during the audit.

4.7 The Quality Assurance Manager shall follow-up all corrective actions resulting from audits and verify and record that the implementation of the corrective action is effective. Corrective actions which are not effective shall be rescinded or cancelled and new ones created in their place until such time as the problem or deficiency has been eliminated.

5.0 Procedure

5.1 The Quality Assurance Manager, in conjunction with the President & General Manager, Plant Manager and other Managers, as applicable, will review Customer complaints, nonconformances, documented procedures, warranty claims and the results of previous audits to identify areas of the quality system which require auditing. The review will be held at least once per year or more frequently as deemed necessary by the Quality Assurance Manager and/or President & General Manager.

5.2 When either the entire system or specific area or product have been scheduled for audit, the Quality Assurance Manager or his delegate shall prepare to perform the audit by reviewing the applicable audit checklist. If Quality Assurance Manager chooses a delegate, he must be independent of those having direct responsibility for the activity being audited.

5.3 The applicable Manager will be contacted and a schedule or date for audit determined.

5.4 The Quality Assurance Manager or delegate will meet with the applicable personnel, interview them and perform the audit. The results of the quality audit will be recorded on the checklist and brought to the attention of the personnel having responsibility in the area audited.

5.5 The Quality Assurance Manager will provide a copy of the completed checklist with any deficient areas highlighted to the applicable Manager. They will determine a schedule and course of corrective action and the Manager will implement.

5.6 Once the corrective action has been taken the Manager will provide evidence that the action has been taken, and is effective to the Quality Assurance Manager. The Quality Assurance Manager will sign and date the checklist to acknowledge that corrective action was taken and was effective.

5.7 The Quality Assurance Manager will then file the report in a file with previous reports. The file of audit reports will be maintained in accordance with Section, "Control of Quality Records".

5.8 Quality audits are conducted yearly during the month of June or more frequently if required.

TRAINING

1.0 Purpose

1.1 The purpose of training is to ensure that all personnel are suitably trained and can perform the work assigned to them.

2.0 Scope

2.1 This applies to all personnel working at ICE Western Sales Ltd.

3.0 Responsibility

3.1 The Plant Manager is responsible for ensuring that all shop personnel are suitably trained to perform the work assigned to them.

3.2 The President is responsible for ensuring that the Director of Sales & Marketing, Controller, Engineering Manager, Plant Manager, and other senior staff are suitably trained or qualified to perform their tasks.

3.3 The Quality Assurance Manager is responsible for monitoring the training of employees on an ongoing basis to ensure that training needs are identified and met via suitable training programs.

4.0 Policy

4.1 All personnel employed at ICE Western Sales Ltd. shall be qualified on the basis of appropriate education, training and/or experience as deemed appropriate by the Plant Manager, Controller, Engineering Manager or President as applicable.

4.2 The President, Controller, Engineering Manager and Plant Manager will identify training needs on an ongoing basis and provide the training in a timely manner to any employee requiring it.

4.3 The President, Engineering Manager, Controller and Plant Manager will create records of all employees qualification, training received both formally and on the job. The controller shall retain and maintain these in his personnel records.

5.0 Procedure

5.1 The President & General Manager or applicable manager shall monitor the workload, job type and personnel capabilities to determine when training is required. The specific training needs and employee qualifications shall be identified and recorded on the training record form.

5.2 The President & General Manager in conjunction with the applicable manager and employee, will define the type of training and either provide it to the employee or have the employee take a recognized training course.

5.3 Once complete the applicable Manager will review the training results or certificate etc. and record the completion date on the applicable training record. Completed training records will be submitted to the Controller for filing in the employee file.

5.4 Subsequent to training all Managers will assign tasks only to qualified personnel having the appropriate education, training and/or experience to perform the tasks.



**ELECTRICAL STANDARDS IMPLEMENTING
JIC (JOINT INDUSTRY COUNCIL) AND CSA
(CANADIAN STANDARDS ASSOCIATION)
WIRING PRACTICES**

**Neil P. Doherty
April 1998
ICE Manufacturing Limited**

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1. Supply Circuit Disconnecting Means (JIC E.3)

1.1 Where nominal 115 volt, single phase, is the only power supply to the equipment, a fused disconnect switch or circuit breaker of suitable size shall be installed.

1.2 On all other equipment the builder shall furnish, as specified by the purchaser, one of the following disconnecting means.

(1) A fusible or non-fusible motor circuit switch conforming to all requirements, except enclosures, listed in NEMA Standard KS-1, Enclosed Switches , for heavy type HD switches, or

(2) A circuit breaker conforming with NEMA Standard AB-1, Molded Case Circuit Breakers, or

(3) A fusible or non-fusible circuit interrupter.

1.3 When a separately mounted safety switch is specified by the purchaser as auxiliary equipment, it shall be a NEMA heavy duty industrial type, manually operated, fusible or non-fusible (as specified) and mounted in a NEMA Type 12 enclosure.

2. Disconnecting Means (CSA)

2.1 Disconnecting Means Required (CSA 28-600): Except as permitted by Subrules 2.2 and 2.3, a separate disconnecting means shall be provided for :

(a) Each motor branch circuit; and

(b) Each motor starter or controller; and

(c) Each motor.

2.2 A single disconnecting means shall be permitted to serve more than one of the functions described in Subrule 2.1.

2.3 A single disconnecting means shall be permitted to serve two or more motors and their associated starting and control equipment grouped and a single branch circuit.

