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DOTQS Infrastructure
DOTQS Galvanizing

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Qualification Standard for Galvanizers

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Documentation Requirements

Galvanizers Quality Management System

1 General Information

This program has been developed to assist Owners and Agencies in the utility, transportation and/or infrastructure sector who specify or purchase hot dip galvanizing services that depend on quality galvanized coatings to protect their products. Requiring compliance with this Standard and Program provides the Customers of these Agencies confidence they will receive the service they have specified and a coating that protects for the service life they expect.

This Standard has been developed to guide galvanizers in their effort to have a comprehensive and fully implemented Quality Management System. An effectively implemented, regularly maintained, and audited Quality Management System is a key indicator of a Galvanizer's ability to consistently deliver quality to their Customers. This is demonstrated via successful, process performance based audits, and on-time delivery of product, fully meeting plans and specifications.

2 Hot Dip Galvanizing Plants

Certification under this program is awarded to hot dip galvanizing plants who meet the criteria and maintain the requirements of this standard. The Standard does not describe requirements for individuals working in the industry. It does not create a vehicle to certify product.

3 References/Library

This is a list of required and recommended references for Galvanizers.

Keep reference documents, standards, codes, and other applicable documents readily accessible to the individuals who need them to perform their work. Keep revisions required by existing contracts available.

The list of required references may increase to cover the products, materials, and services that the Galvanizer provides.

Required references:

Contract Specifications for manufacture, fabrication and construction

ASTM Standards for materials used by the company

- ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products1
- A153/A153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- A384/A384M Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
- A385 Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
- SSPC SP6
- ASTM A780
- ASTM B6 Standard for Zinc
- A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- ASTM Standards for materials used by the company

Suggested References:

- ASTM D 6386: Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
- A143/A143M Practice for Safeguarding Against Embrittlementof Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement

4 Definitions

Where specific definitions are necessary they appear in this section or in the section to which it relates.

Customer—(when capitalized in this document) Entity who is placing the order for service. The Customer may also be the end user that has created the specifications and requirements for the project.

QAI—Quality Assurance Inspector. Term used in this Standard to refer to the Inspector representing the Customer. The QAI is typically on site daily or at some lesser frequency to observe and to perform sample inspections and tests to demonstrate conformity of product requirements on behalf of the Customer.

QCI—Quality Control Inspector. Term used in this Standard to refer to the Galvanizer's inspector. The QCI is performing and documenting measurements and tests required to demonstrate conformity of product and process requirements on behalf of the Galvanizer.

Router—an electronic or hard copy document that captures the customer's job requirements. It accompanies the parts as they move through the process or is accessible to personnel in the process who need to assure and execute requirements. Inspections, process parameters and other information may be recorded on the router.

5 Management

Executive Management is defined as the CEO, President, or other individual who is responsible for overseeing the Quality Management System (QMS) of the facility and who has full authority in final decision making for all aspects of the Quality Management System.

The Galvanizer's Executive Management is responsible for developing a commitment to quality, directing the firm to achieve that quality, providing needed personnel and resources, and overseeing the Quality Management System.

Quality personnel must have a means to communicate issues that are affecting quality with Executive Management. Executive Management will assure there are reporting systems that inform them regularly of the functioning of the quality management system, especially of the results of internal and external assessments and Customer feedback.

5.1 Management Representative

This individual is identified in the organizational chart or other method in the quality management system documentation.

5.2 Quality Policy

Document in the Quality Management System a statement that defines the organization's commitment to deliver the final product in compliance with the Customer's order. It may reference applicable codes and standards, and the Galvanizer's own Quality Management System. Assure that all personnel are aware of their contribution to this commitment.

5.3 Performance indicators/goals

Establish performance indicators related to project quality to demonstrate the ongoing effectiveness of the Quality Management System. Oversee the creation of goals, the plans to achieve them, and the current level of performance. Determine a target for each indicator to provide confidence that business is running well and Customers are receiving product in accordance with contract requirements. Have a method to evaluate these indicators by process.

Clearly describe the current achievement level and actions that are ongoing to address indicators that are not performing on target. It is not required that the current Performance Indicators are described in the Quality Management System Documentation. Performance indicators and the current level of progress may be available privately in other management documents.

