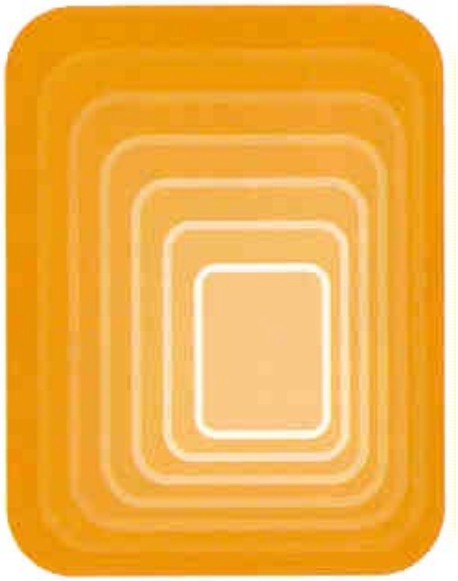
Quality Assurance Manual



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Issue and Review Record

Rev.	Date	Pages	Description or Remarks
0	November 2, 1998	1 to 17	Initial issue
-	January 22, 1999	-	1999 Annual Quality Manual Review
1	November 29, 1999	15-1	Rev. Section References in Paragraph 15.2.1 & 15.3.1
-	January 13, 2000	-	2000 Annual Quality Manual Review
-	January 18, 2001	-	2001 Annual Quality Manual Review
-	January 11, 2002	-	2002 Annual Quality Manual Review
-	Nov 19,2004	2	Rev, Mission Statement and Company Values
-	Jan 12,2006	-	2006 Annual Quality Manual Review
-	Jan 29,2007	-	2007 Annual Quality Manual Review
-	Jan 21,2008	-	2008 Annual Quality Manual Review
-	Feb 22,2010	-	2010 Annual Quality Manual Review
-	Jan 28,2014	-	2014 Quality Manual Review
-	Feb 19,2015	-	2015 Quality Manual Review
-	Feb 15,2016	-	2016 Quality Manual Review
-	Dec.7,2017	-	2018 Quality Manual Update
2	January 7, 2019	1-Aug	Rev. Welding Sections 8.1.2, 8.2.1, 8.2.3 & 8.4.1
-	February 13, 2020	-	2020 Quality Manual Review
-	January 8, 2021	-	2021 Quality Manual Review
-	February 7, 2022	-	2022 Quality Manual Review
-	January 3, 2023	-	2023 Quality Manual Review

Table of Contents

1.0 Scope and Purpose

1.1. Purpose

The purpose of this manual is to define and publish a quality control system for implementation by GFS

1.2. Policy

1.2.1. GFS will implement systems and procedures necessary to assure that all manufactured products and services offered, meet the requirements and standards established by our management team and customer requirements, to provide a better product and service to our customers.

1.2.2. This manual is subject to review by customer representatives at any time prior to issuance of a contract and at all times when a contract is in force.

1.2.3. Procedures to document and resolve Customer complaints have been established in a separate GFS standard.

1.3. Application

The Quality Assurance System defined herein conforms to the requirements of the GFS Management Team.

1.4. Responsibilities

1.4.1. This manual and supporting documents will be reviewed on an annual basis, and revised as necessary to ensure conformance.

1.4.2 Revisions will be issued by the Quality Assurance Manager and controlled in accordance with the applicable procedures.

2.0 Responsibilities

2.1 The Quality Assurance Team Leader reports to the President of the company in matters relating to Quality and for manufacturing priorities.

2.1.1. The QA Team (Shop Superintendent and Foremen) will have the authority and organizational freedom to resolve any quality problems.

2.2 The Quality Assurance Review Board responsibilities include.

2.2.1. Planning how to meet customer's quality requirements.

2.2.2. Reviewing customer drawings and specifications.

2.2.3. Determining inspection points.

2.2.4. Writing inspection and test plans.

2.2.5. Establish and monitor effectiveness of quality program procedures.

2.2.6. Keeping adequate quality assurance records.

2.2.7. Reviewing quality assurance records and overseeing follow-up for correction and correction of defects.

2.2.8. Assure that supplier quality control and follow-up are adequate.

2.2.9. Coordinating in-plant correction of items rejected by customers, explaining to customers what action will be taken, and evaluating the actions for effectiveness.