3. Types and Ratings of Disconnecting Means (CSA 28-602)

3.1 A disconnecting means for a motor branch circuit shall be:

(1) A manually operable fused or unfused motor circuit switch, which complies with Rule 14-010(b)* and has a horsepower rating not less than that of the motor it serves; or

(2) A moulded case switch or circuit breaker which complies with Rule 14-010(b) and has a current rating not less than 115% of the full load current rating of the motor it serves; or

(3) An instantaneous-trip circuit breaker that complies with rules 14-010(b)* and 28-210^; or

(4) An equivalent device which opens all ungrounded conductors of the branch circuit simultaneously and is capable of safely making and interrupting the locked rotor current of the connected load; or

(5) A single plug fuse for a branch circuit having one grounded conductor feeding a two-wire single phase or dc motor rated at not more than 1/3 hp provided it is used only as an isolating means and is not used to interrupt current; or

(6) The draw out feature of a high voltage motor starter or controller of the draw out type which complies with Rule 14-010(b), providing it is used only as an isolating mean to interrupt current.

* Rule 14-010(b) states, “Manually operable control devices which safely disconnect all ungrounded conductors of the circuit at the point of supply simultaneously, except for multi-wire branch circuits that supply only fixed lighting loads or non-split receptacles, and that have each lighting load or receptacle connected to the neutral and one ungrounded conductor”.

^ Rule 28-210 states, “ Instantaneous trip circuit breakers, when used for branch circuit protection, shall be:

- (a) Part of a combination motor starter or controller that also provides overload protection; and
- (b) Rated or adjusted, for an ac motor, to trip at not more than 1,300% of the motor full motor load current or at not more than 215% of the motor locked rotor current, where given, except that ratings or settings for trip currents need not be less than 15A; or
- (c) Rated or adjusted, for an dc motor rated at 50 hp or less to trip at not more than 250% of the motor full load current, or for a dc motor rated at more than 50hp, to trip at not more than 200% of the motor full load current.

4. Rating (JIC E3.3.1)

4.1 The ampacity of the disconnecting means shall be not less than 115 percent of the sum of the full-load currents required for all equipment which may be in operation at the same time under normal conditions.

5. Position Indication (JIC E3.5)

5.1 The disconnecting means shall plainly indicate whether it is in the open or closed position.

6. Indication of Control Device Positions (CSA 14-408)

6.1 Manually operable control devices shall indicate the “on” and “off” positions, unless the application of the device is such as to make this requirement unnecessary.

7. Operating Handle (JIC E3.11)

7.1 Location: The operating handle of the disconnecting means shall be readily accessible. The center of the grip, when in its highest position, shall not be more than 6-1/2 feet above the floor and should not be lower than 3 feet above the floor.

7.2 The operating handle shall be mounted on the front of the control compartment or enclosure, not on a door.

8. Grouping of Control Devices (CSA 14-412)

8.1 Control devices controlling feeders and branch circuits shall be grouped where applicable.

9. Connection to Different Circuits (CSA 14-414)

9.1 Where electrical equipment is supplied by two or more different transformers or other different sources of voltage, then:

(a) A single disconnecting means which will effectively isolate all ungrounded conductors supplying the equipment shall be provided integral with or adjacent to the equipment; or

(b) Each supply circuit shall be provided with a disconnecting means integral with or adjacent to the equipment, and the disconnecting means shall be grouped together.

9.2 Notwithstanding Subrule 1.4.1, disconnecting means integral with or adjacent to equipment need not be provided for control circuits originating beyond equipment and not exceeding 150 volts-to-ground provided that all associated bare live parts are protected against inadvertent contact by means of barriers.

9.3 Where multiple disconnecting means as in Subrule 1.4.1(b) are provided, suitable warning signs shall be placed on or adjacent to each disconnecting means to the effect that all of the disconnecting means must be opened to ensure complete de-energization of the equipment.

9.4 Where barriers are used as required in Subrule 1.4.2, a suitable warning sign shall be placed on or adjacent to the equipment, or on the barriers, indicating that there is more than one source of supply to the equipment.

10. Conductors (JIC “Protection” E4.4.2)

10.1 The rating of overcurrent protective devices in the control circuit shall be as low as practicable and shall not exceed the values given in Table 1 for the smallest conductor in the circuit. In Table 1 and Table 2, the smaller of the computed overload ratings shall be used.

10.2 Conductors installed in any location shall be suitable for the condition of use as indicated in CSA Table 36* for the particular location involved and with particular respect to:

(a) Moisture, if any;

(b) Corrosive action, if any;

(c) Temperature;

(d) Degree of Enclosure;

(e) Mechanical Protection.

10.3 * ICE utilizes a Duraflex liquid-tight non-metallic flexible conduit (See ICE Code 18) which is noted in JIC electrical standards and has the following specifications:

(a) UL Listed/CSA Certified – complies with UL Specification 514B, CSA Specification C22.2#18, and NEMA Specification FB-1.

(b) Exceeds the UL 150 pound 5 minute pullout test.

(c) Flexible Temperature Range: -5°F to 176°F (-21°C to -80°C)

(d) Resistant to oil, water and most chemicals

(e) Furnished with Locknut and Sealing O-Ring providing a liquid –tight seal at knockout hole.

10.4 Due to these limitations ICE shall abide by the standards herein*:

(a) All indoor direct fired units shall use the Duraflex liquid-tight non-metallic flexible conduit.

(b) All outdoor direct fired units which are not exposed to a minimum outdoor temperature below -5°F (-10°C) shall use the Duraflex liquid-tight non-metallic flexible conduit.

(c) Any outdoor direct fired unit that does not meet the requirements of 10.4(b) shall use a metallic BX-type flexible conduit with a sealed PVC jacket.

(d) Indirect fired units may use a combination of Duraflex liquid-tight non-metallic flexible conduit, metallic BX-type flexible conduit, and plastic sheathing. Metallic BX-type flexible conduit will be used where a degree of protection is necessary to protect the conductors from damage.