Develop, measure, review, and act on performance indicators to demonstrate control of the Quality Management System and a culture of Customer responsiveness.

Minimum Performance Indicators:

1. Product quality
2. Customer service

6 Order Review

6.1 Review of documentation and verbal direction

Document a method to assure information has been received from Customers to assure a successful galvanized product. Describe the method to determine and document these job requirements in advance of commencing work

Minimum Requirements:

- Contract specification that will govern the work (determine if there is an existing instruction or method in the plant to assure compliance during the galvanizing process and at inspection)
- Confirm with the Customer any special provisions that will govern the order.
- Required DFT of galvanized work if different than A123
- Allowed touch up method per ASTM A 780
- Required marking and recording of product if required by Customer
- Requirements for preblast of the product must be included in the router for receipt of Customer material
- Request a Steel MTR and review to confirm base materials are not reactive .
- Finish requirements (fitness for use related to the product application)
- Inspection requirements

If the specific information described above is not received, it is the Galvanizer's responsibility to contact their Customer to request the required information. Information received in writing is reviewed. If information is received verbally it is documented and copied to the Customer for potential comment. Identify the position responsible for review.

6.2 Notification to the Customer

If the Customer requests to be informed when processing starts or when product is ready for a specified inspection, the Galvanizer must identify a method and responsible personnel who will notify the Customer. Document the direction received from the Customer and how it is communicated to the plant if direction requires handling, work or planning that is not currently part of documented process control.

Document how Customer notification is accomplished and implement when contracts require.

6.3 Order Review Record

The order review record must show how the following items in this section were reviewed. The Galvanizer's quality manual or procedures must also describe the method of conveyance to the responsible planning, production or quality functions.

Show the Galvanizer has reviewed and identified issues related to:

6.3.1 Galvanizing Process

Capability and load on equipment and work stations including the need to run multiple shifts or subcontract work.

6.3.2 Inspection

Unique inspection types, changes in frequency or documentation and reporting from standard practices, procedures and methods are noted. Note any independent testing or witness services necessary.

6.3.3 Training and qualification

Personnel qualifications needed beyond current levels to meet contract requirements

6.3.4 Traceability

Capture the Customer's order requirements for traceability of lots of similar items or any related requirement.

6.3.5 Inspection Requirements

- DFT measurement
- Post Galvanizing process knowledge (prohibition of quenching when galvanized production will be duplex coated.

6.3.6 Aesthetic requirements

Coating discontinuities that will interfere with the intended use of the product as defined by the Customer's order or referenced contract.

6.3.7 Project Communication

At or before the review, the Galvanizer will identify a consistent individual for all communication with the Customer.
The review record will document contact information for the Customer or Contractor Representatives, and any specific communication requirements mandated by contract documents.

6.3.8 Certificate of conformance

The Galvanizer must describe how information is gathered and reviewed to produce a certificate of conformance when required per, ASTM A123, clause 10.1.

6.3.9 Packaging and Shipping

Create a specific record of requirements for preparing the load, special protection and documentation required by the Customer. Review and record any unique Customer requirements.

6.4 Order review Quality Records

- Order review record
- Customer correspondence
- Certificate of conformance

7 Communication of Order Requirements

The standard requirements for processing unique Customer requirements and referenced codes or specifications must be communicated to personnel who are responsible for the work.
This Standard will use the term Router to refer to the document or documents that communicate order requirements. Documents such as travelers, weight tickets, lists or other methods may also be used and must be described.
Describe the document(s) created that will identify the product job number (or other unique identification), Customer, and how instructions for treating and handling the specific product are referenced or communicated.
Pre-treatment (like blasting) and the requirements for initial and final part marking/identification are essential elements to communicate information to the production process and inspection activity must show how this is done.
Consider using the Router to capture inspection data.

8 Document Control

Develop, document, and implement an effective procedure to control documents/data affecting the quality and conformance of the processes and coated product.
The document control system should include the Quality Management System documentation (Quality Manual, standard procedures, work instructions) and Customer contracts, orders and communications.

8.1 Access

Describe how quality documents and quality records are available to personnel who have responsibility in the quality management system (hard copy or electronically).