2.3 The GFS main office is responsible for establishing job costs, client liaison, in-process project management and job close out. A standard has been set up for these procedures.

3.0 Configuration Control

3.1 We manufacture to customer drawings and specifications. Sets of these are filed in job number folders in our main office.

3.2 Any detail drawings made by GFS, Inc., from customer supplied design drawing will conform to GFS, CAD standards.

3.3 The main office is responsible for the following:

3.3.1. Charging out and keeping track of drawings and specifications.

3.3.2. Receiving Engineering changes from our customer and sending these changes to our shop immediately.

3.3.3. Voiding outdated Engineering changes, drawings, and specifications.

3.4 A standard procedure has been set up to control changes by effective date.

4.0 Purchase Order Control

4.1 When a purchase order is issued to subcontractors, our buyer will send our supplier all required drawings, specifications, and quality requirements (such as GFS fabrication terms and conditions, material or process certifications, physical or chemical analysis, source inspection) with the purchase order. The PO Number and Job Number will be identified on all material processing.

4.1.1 If there is a drawing or specification change after our order is placed with the supplier our buyer will send the supplier a purchase order amendment including our latest Engineering change and the latest drawings or order specifications.

4.2 When a purchase order is issued for raw material, the supplier will issue mill certification test reports to GFS where they will be kept on file. The PO Number and Job Number will be identified on all material.

4.3 Copies of all purchase orders will be kept on file for our customers to review.

5.0 UNLOADING, RECEIVING AND IDENTIFYING INCOMING MATERIAL

5.1 The receiver shall determine the contents of incoming shipments from the shipping papers and will check the items for quantity, damage, incomplete, illegible identification or identification not in accordance with the shipping papers.
The receiver shall record his findings on the shipping papers and forward them as required.

5.2 The Foreman shall instruct the receiver on any special handling, storage or preservation requirements specified on the drawings. The receiver shall follow these requirements during unloading and storage operations.
All material shall be handled and blocked in a manner to prevent permanent distortion or damage.

5.3 If the Vendor's marking or tagging are complete, legible and in accordance with Purchase Order requirements, the contract number and Purchase Order number will be marked on all items.

5.4 Rejected items will be identified and set aside until the Purchasing Department and Shop Superintendent decides on disposition.

5.5 The Purchasing Department has the responsibility of assuring that a pattern of continually receiving faulty items from any supplier doesn't develop, and assuring supplier corrective action.

5.6 Material that is to be cut (sawed, sheared, burned, etc.) for a contract must be verified by a Purchase Order Number, Contract Number, size, weight, or grade as shown on the GFS, Inc. cutting list. Material taken from stock must have size, weight and grade verified before using.
The Foreman will monitor compliance.

5.7 Any material being returned to GFS stock must have size, weight, and grade marked on it.

6.0 INPROCESS INSPECTION

6.1 Item identification shall be maintained at all times. Detail piece marks, sub-assembly piece marks and/or shipping piece marks must be maintained as applicable. Plant personnel are responsible for maintenance of identification and Foreman will monitor compliance

6.2 Material that has been cut (sawed, sheared, burned, etc.) will be dimensionally checked.

6.3 During "Fitting" stage of fabrication, dimensional checks will be made routinely per section 7.2 and customer requirements.

6.4 Foremen will be responsible for visual inspection of product thru out the fabrication and assembly process per section 15.0.

7.0 FABRICATION

7.1 Cutters, Drawings and Specifications.

7.1.1 The production personnel will be issued contract specifications, cutters, and drawings (latest revision) as per contract number and sequence number.