(e) An outdoor unit shall use metallic BX-type flexible conduit on supply fan motor isolation when the outdoor unit does not meet the requirements of 10.4(b).

*- Based on CSA code C22.2 No. 227.2-93 for Flexible Liquid-Tight Nonmetallic Conduit which states:

1.1 This standard applies to flexible liquid-tight nonmetallic conduit and fittings in trade sizes $3/8''$ to $2''$ intended for use as a raceway for the installation of conductors in accordance with the rules of the Canadian Electrical Code, Part 1, for nonhazardous locations.

1.2 Flexible liquid-tight nonmetallic conduit covered by this standard has reasonably smooth interior, is liquid-tight, available in types A and B constructions, and is provided in a thermoplastic that is recognized for use at a maximum continuous operating temperature of 167°F (75°C) and a minimum working temperature of -2°F (-18°C).

11. Ampacity of Wires and Cables (CSA 4-004)

11.1 The maximum current which a copper conductor of a given size and insulation may carry shall be as follows:

- (a) Single conductor, and single-conductor metal sheathed or armoured cable, in a free air run, as specified in Table 5; and
- (b) 1,2, or 3 conductors in a run of raceway, or 2- or 3-conductor cable, except as indicated in Subrule (d), as specified in Table 6; and
- (c) 4 or more conductors in a run of raceway or cable, as specified in Table 2X with the correction factors applied in Table 7; and
- (d) Single conductor and 2-, 3-, or 4-conductor cables and single and 2-, 3-, and 4-conductor metal sheathed cables, in conductor sizes $1/10$ AWG and larger, in an underground run, as calculated by the method of the IEEE Standard. Standard Power Cable Ampacity Tables, IEEE 835.

11.2 A neutral conductor which carries only the unbalanced current from other conductors, as in the case of normally balanced circuits of three or more conductors, shall not be counted in determining ampacities as provided for in Subrule 11.1.

11.3 When a load is connected between a single-phase conductor and the neutral, or between each of two phase conductors and the neutral, of a three-phase, four wire system, the common conductor carries a current comparable to that in the phase conductors and shall be counted in determining the ampacities as provided for in Subrule 11.1.

11.4 A bonding conductor shall not be counted in determining the ampacities as provided in Subrule 11.1.

11.5 The correction factors specified in this Rule:

- (a) Apply only to, and shall be determined from, the number of power and lighting conductors in a cable or raceway; and

(b) Shall not apply to conductors installed in auxiliary gutters.

11.6 The ambient correction factors of Table 8 shall apply where conductors are installed in an ambient exceeding or anticipated to exceed 30°C.

11.7 Where single conductors having a free air rating are run in contact with each other, the ampacity shall be corrected by applying the factors in Table 9 for up to four conductors in contact, by utilizing the ampacity of Table 6 where there are more than four in contact.

12. Transformers (JIC)

12.1 The transformer for the control circuit shall be protected in the secondary circuit against overloads and short circuits with overcurrent devices selected in accordance with Table 3.

12.2 A disconnecting means shall be installed in the primary circuit of each power and distributing transformer. (CSA 26-250)

13. Control Enclosures and Compartments (JIC E7)

13.1 A permanent metal (plastic) data pocket shall be attached to the inside of the enclosure or compartment. If space permits, the pocket should be at least 10.5 inches wide and adequate depth and thickness to accommodate all electrical wiring diagrams.

13.2 The interior of the enclosure and panel shall be finished in a light colour.

13.3 Hinged doors which swing horizontally shall be provided for control enclosures and compartments.

13.4 Doors shall not exceed 36" in width.

14. Enclosures for Control Devices

14.1 Control devices, unless they are located or guarded so as to render them inaccessible to unauthorized persons and to prevent fire hazards, shall have all current-carrying parts in enclosures of metal or other fire resistant material. (CSA 14-410)

14.2 The enclosure shall be mounted in such a manner and position as to guard it against oil, dirt, coolant, and dust, and to minimize the possibility of damage from floor trucks or other moving equipment.

15. Location and Mounting of Control Equipment (JIC E8)

15.1 "STOP" button operators shall be of the unguarded type.

15.2 A legend (name) plate shall be provided for each control station component to identify its function and located so that it can be read easily by the equipment operator from his/her work position. Markings on the plate shall be permanent, such as by embossing or engraving.

15.3 Location of Control Devices (CSA 14-406): Control devices, with the exception of isolating switches, shall be readily accessible.

15.4 Remotely controlled devices shall be considered to be readily accessible if the means of controlling them are readily accessible.

15.5 Panel mounted control devices shall be front mounted, connected and wired. (JIC E6.2.1) Exception: This does not apply to such direct current and large alternating current equipment not commercially available for front connection.

15.6 Control devices and coils shall be marked in accordance with published pertinent standards or with the maker's name or trademark, ordering number and applicable voltage and frequency. (JIC E6.2.3)

Exception: Where the device is too small to identify, the information shall be shown on the diagram or stock list.

15.7 Relays shall have a complete set of contacts (eg., a four-pole block shall have all contacts furnished). (JIC E6.2.10)

15.8 Control equipment shall be so mounted and located that it will not interfere with machine adjustments or maintenance. (JIC E8.1.3)

15.9 Terminal blocks shall be mounted to provide unobstructed access to the terminals and their conductors. The blocks shall not be mounted above each other in a plane perpendicular to the panel. (JIC E8.1.5)

15.10 Panel mounted control components, such as relays, shall be mounted in numerical order from left to right and top to bottom corresponding to the panel layout. Starters and contactors should be mounted in a similar manner. (JIC E8.2.5)

15.11 Any device(s) mounted on the control panel, carrying line voltage or a combination of line voltage and control voltage, shall be grouped above or to the side and segregated from devices which carry only the control voltage. This does not apply where the line voltage is 115 volts. In no case shall any device be mounted above the disconnecting means. (JIC E8.2.6)

16. Operator's Control Stations and Devices (JIC E9)

16.1 Push button operators, selector switch operators and indicating lights shall be of the oil-tight type.

16.2 Push button operators shall retain their colour identification throughout their life.

16.3 Emergency push button operators shall be of the palm or mushroom type.

16.4 "Start" button operators shall be of the fully-guarded type.