8.2 Identification

Describe how each quality document is identified and maintained so that it is used properly.
Include the following on the cover of the Quality Management System documentation

- Current revision by date
- Galvanizer name
- Address/location of Galvanizer
- Customer point of Contact
- Email and phone for point of contact

Create a table of contents page for the Quality Management System. The table of contents page will identify each section and the exhibits or attachments that are part of the Quality Management System documentation. Identify referenced forms, records, and work instructions in their procedure or in the section of the Quality Management System documentation where records are addressed.
Maintain a revision history page or other suitable method to identify changes to the Quality Management System and approval dates for changes to the Quality Management System.

8.3 Transmittals

Address how quality documents, submittals, records and other project correspondence are controlled and distributed outside of the company. Include how revisions are controlled with this system. Include methods for transmittal to owners, clients, subcontractors and vendors.

8.4 Review and approval of Quality Documents

Review and approve Quality Management System documentation. Document this review using signatures, dates or other positive means.
Executive Management is responsible for review and approval; however, specific detailed reviews may be delegated to the managers of the function. Create a record of review and document related actions at least once a year.
As part of the review, ensure that all written information matches the Galvanizer's operations.

8.5 Revision control, distribution and oboslence.

Identify the Quality Management System documentation with a revision date, alphanumeric system, or other suitable method which assures that the current revision is identified. Use a master list or similar method so that any copy of Quality Management System documentation status can be checked against it.
Create and describe the method to retrieve and replace obsolete copies of materials. Distribution may be by electronic or hard copy, but the control must be clearly defined and implemented to assure that whole copies or

specific procedures or sections required for a work area are always current.
Clearly mark what changes are made with each revision. Suitable methods may include marking changes or describing changes in a revision history.

9 Record Control

Define and document methods for the control of quality records. Provide for the following elements of control for quality records:

- Identification
- Collection
- Storage
- Maintenance
- Retrieval and backup of electronic data
- Retention
- Disposal

Control blank forms with a revision date. Assign responsibility to create and control a master list of forms. Consider including on blank forms information that instructs the user how to complete the form or what information needs to be captured, entered, and analyzed. Ensure all quality records are legible and are stored in such a way that prevents damage, deterioration, or loss. Records may be electronic, hard copy, or a combination with appropriate controls described in the procedure.

Certificate of Compliance

Define the format and identification of this Customer defined record. Define a standard identification used by the Galvanizer when a Customer specific format is not described in the order.
The Certificate of Compliance format includes these items as applicable to the product at a minimum:

- Name and address of the Galvanizer
- Product ID #
- Project ID#
- Product description and or part numbers
- Product quantity
- Statement of Material compliance, including applicable specifications (e.g. ASTM A153, ASTM A 123)

10 Purchasing

Develop, document, and implement a procedure to define and document purchasing requirements. Ensure that all purchased products, materials and services that have a direct impact on quality conform to order requirements.

10.1 Purchasing Data

Develop a document that functions as a purchasing agreement and notice to the vendor for materials incorporated into the product and for services that ensure the quality of the product.
Require that purchasing documents contain a clear description of the requirements necessary for the vendor or subcontractor to process the order or deliver the service.
Zincs

- Must list ASTM Specification
- Packing and delivery requirements
- Need for Certificates of conformance and SDS Sheets

Fluxes

- Specify accurate description of flux
- Packing and Delivery requirements
- Manufacturer and trade name
- Need for Certificates of conformance and SDS Sheets

Acids

- Container marking to verify Compliance with OSHA
- Type and acid strength
- Need for Certificates of conformance and SDS Sheets

Touch up products

- Paint
- "Hot stick"

Additives/brightener bars

- Aluminum
- Nickel

10.2 Certificates of conformance

Certificates of conformance or manufacturer's test reports for zinc coatings are retained for the materials after the completion of the project. Certificates of conformance for zinc contain the lot number and chemical analysis and a written statement from the manufacturer that the product supplied meets the purity requirements of ASTM B6.
Additives and chemicals need only have a Certificate of Analysis.

11 Identification

Identification of raw materials and Customer product.