7.1.2 Shop Foreman will see to it that all revised documents are issued immediately to shop personnel for work on said contract. All previous revisions will be marked "VOID" and returned to the shop office. No documents that have "VOID" marked on them are to be left on the shop floor.

7.2 Dimensional Tolerances.

7.2.1 The Shop will work to the ± tolerance as it is shown on the shop detail drawing.

7.2.2 If no ± tolerances are on the shop detail drawings, the shop will use GFS, Inc. standard dimensional tolerances.

7.2.3 GFS, Inc. standard dimensional tolerances for welding structural members such as beams, channels, angles, columns, trusses, etc.

Lengths of 30 ft. or less:

- Overall length ± 1/8"
- Straightness 1/8" x total length divided by 10

Lengths over 30 ft. to 45 ft.:

- Over all length ± 1/4"
- Straightness 3/8" x total length divided by 10

Lengths over 45 ft.:

- Overall length ± 3/8"
- Straightness 3/8" + 1/8" x total length divided by 10

7.2.4 GFS, Inc. standard dimensional tolerances for welding a furnace box section.

Width of box 10 ft. or less ± 1/8”

- Height of box 10 ft. or less ± 1/8”
- Squareness ± 1/8”
- Flatness of walls ± 1/8”
- Overall length of Box 30 ft. or less ± 1/8”

Width of boxes over 10 ft. to 15 ft. ± 3/16”

- Height of boxes over 10 ft. to 15 ft. ± 3/16”
- Squareness ± 3/16”
- Flatness of walls ± 3/16”
- Overall length of box over 30 to 45 ft. ± 3/16”

Width of boxes over 15 ft. ± 1/4”

- Height of boxes over 15 ft. ± 1/4”
- Squareness (16 & over x 16 & over) ± 1/4”
- Flatness of walls ± 1/4”
- Overall length over 46 ft. ± 3/8”

7.3 Preparation of Base Metal:

7.3.1 Surfaces on which weld metal is to be deposited shall be smooth, uniform and free from fins, tears, cracks and other imperfections, which would adversely affect the quality or strength of the weld. Surfaces that are to be welded, and surfaces adjacent to a weld, must be free from loose or thick scale, slag, rust, moisture, grease and other foreign materials that would prevent proper welding or produce objectionable fumes. Mill scale that can withstand vigorous wire brushing, a thin rust-inhibitive coating or an anti-spatter compound may remain.

7.3.2 In thermal cutting, the equipment will be adjusted and manipulated to avoid cutting beyond (inside) the prescribed lines. The roughness of all thermal-cut surfaces shall be no greater than that defined by AWS-C-4-1 (latest revision) Criteria for Describing Oxygen-Cut Surfaces.

7.4 Cope and Block Cuts:

7.4.1 All cope cuts and re-entrant cuts will be notch-free and cut to a radius of at least 1/2", unless otherwise shown on shop detail drawings.

7.5 Fit-Up:

7.5.1 The parts to be joined by fillet welds shall be brought into as close contact as possible. The root opening is not to exceed 3/16" except in cases involving either shapes or plates 3" or greater in thickness. After straightening and fit-up, if the root opening cannot be sufficiently closed to meet this tolerance, a maximum root opening of 5/16" is acceptable, provided suitable backing is used. If the separation is greater than 1/16", the leg of the fillet weld can be increased by the amount of the root opening. The separation between faying surfaces of the plug and slot weld, and of butt joints landing on a backing bar, is not to exceed 1/16".

7.6 Tack Welds:

7.6.1 Tack welds are made by the fitter and or helper to hold assembly together before final welds are made.

7.6.2 Tack welds are subject to the same quality requirements as the final welds, with the following exceptions:

A. Preheat is not mandatory for single-pass tack welds that are remelted and incorporated into the final weld, regardless of whether it is a continuous weld or a stitch weld.

B. Discontinuities, such as undercut, unfilled craters and porosity need not be removed before the final weld is made.

7.6.3 Tack welds, which are incorporated into the final weld, will be made with the electrodes meeting the requirements of the final welds and are to be cleaned thoroughly.