17. Wiring Methods and Practices (JIC E12)

17.1 General Requirements: Conductors shall be colour coded as follows:

- (1) BLACK – Line, load and control circuits at line voltage of 600VAC, 460VAC, 230VAC, and/or 208VAC
- (2) RED – AC control circuits with voltages of 120VAC
- (3) YELLOW – 24VAC
- (4) WHITE – Neutral
- (5) GREEN – Ground

Standard size of conductor is 16 AWG but may vary depending upon Table 1.

Exception No. 1: Internal wiring on individual devices purchased completely wired.

Exception No. 2: Where insulation that is used that is not available in the colours required.

Exception No. 3: Where multiconductor cable is used.

Exception No. 4: Conductors used to connect electronic, precision, static or similar devices or panels.

Exception No. 5: Equipment for use outside the United States where the above colour code is not in agreement with established electrical code.

Exception No. 6: Additional colours may be used to facilitate identification between control panel and devices on the equipment.

17.2 Colour of Conductors (CSA 4-036): Insulated grounding or bonding conductors shall:

(a) Have a continuous outer finish that is either green or green with one or more yellow stripes; or

(2) If larger than No. 2 AWG, be permitted to be suitably labeled or marked in a permanent manner with a green colour or green with one or more yellow stripes at each end and at each point where the conductor is accessible.

17.3 Conductors coloured or marked in accordance with Subrule 5.1.2 shall only be used as grounding or bonding conductors.

17.4 Where colour coded circuits are required, the following colour coding shall be used, except in the case of service-entrance cable:

3 phase AC	1 Red (phase A)
	1 Black (phase B)
	1 Blue (phase C)
	1 White (where neutral is required)

17.5 Conductors shall be identified at each termination by marking with a number to correspond with the diagram(s).

17.6 Identification tags shall be made of oil resistant material. Sleeve type tags shall be undersized so that they will not slip off the conductor if the conductor is removed from its termination point.

17.7 Terminals on terminal blocks shall be plainly and permanently marked to correspond with the identification shown on the diagram(s).

17.8 Terminals on terminal blocks shall be numbered in ascending order (1,2,3...) starting from top to bottom, or from left to right.

Exception: Terminals for remote interlock wiring shall be grouped separately.

17.9 Conductors and cables shall be run without splices from terminal to terminal.

Exception: Splices may be made to leads attached to electrical devices, such as motors, solenoids, and transformers, and shall be insulated with oil-resistant electrical tape.

17.10 Joints and Splices Within Cable Trays (CSA 12-2206): Where joints and splices are made on feeders or branch circuits within cable trays, the connectors shall be insulated and shall be accessible.

17.11 Terminal blocks shall be wired and mounted so that internal and external wiring does not cross over the terminals. Not more than two conductors shall be terminated at each point.

17.12 Panel wiring shall be contained in panel wireways, unless the total number of starters, relays and timers is less than six. Where wireways are not used, conductors shall be bundled to keep them in place.

18. Liquid-Tight and Flexible Conduit Fittings (JIC) See ICE Code 10.2

18.1 When the conduit enters the opening through a conduit connector equipped with a tapered surface or similar sealing action, no locknuts or gaskets are required, providing the resulting seal is a liquid type.

18.2 Liquid-tight Flexible conduit shall be installed in manner that liquids will tend to run off the surface instead of draining toward the fittings.

18.3 Standards for Fittings: Connectors for liquid tight flexible metal and non-metallic conduit shall be liquid-tight, designed to electrical trade sizes, and meet the requirements of Underwriter's Laboratories Standard UL 514.

18.4 Non-metallic Conduit: Liquid-tight flexible non-metallic conduit shall consist of a water and oil resistant and flame-retardant material. It shall be constricted of a seamless liner and

cover, bonded together with one or more layers of flexible, braided, reinforcing cords. (JIC 13.3.2.1)

18.5 The conduit shall be resistant to kinking and shall have physical characteristics comparable to the jacket of multi-conductor cable. (JIC 13.3.2.2)

18.6 The conduit shall be suitable for use at temperatures of 80°C in air and 60°C in the presence of water, oil or coolant. (JIC 13.3.2.3)

18.7 Liquid-tight flexible conduit shall be permitted where a flexible connection is required in a dry, damp, or wet location. (CSA 12-1302,1)

18.8 Liquid-tight conduit shall not be used under such conditions that the temperature will exceed 60°C unless marked for a higher temperature. (CSA 12-1302,3-E)

18.9 Maximum number of conductors in liquid-tight flexible conduit shall:

(a) Be of sufficient size to permit the conductors to be drawn in and withdrawn without injury to the conductors.

(b) Not exceed 200 conductors in one conduit. (CSA 10-404)

18.10 Where a non-metallic wiring system is used: a bonding connection shall be provided at all outlets; and Metal boxes shall be bonded to ground. (CSA 10-404)

19. Grounding (JIC E15)

19.1 Equipment grounding conductors: A copper or other corrosion-resistant conductor shall be used for grounding and bonding purposes.