11.1 Raw Material Identification

The Galvanizer must develop a documented procedure for the identification and traceability of materials and products (raw materials before the process such as zinc, brightening bars, acid, flux) used in the process.
The procedure describes how the Galvanizer assures appropriate identification at the purchasing process. The process must be designed to assure incorporation of the correct raw materials into the galvanizing process. This relates to how records provide a basis for raw material identification (e.g., *MTRs* or *C of Cs* for raw materials) are filed and retained per the document control procedure.

11.2 Ingot Marking

Standard marking (Id) for zinc ingots will be by lot number. Material that arrives in bundles or pallets may be marked by such. As a group is broken, the identification is transferred to pieces removed from the bundle and on the remaining bundle in storage.

11.3 Identification of Customer Product

Identification of Customer product must be maintained at all times. Describe how rack routers, galvanizing resistant tags, and other methods are used. Include description of a system for traceability for lots of details and loose items. Similarly, there must be a system for traceability for hardware processed in accordance with ASTM A153.

12 Galvanizing Process Control

Address how the Galvanizer plans to accomplish this work on all shifts. Also, ensure that the planned work is adequately covered with qualified personnel during all operations.

12.1 Required Procedures

Document the procedures identified in the flow chart in Annex A. The procedures may be combined in a single procedure or document or may be referenced from the quality manual as work instructions or separate procedures. Make the best choice to accommodate the Galvanizer's company processes and culture. Procedures must include the minimum parameters identified in the flow chart.

Additionally, the procedures will define specific parameters chosen by the Galvanizer:

- Frequency of testing tank contents including the zinc bath
- pH/acid strength (limits)
- Temperature (limits)
- Iron content
- Zinc purity
- Time in baths
- Metal contamination (limits)

The procedures must describe how work instructions and procedures will be made accessible to rackers, kettle operators and other craft workers of all languages employed by the Suppler who have responsibility for the process.

12.2 Process checking equipment

Ensure the appropriate equipment is present and used properly to verify the process. Work instructions and other aids may demonstrate control and consistency of use.

- Titration equipment for verifying bath chemistry
- Recording Thermometers and/or Thermocouples/PLC controllers

12.3 Required Records

Create records as identified in the flow chart in Annex A. Add Customer part identification to assure the correct job requirements are applied.

12.4 Other procedures

The Galvanizer will be required to document and implement a procedure when a process is critical or it is proved out of control during an internal audit or an external audit or as a regular course of business.

12.5 Quality Records

- Galvanizer's bill-of-lading, purchasing documents.
- MTRs for Customer materials
- Certificates of conformance
- Certificates of Analysis
- Router

13 Inspection

13.1 Receipt Inspection—arrival on the truck

13.1.1 Receipt of Raw Materials

Identify the sequence of steps, checks and inspections that are followed by receiving personnel when galvanizing process materials arrive. List any required records.

13.1.2 Receipt of Customer Product

Inspect incoming materials against client information (shipping or delivery ticket) if provided. Regardless, perform and record inspection information traceable to the Customer's materials throughout the process. Document the received condition of the Customer's load using notes, forms, photos or other suitable means. If the specific items listed in in-process inspection are visible before the truck is unloaded, notify the Customer for further direction.

13.2 Release to Production—Raw Materials and Customer Product

Describe how raw materials and Customer product are made available for the galvanizing process after successful receipt. Include records, notification, marking, location or other suitable means to assure that production personnel use appropriate materials, and product which has been released for processing.

13.3 In-process inspecton—before racking

The order review process must be completed before racking and processing.

Document the receipt inspection of received fabricated product for proper venting and the existence of detrimental coatings or any contamination that will affect the galvanizing process and end quality, per ASTM A385 and ASTM A384. Inform the Customer if conditions exist that will likely affect the quality of the galvanized product.

Perform in-process inspection before product goes into the first bath, caustic. Per customer agreement/order, inspect for:

- Proper venting and proper drains and escapes
- Cleanliness
  - removing paint, varnish or other objectionable condition by mechanical or thermal means
  - removing fabrication debris—blast media, metal debris, weld slag trapped in part geometry
- Significant deposits of grease or oil

Notify the Customer when the results of receipt inspection reveal damage, distortion or a need to alter the part for the galvanizing process.

Galvanizers may not be authorized to perform fabrication (drilling, hole making, welding on lifting attachments) without written Customer authorization.