7.6.4 Fitter will mark the weld size and length on assembled section, regardless of whether it is a continuous weld or a stitch weld.

7.6.5 Fitter will tack and assemble section in such a manner so that all tacks are in the welded area.

7.6.6 Fitter will layout all stitch welds in such a manner as to have a full-length stitch weld at each end of a weld run.

7.7 Control of Distortion and Shrinkage:

7.7.1 In assembling and joining parts of a structure or built-up member, and in welding reinforcement parts to members, the procedure and sequence shall be such to minimize distortion and shrinkage.

7.7.2 All welds will be made in a sequence that will balance the applied best of welding while the welding progresses.

8.0 WELDING

8.1 Weld Material (Weld Wire and Gasses) Control:

8.1.1 Welding materials that are ordered for stock (not for a particular contract) and which have the manufacturers markings required by the AWS. Specification need not have additional information marked on them, provided they can be traced to any required material certifications.

8.1.2 Low Hydrogen electrodes will be issued only in quantities that can be used within the exposure time period specified by the manufacturer or control codes. All low hydrogen electrodes being returned to the holding oven, must remain in the holding oven for at least 6 hours to allow reconditioning.

8.1.3 At the end of a shift, or upon completion of welding operations, unused bare electrodes in the plant will be left on the machine or removed and returned to the issuance area.

8.2 Welder Qualifications:

8.2.1 All welder qualifications must be as per AWS and ASME standards

8.2.2 All welders will be assigned a unique identifying symbol. The Shop Superintendent will maintain a list of the symbol assignments. It is the Foreman's responsibility to insure that these symbols are regularly and consistently steel-die stamped, when permitted by the contract specifications, or otherwise identified adjacent to all welds.

8.2.3 Copies of Welder qualification test reports and Welder performance qualifications will be maintained and filed by the Senior Certified Welding Inspector/Shop Superintendent.

8.3 Qualification of Tackers:

8.3.1 GFS, Inc. tackers will be qualified as per AWS qualification of tack welders. Part E, Section 5.43 thru Section 5.52. AWS D1.1 (latest revision)

8.4 Welding standards

8.4.1 All welding to be made in accordance with AWS Dl.1, ASME B31.1 and ASME B31.3.

8.4.2 All Stud welding to be made in accordance with Chapters 7 and C7 in AWS Dl.1 (latest revision)

9.0 PIPING PROCEDURES

9.1 Procedures for Pipe Installation

9.1.1 Piping information will be obtained from contract documents and drawings. If no information is available, GFS will use standard practices from The Pipe Fitters and Pipe Welders Handbook, latest edition, published by Glencoe Publishing Company.

10.0 MACHINING PROCEDURES

10.1 Procedures for Machining

10.1.1 Machining information will be obtained from contract documents and drawings. If no information is available, GFS will use standard practices from The Machinery's Handbook, latest edition, published by Industrial Press, Inc.

11.0 ASSEMBLY PROCEDURES

11.1 Assembly criteria

11.1.1 All assembly criteria will be obtained from contract documents and drawings. This includes, but is not limited to, centerline alignment, chain alignment, sprocket settings, roll settings, bearing settings, bolting requirements, etc.

11.2 Traceability of assembly items

11.2.1 All free-issue items supplied by the customer must be tagged with purchase order number, drawing number, and item number. (All operations manuals received with customer supplied free-issue items, will be packaged and shipped to field with free issue item).

11.2.2 All assembly items purchased by GFS, Inc. will be tagged with GFS purchase order number, contract number, drawing number, and item number.

11.3 Disassembly

11.3.1 Shop assembled items will be disassembled per customer requirements and shipping limitations.

12.0 ELECTRICAL PROCEDURES

12.1 Procedure for electrical installation

12.1.1 All electrical specifications and information will be obtained from the contract documents and drawings. If this information is not available, GFS will use the codes and procedures found in:

12.1.1.1 USA - The National Electrical Code, latest edition published by The National Fire Protection Association.

12.1.1.2 Canada - The Canadian Electrical Code, latest edition.

12.1.2 If Customer documents do not specify, GFS will use standard ridged conduit, standard flexible conduit, standard wire and standard junction boxes.