19.2 The grounding conductor shall be of copper (CSA 54-300-2)

19.3 The grounding conductor shall not be smaller than No. 14 AWG (CSA-54-300-3).

19.4 Raceway shall not be used in lieu of a grounding or bonding conductor.

19.5 The size of the equipment grounding conductor shall be as shown in Table 4. Column "A" indicates maximum capacity in Amperes of the overcurrent protective device in the circuit ahead of the equipment.

19.6 Alternating currents circuits which are to be grounded shall have (CSA 10-400):

(a) A connection to a grounding electrode at each individual service; and

(b) At least one additional connection to a grounding electrode at the transformer or elsewhere.

19.7 The secondary grounded circuit conductor shall be permitted to be grounded by an interconnection to the primary grounded circuit conductor provided:

(a) The primary is grounded at the transformers; and

(b) Interconnection is made only at the transformer

20. Terminal Fittings (CSA 12-3006)

20.1 Where conductors are run from the ends of conduit, armoured cable, surface raceway, or nonmetallic sheathed cable to appliances or open wiring, an outlet fitting or terminal fitting shall be permitted to be used instead of the box required by Rule 12-3002*, and the conductors shall be run without splice, tap, or joint within the fitting.

20.2 The fitting shall have a separately bushed hole for each conductor.

20.3 The fittings shall not be used at outlets for fixtures.

* Rule 12-3002, "Outlet Boxes", is not a requirement in ICE 's electrical code.

21. Testing (JIC)

21.1 Circuit Tests: When all wiring of the electrical system is complete, the builder shall test each circuit for continuity, short circuits, and fault grounds.

TABLE 1 – Control Conductor Overcurrent Protection (JIC Table 4-4)

Conductor Size, AWG	Maximum Rating, Amperes
22	3.5
20	6.25
18	8
16	10
14	15
12	20
10	30
8	40
6	60
4	70
3	80
2	100
1	110

TABLE 2 – Power Conductor Overcurrent Protection (JIC Table 4-3)

Conductor Size, AWG	Maximum Circuit Breaker Rating, Amperes	Maximum Dual Element Fuse Rating, Amperes
14	60	30
12	80	40
10	100	50
8	150	80
6	200	100
4	250	125
3	300	150
2	350	175
1	400	200

Table 3 – Control Transformer Overcurrent Protection (115V Secondary)

Control Transformer Size, Volt-Amperes	Maximum Rating
150	1.6
200	2.0
250	2.5
300	3.2
500	5
750	8
1000	10
1250	12
1500	15
2000	20
3000	30
5000	50

Table 4 – Size of Grounding Conductors

Column "A", Amperes	Copper Wire Size, AWG
20	14 or 16
30	14
40	12
60	10
100	8
200	6
400	4

Table 5 – Allowable Ampacities for Single Copper Conductors in Free Air

(CSA Table 1 truncated)

	60°C	75°C	85-90°C
Size AWG	Type RW	Types RW75, TW75	Types R90, RW90
14	20	20	20
12	25	25	25
10	40	40	40
8	55	65	70
6	80	95	100
4	105	125	135
3	120	145	155
2	140	170	180
1	165	195	210

Table 6 – Allowable Ampacities for Not More Than 3 Copper Conductors in Raceway or Cable (CSA Table 2 truncated)

	60°C	75°C	85-90°C
Size AWG	Type RW	Types RW75, TW75	Types R90, RW90
14	15	15	15
12	20	20	20
10	30	30	30
8	40	45	45
6	55	65	65
4	70	85	85
3	80	100	105
2	100	115	120
1	110	130	140

Table 7 – Ampacity Correction Factors For Table 6 (CSA Table 5C)

Number of Conductors	Ampacity Correction Factor
1-3	1.00
4-6	0.80
7-24	0.70
25-42	0.60
43 and up	0.50

Table 8 – Correction Factors Applying to Tables, Ampacity Correction Factors for Ambient Temperatures above 30°C (CSA Table 5A truncated)

Ambient Temperature in °C	60°C Type RW	75°C Types RW75, TW75	85°C-90°C Types R90, RW90
40	0.82	0.88	0.90
45	0.71	0.82	0.85
50	0.58	0.75	0.80
55	0.41	0.65	0.74
60	-	0.58	0.67
70	-	0.35	0.52
75	-	-	0.43
80	-	-	0.30

Table 9 – Correction Factors (CSA Table 5A truncated)

Number of Conductors	Correction Factors
2	0.90
3	0.85
4	0.80



DATE ISSUED _____

DATE REQUIRED _____

WORK ORDER

ITEM TO BUILD _____

QUANTITY TO BUILD

FABRICATION

SPOT WELD

WELD SHOP

PAINTING

ASSEMBLY

SUB-ASSEMBLY

INSULATION

STORES

SHIPPING

ROUTING

SHEAR	<input type="text"/>	<input type="text"/>
NOTCH	<input type="text"/>	<input type="text"/>
BREAK	<input type="text"/>	<input type="text"/>
OTHER	<input type="text"/>	<input type="text"/>



CAPITAL APPROPRIATION REQUEST

DIVISION: _____ APPROPRIATION #: _____

DEPARTMENT NAME: _____ DATE: _____

GENERAL DESCRIPTION: _____

ACCOUNT CODING: _____

BUDGETED: YES _____ NO _____ BUDGET YEAR: _____

BUDGETED COST: _____ ACTUAL COST: _____

WERE COMPETING BIDS OBTAINED: YES _____ NO _____

IF NO, WHY _____

=====

STRATEGIC EXPENDITURE: _____

SUSTAINING EXPENDITURE: _____

NUMBER OF SUPPORTING FORMS ATTACHED _____

=====

DETAILED DESCRIPTION: _____ DETAILED ACTUAL COST _____

=====

JUSTIFICATION OF PROJECT/DESCRIPTION OF ECONOMIC ASSUMPTIONS:

MAINTENANCE JOB ORDER (MAJOR)

Date Written _____ Date Required _____ Dept. _____ Page _____ of _____

Building _____ Location _____

Charges Costs to: Account No. _____ Capital Approp. No. _____

DESCRIPTION OF WORK (Include sketch of equipment.)

REASONS FOR WORK (Include economic justification when appropriate.)

Signed _____
(Originator)

COSTS	ESTIMATED	ACTUAL
Matls.		
Labor		
Contr.		
TOTAL		

REQUIREMENTS

APPROVALS

Equipment Downtime	Dept. Supv. _____
	Maint. Fmn. _____
Equip. Preparation	Plant Engr. _____
	Porj. Engr. _____
Safety Permits	Plant Mgr. _____

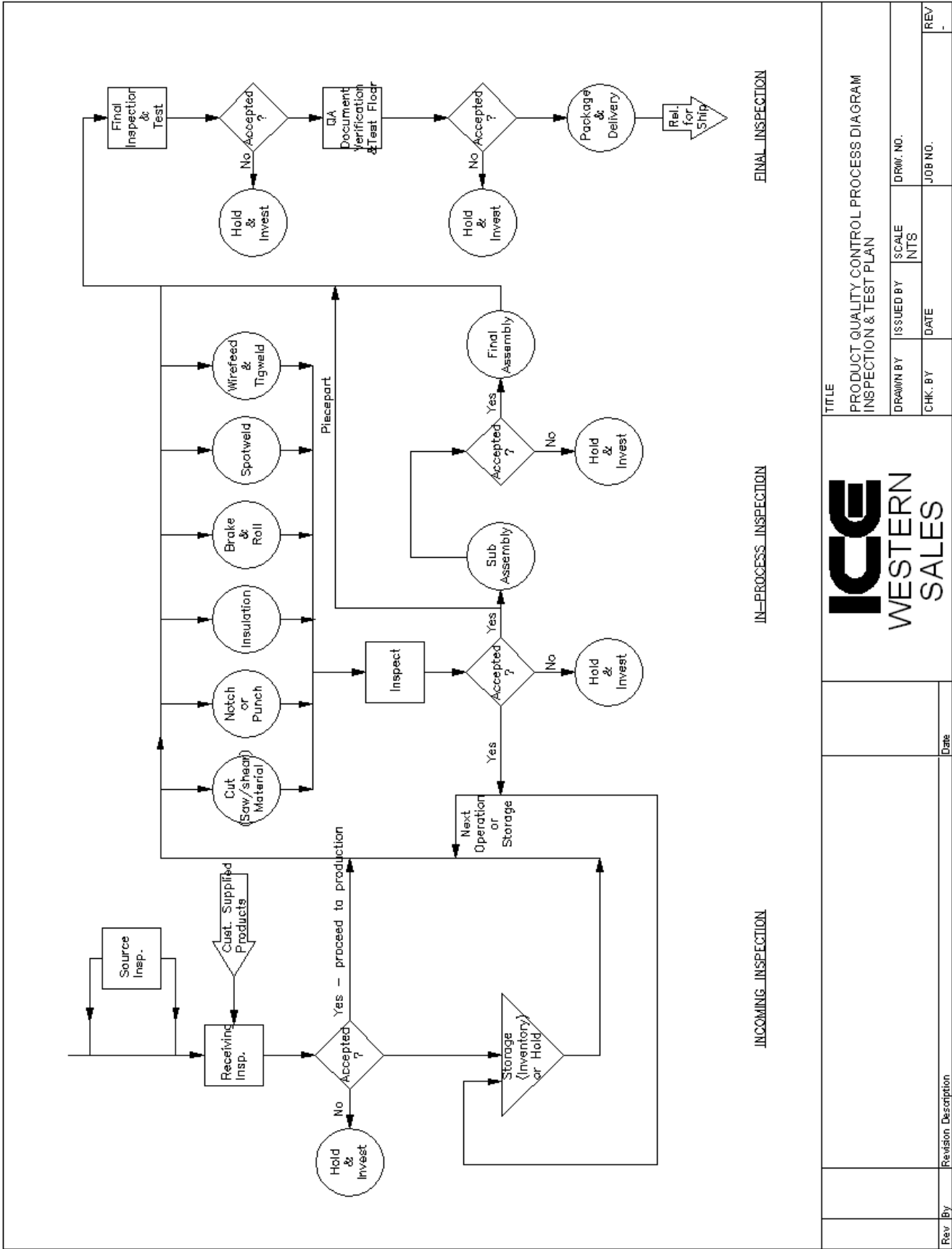
MAINTENANCE JOB ORDER (MINOR)

Date Written _____ Date Required _____ Charge Account No. _____

Building _____ Location _____

Describe Work to be Done _____

Signed _____
(Originator)



		TITLE	
		PRODUCT QUALITY CONTROL PROCESS DIAGRAM INSPECTION & TEST PLAN	
Rev. By	Revision Description	DRAWN BY	SCALE
		CHK. BY	NTS
		DATE	DRW. NO.
			JOB NO.
			REV

ICE WESTERN
DESIGN REVIEW

1. Does the unit's configuration meet customer's requirement?

2. SPECIFICATION SHEET

3. BLOWER

4. MOTOR

5. HEATING SECTION

6. COIL (HEATING / COOLING CAPACITY)

7. FILTER SECTION

8. COMPRESSOR

9. CONDENSER

10. HEATING RECOVERY SECTION

11. HUMIDIFICATION SECTION

12. OTHERS

DATE: _____ **JOB:** _____ **CHECKED BY:** _____

ICE WESTERN
PURCHASE ORDER CHECKLIST

- Purchase orders must be issued from "ICE WESTERN"