13.0 REFACTORY PROCEDURES

13.1 Procedures for the installation of refractory

13.1.1 All refractory specifications (installation instructions, material type, expansion joints, stud patterns, etc.) will be obtained from the contract documents and drawings. If this information is not available, GFS will use procedures that are recommended by the refractory manufacturer and approved by the customer.

14.0 CLEANING AND PAINTING PROCEDURES

14.1 Cleaning and Painting

14.1.1 Surface preparation on contract work shall be done in conformance with the required SSPC specification called for in the contract documents and drawings. (GFS standard surface preparation is, SSPS SP3, Power Tool Cleaning)

14.1.2 The paint material shall be stored in an enclosed shop area. Application shall be consistent with the coating instructions and the manufacturer's recommendations.

14.1.3 Prior to shipment, all items shall be cleaned, painted, packaged, and loaded in accordance with instructions specified in the contract documents and on the shop drawings. If no special instructions are given, good shop practice shall be followed to prevent damage, deterioration, or loss of items during shipment.

15.0 INSPECTION PROCEDURES

15.1 General

15.1.1 Fabrication inspection and tests shall be performed by the Quality Control/Production Team as necessary prior to, during, and after all stages of fabrication to ensure that materials and workmanship meet the requirements of contract documents. Verification, inspection and testing shall be performed and their results reported to the owner and contractor in a timely manner to avoid delays in the work.

15.1.2 Inspection procedures supplied in the customer's original contract documents will take precedence in all stages of fabrication. If no inspection procedures are given, GFS will use the inspection procedures described in this Quality Control Manual.

15.2 Fabrication

15.2.1 Dimensional inspections will be performed in accordance with the Procedure for Fabrication (Section 7.2) of this manual.

15.3 Welding

15.3.1 Visual welding inspection will be conducted in accordance with the Welding Procedures (Section 8.4) of this manual.

15.3.2 If Hydro-Static testing procedures are not spelled out on shop drawings or job specification, but are required, GFS will use the following procedures:

15.3.2.1 Remove dirt, grease, and weld spatters in seams that are to be tested.

15.3.2.2 Visually inspect for defects and repair as required

15.3.2.3 Attach the proper pipes, plugs, and gauges

15.3.2.4 Pressurize to fifty (50) pounds of air pressure

15.3.2.5 Splash a detergent/water mixture over welds that are to be tested:

15.3.2.5.1 If leaks show, mark and release pressure

15.3.2.5.2 Grind repair area and reweld (must be qualified welder).

15.3.2.5.3 Retest weld

15.3.2.6 Fifty (50) pounds of air pressure is to be held for ½ hour. Foreman is to witness start and finish of holding period.

15.3.2.7 Foreman is to document test and give results to the shop superintendent.

15.3.3 Dye penetrant testing will be done on all gas tight welds that are accessible from both sides using the following method:

15.3.3.1 The weld will be visually checked for any potential leaks and a qualified welder will make repairs at the time.

15.3.3.2 All dirt, grease, weld spatter, slag, and loose scale will be removed.

15.3.3.3 The developer will be applied on the gas tight side of the weld.

15.3.3.4 The penetrant will be applied liberally on the opposite side of the weld.

15.3.3.5 If a leak appears …

15.3.3.5.1 Repair area will be marked

15.3.3.5.2 Repair area will be ground or gouged

15.3.3.5.3 Repair area will be rewelded by a qualified welder

15.3.3.5.4 Steps 15.3.3.1 to 15.3.3.4 will be repeated to retest the weld.

15.3.4 Dye penetrant testing will be done on all gas tight welds that are accessible from only one side using the following method:

15.3.4.1 The weld will be visually checked for any potential leaks and a qualified welder will make repairs at that time.