Phone: (403) 252-5577

Fax: (403) 252-5566

PO # _____

BILL TO:

SHIP TO:

TERMS

FOB

DATE REQ'D

SHIP VIA

PPD or COLLECT

FULL ORDER CODE

QTY

PRICE

END USER NAME AND LOCATION (CITY/STATE)

CONSULTANT NAME AND LOCATION

ATTACH REFERENCES IF NEW CUSTOMER

ICE WESTERN

WIRED BY:

CHECKED BY:

WIRED BY:

CHECKED BY:

ICE WESTERN
BLOWER & MOTOR CHECKLIST

JOB #
BLOWER
BEARINGS
CUTOFF
WHEEL
LOCKING COLLARS
BLOWER
BEARINGS
CUTOFF
WHEEL
LOCKING COLLARS
MOTOR
MOTOR FUNCTION:
MANUFACTURER:
CAT./MODEL NO.:
SERIAL NO.:
VOLTAGE:
AMPS:
RPM:
SERVICE FACTOR:
INSULATION CLASS:
EFFICIENCY:
DOP TEFC
MOTOR
MOTOR FUNCTION:
MANUFACTURER:
CAT./MODEL NO.:
SERIAL NO.:
VOLTAGE:
AMPS:
RPM:
SERVICE FACTOR:
INSULATION CLASS:
EFFICIENCY:
DOP TEFC
ALL CHECKED BY:

ICE WESTERN SALES LTD.
9732 52 Street SE
Calgary, AB T2C 2R5
Ph: 1-403-252-5577
Fax: 1-403-252-5556



INDUSTRIAL
COMMERCIAL
EQUIPMENT
MANUFACTURING LTD.

FACTORY TEST REPORT

JOB NAME: _____

INSTALLATION CONTACTOR: _____

JOB ADDRESS: _____

SERVICE TECHNICIAN: _____

DATE: _____

SERIAL NO. & MODEL NO: _____

INLET DAMPER SECTION

- Verify Instrument Air Pressure
- Verify Damper Actuator Operation
- Verify Damper Open End Switch Operation

MIXED AIR DAMPER SECTION

- Verify Pressure Transducer Operation
- Verify Mixed Air Damper Actuator
- Verify Mixed Air/Outside Air Temp Sensor Transmitter Operation
- Verify Mixed Air Control PID Loop Tuning

FAN SECTION

Supply Voltage

L1-L2: _____ L2-L3: _____ L3-L1: _____

Supply Fan Amps

L1: _____ L2: _____ L3: _____

- Verify Current Sensor Setting
- Verify Overload Setting
- Verify Supply Air Temp. Sensor & Transmitter Operation
- Verify High Temp. Limit Switch Setting
- Verify Low Temp. Limit Switch Setting
- Verify Supply Fan on Ind. Light Operation

BURNER SECTION

Static Pressure Drop across Burner _____

External Static Pressure _____

Gas Inlet Pressure _____

Manifold Pressure (Design 3-5" WC) _____

- Verify High Gas Pressure Setting
- Verify Low Gas Pressure Switch Setting
- Low Velocity Air Proving Switch Setting
- High Velocity Air Proving Switch Setting
- Verify Flame Signal Change Over
- Verify Heater on Ind. Light Operation
- Verify Burner Control PID Loop Tuning

REFRIGERATION SECTION

Supply Voltage

L1-L2: _____ L2-L3: _____ L3-L1: _____

Refrigerant Suction Pressure

Circuit 1 _____ Circuit 2 _____

Circuit 3 _____ Circuit 4 _____

Refrigerant Discharge Pressure

Circuit 1 _____ Circuit 2 _____

Circuit 3 _____ Circuit 4 _____

ELECTRIC HEATER SECTION

Supply Voltage

L1-L2: _____ L2-L3: _____ L3-L1: _____

Electric Heater Amps

L1: _____ L2: _____ L3: _____

Compressor Amps

Circuit 1 L1: _____ L2: _____ L3: _____

Circuit 2 L1: _____ L2: _____ L3: _____

Circuit 3 L1: _____ L2: _____ L3: _____

Circuit 4 L1: _____ L2: _____ L3: _____

Evaporator Air Temperature

Entering Air _____ Leaving Air _____

Verify Refrigeration Piping

ACCESSORIES

UPS Voltage _____ Receptacle Voltage _____

Verify Filter Differential Pressure Switch Setting

Verify Room Thermostat Operation

Verify Smoke Detector Operation

Verify Marine Lights Operation

Verify Push Buttons/Switches Operation

Verify IND. Lights Operation

COMMISSIONING / START-UP COMPLETED BY

Print Name / Company

Signature

Print Name / Company

Signature

ICE WESTERN
CALIBRATION LOG REGISTER

CONT. #	DESCRIPTION	LOCATION	CALIBRATION FREQUENCY	DATE
CA-0001	Brake Backstop	PROD. FLOOR	6 MONTHS	
CA-0002	Brake Backstop	PROD. FLOOR	6 MONTHS	
CA-0003	Brake Backstop	PROD. FLOOR	6 MONTHS	
CA-0004	Shear Blades	PROD. FLOOR	6 MONTHS	
CA-0005	Shear Blades	PROD. FLOOR	6 MONTHS	
CA-0006	Shear Blades	PROD. FLOOR	6 MONTHS	
CA-0007	Magnehelic Gauge	PROD. FLOOR	6 MONTHS	
CA-0008	Magnehelic Gauge	PROD. FLOOR	6 MONTHS	
CA-0009	Manometer	PROD. FLOOR	6 MONTHS	
CA-0010	Manometer	PROD. FLOOR	6 MONTHS	
CA-0011	Manometer	PROD. FLOOR	6 MONTHS	
CA-0012	Manometer	PROD. FLOOR	6 MONTHS	
CA-0013	Tachometer	PROD. FLOOR	YEARLY	
CA-0014	Tachometer	PROD. FLOOR	YEARLY	
CA-0015	Di-Electric Tester	PROD. FLOOR	YEARLY	
CA-0016	Di-Electric Tester	PROD. FLOOR	YEARLY	
CA-0017	Di-Electric Tester	PROD. FLOOR	YEARLY	
CA-0018	Multimeter	PROD. FLOOR	YEARLY	
CA-0019	Multimeter	PROD. FLOOR	YEARLY	
CA-0020	Multimeter	PROD. FLOOR	YEARLY	
CA-0021	Multimeter	PROD. FLOOR	YEARLY	
CA-0022	Tape Measure	PROD. FLOOR	2 MONTHS	
CA-0023				
CA-0024				
CA-0025				
CA-0026				
CA-0027				
CA-0028				
CA-0029				
CA-0030				
CA-0031				
CA-0032				
CA-0033				
CA-0034				
CA-0035				

ICE WESTERN
CALIBRATION RECORD

<u>DESCRIPTION</u> MANOMETER		<u>CONTROL #</u> CA-0012	<u>SERIAL #</u>	<u>Calibration Frequency</u> 6 Months	
<u>EQUIPMENT LOCATION</u> PRODUCTION FLOOR					
<u>CAPABILITY</u> +/- 0.1" W.C.		<u>STABILITY</u> 40~150 DEG. FAHRENHEIT		<u>RANGE</u> 0~12" W.C.	
<u>CALIBRATION METHOD</u> -Add Fluid If Required -Zero Gauge And Compare Readings Side To Side					
<u>ACCEPTANCE CRITERIA</u> +/- 0.1" W.C.			<u>TRACEABILITY NRC/NBS/NPL/BCS/OTHER</u> ICE		
<u>DATE</u>	<u>INSPECTOR</u>	<u>INSPECTION RESULTS</u>			<u>DISPOSITION</u>
		<u>AS FOUND</u>	<u>AS LEFT</u>	<u>NEXT DUE DATE</u>	
4/16/98	R. FROESE	+0.02" W.C.	+0.02" W.C.	10/16/98	NONE
<u>ACTION TAKEN WHEN RESULTS ARE UNSATISFACTORY: REPLACE</u>					

ICE WESTERN
NON-CONFORMANCE/CORRECTIVE ACTION REPORT

NCR - _____ / _____

Part A: Non-Conformance Report

Customer		Job #	Purchase Order #
----------	--	-------	------------------

Description	Invoice #
-------------	-----------

Date of Occurrence	W/O #	Operation #	Qty. Non-Conf./Tot.
--------------------	-------	-------------	---------------------

Non-Conformance Origin: Engineering Purchasing Customer
 Fabrication Assembly Marketing

Details on Non-Conformance:

Supplier Corrective Action Report Required: Yes No

Date: _____ Authorized: _____

Part B: Non-Conformance Disposition

Use As Is Rework Scrap Re-grade Return to Customer/Vendor

Details on Disposition:

Date: _____ Signature: _____

Part C: Cause and Corrective Action

Cause:

Corrective Action:

Date: _____ Signature: _____

Part D: Corrective Action Follow-UP

Date: _____ Signature: _____

ICE WESTERN
PREVENTATIVE ACTION REQUEST

TO:

REQUEST DATE:

FROM:

REPLY DUE DATE:

NONCONFORMANCE NO.(S)

DESCRIPTION OF CONDITION:

APPARENT CAUSE:

ACTION TAKEN TO PREVENT RECURRENCE:

SIGNATURE: _____ TITLE: _____ DATE: _____

PROBLEMS DURING PRODUCTION

JOB NAME _____ JOB NUMBER _____

FILE NUMBER _____ MODEL NUMBER _____

	Date of Service	Service By	Problem	Description	Corrective Action
1.					
2.					
3.					
4.					
5.					

ICE WESTERN SALES LTD.
 9732-52nd St. S.E.
 Calgary, AB T2C 2R5
 Ph: 1-403-252-5577
 Fax: 1-403-252-5556



**INDUSTRIAL
 COMMERCIAL
 EQUIPMENT
 MANUFACTURING LTD.**

PROBLEMS IN FIELD

JOB NAME _____ JOB NUMBER _____

FILE NUMBER _____ MODEL NUMBER _____

Date of Service	Service By	Problem	Description	Corrective Action
1.				
2.				
3.				
4.				
5.				

ICE WESTERN SALES LTD.
 9732-52nd St. S.E.
 Calgary, AB T2C 2R5
 Ph: 1-403-252-5577
 Fax: 1-403-252-5556



**INDUSTRIAL
 COMMERCIAL
 EQUIPMENT
 MANUFACTURING LTD.**

ICE WESTERN
PACKAGING CHECK LIST

1. ALL AREAS OF UNIT PAINTED

2. ALL OPENINGS COVERED

3. WEATHERHOUSING CAULKED

4. ALL COMPONENTS SECURELY FASTENED TO PREVENT SHIPPING DAMAGE (REMOTE PANELS, SENSORS ETC.)

5. INTERIOR OF UNIT CLEAN

6. ISOLATION SHIPPLING BRACKETS/BRACES IN PLACE

7. ALL SCREWS IN PLACE

8. DOORS SECURED FOR TRANSIT

9. INTERIOR STRUCTUREAL STEEL PRIMED

10. INDOOR UNIT PROTECTED AGAINST MOISTURE

11. INLET HOODS FITTED TO ENSUER CONFORMANCE

12. UNIT TAGGED WITH APPROPRIATE INFORMATION

DATE: _____ **JOB:** _____ **CHECKED BY:** _____