15.3.4.2 All dirt, grease, weld spatter, slag, and loose scale will be removed.

15.3.4.3 The penetrant will be applied to the weld and allowed to work into any weld imperfections for fifteen minutes

15.3.4.4 The penetrant will then be removed

15.3.4.5 The developer will be applied over the weld surface

15.3.4.6 If a leak appears…

15.3.4.6.1 Repair area will be marked

15.3.4.6.2 Repair area will be ground or gouged

15.3.4.6.3 Repair area will be rewelded by a qualified welder

15.3.4.6.4 Steps 15.3.4.1 to 15.3.4.5 will be repeated to retest the weld.

15.4 Assembly

15.4.1 Any inspection on assembled items will be done by the customer or by GFS in accordance with instructions supplied by the customer.

15.5 Machining

15.5.1 The general shop foreman will inspect machined pieces in accordance with the dimensional tolerances shown on the contract documents and drawings.

15.6 Piping

15.6.1 The pipe foreman will perform dimensional inspections on pipe assemblies in accordance with contract documents and specifications.

15.6.2 Any leak testing will be done in accordance with contract documents and specifications. If no testing criteria is given, GFS will use one of the testing methods described in section 15.3 of this manual.

15.6.3 Large, multi threaded connected pipe assemblies will not be pressure tested due to the inability to prevent the vibration during transit from loosening the connection.

15.7 Electrical

15.7.1 Any inspection on electrical items will be done by the customer or by GFS in accordance with instructions supplied by the customer.

15.8 Refractory

15.8.1 Any inspection on refractory items will be done by the customer or by GFS in accordance with instructions supplied by the customer.

15.9 Painting

15.9.1 The initial paint inspection will be a visual inspection to check for runs, sags, light spots, and missed spots. Appropriate corrective measures will be taken for any imperfections that are found.

15.10 Inspection Documentation

15.10.1 All gas tight weld testing and pressure testing will be documented on the appropriate form and signed by the Quality Control/Production Team member and forwarded to the Shop Supervisor's office.

15.10.2 Each department will use the standard inspection report to document inspection and repairs, if any. The report will be signed by the Quality Control/Production Team member and forwarded to the Shop Supervisor's office.

15.10.3 Any special inspection witnessed or performed by the customer or his designated representative will be documented on the appropriate form, signed by the Quality Control/Production Team member and the customer representative then forwarded to the Shop Supervisor's office.

15.10.4 At completion of job, all forms will be placed in the Job folder at the Main Office where they will be stored for a period of 2 (Two) years.

16.0 SHIPPING PROCEDURES

16.1 Piece Marking

16.1.1 All pieces that are to be shipped will be properly identified in accordance with the marking instructions found in the contract documents and drawings. The shop foremen will monitor compliance.

16.2 Shipping papers

16.2.1 All shipping papers will be completed in accordance with the instructions found in the contract documents and drawings. The shop foremen will insure that what is listed on the shipping papers corresponds to what is loaded on the truck.

16.3 Bracing

16.3.1 All fabricated members will be braced for shipping in accordance with instructions found in the contract documents and drawings. If no bracing instructions are given, GFS will use good shop practice to provide sound bracing for shipment.

16.4 Refractory

16.4.1 All refractory shipped (either loose or installed in a fabricated structure) will be 100% tarpped regardless of distance to be traveled or predicted weather conditions.

16.5 Lifting Lugs

16.5.1 Customer approved Lifting lugs may be installed on fabricated structures in order to aid in loading. Lifting lug placement will be done in such a way as to avoid any distortion during lifting.

16.6 Tie Down Points

16.6.1 Tie down points will be determined in such a way as to avoid any distortion in transit. GFS and the trucking company responsible for the load will agree upon tie down points.

17.0 Miscellaneous

17.1 The Quality Assurance Team, thereto, will determine control of manual and Quality Control forms and changes.

17.2 Security of welders' stamps will be the responsibility of the shop superintendent.

17.3 These "stamp" records will be made available to customers upon request.