13.4 Final Inspection—after zinc bath, prior to loading for shipping.

Final inspection must include the quality records demonstrating the proper execution of the process.

Ensure that inspection criteria consider the form/fit/function of the product.
Define product lot for application of the sampling plan.
Show how the requirements of A123 or A153 are satisfied.
Visual inspection for all product will verify the absence of coating discontinuities that will interfere with the function of the product, including cleanliness of tapped holes, lumps, projections, globules, high spots, drip lines, heavy deposits, black and bare areas, blisters, flux deposits, thin spots, dross inclusions, etc.,
Perform DFT measurement.

13.5 Aesthetic and special purpose inspection requirements

Provide methods to inspect special Customer requirements that prohibit coating discontinuities that will interfere with the desired appearance of the product. Include requirements for post processing of galvanized products, especially those that will be duplex coated.

13.6 Customer Verification

Ensure the Customer or the Customer's representative has access to the Galvanizer's operation to verify conformance of their product, observe the process or conduct audits of the quality management system.
The Galvanizer is responsible for determining and documenting the acceptability of the product before proceeding with subsequent processing or shipping, in accordance with their documented inspection procedure(s).
The Galvanizer's inspections on a particular element or process are to be complete before a Customer's representative is presented with the option to verify acceptability. Customer's verification inspectors should not perform, reinforce, or supplant Quality Control duties for the Galvanizer or direct production personnel, except to note hazardous conditions that might result in injury or damage.

13.7 Inspection Equipment

Possess the necessary inspection equipment to perform required inspections based on the complexity of the product. These include but are not limited to:

- DFT Gage (Type 2)
- Truck and Portable Scales (when zinc pick up weight is used to bill client)

13.8 Qualification and Assignment

Document specific experience level, certification or training that qualifies inspection personnel. Assure that any required documentation information is presented in a language understood by assigned personnel.

13.8.1 Inprocess Inspectors

These are often production personnel performing the inspection as product arrives and then before the caustic tank process. Assure that personnel performing tank analysis have received documented training in their tasks. The Galvanizer must select appropriate requirements to add to their inprocess inspection activity and address how personnel are given the appropriate information and knowledge to accomplish this task.

13.8.2 Final Inspectors

Designated final inspectors must demonstrate competency to perform inspections per ASTM A123 including dry film thickness and the limitations of any repair areas allowed for the product and end Customer. Provide and document training in ASTM A123 and ASTM A153 (as applicable to the supply types offered) to personnel based on assigned duties. Online training for Galvanizing Inspectors by the American Galvanizing Association is required.

13.9 Inspection Records

13.9.1 Recording Inspections

Inspection records may be required for receipt, in-process and final inspection. The certificate of conformance by lot required by ASTM A123 and A153 must be specified in the order and investigated in the review process. include methods to accomplish if the requirement for a notarized record is present.
The Galvanizer must address the responsibilities for and methods of producing this record when required. The responsibilities and methods to produce these records must be documented.

13.9.2 Records (potentially) generated by this Element

- DFT measurement record
- Personnel training or qualification
- Receipt inspection reports
- Final visual inspection reports
- Certificate of conformance
- Zinc purity certificate

14 Calibration

Ensure the equipment calibration is maintained in accordance with manufacturer or contract requirements or adjusted for use and documented.

14.1 Calibration

Describe, in procedure format, a method to calibrate these items:

- Dry film thickness gages or shims
- Scales
- Temperature controllers including kettle controls

Include in the procedure:

1. An equipment list that provides a means for unique identification of each piece of equipment. Each piece of equipment will bear a unique identification "mark" that ties to the list.
2. The required precision for each type of inspection, measure and test gage. That determination must meet industry requirements as described in codes, standards and specifications required by the Owner's specification or the Galvanizer's industry certification requirements.
3. Handling and storage instructions for both master and controlled gages to maintain accuracy and fitness for use.
4. The calibration frequency and accuracy for each piece of equipment is based upon manufacturer's recommendations,

project requirements, and specification requirements. In the case of infrequently used devices and standards, where the calibration frequency is not mandated by code or specification, the Galvanizer may adopt a documented recalibration interval different than recommended by the manufacturer, as long as the condition of the instrument and potential problems caused by infrequent calibration are addressed.

5. Identification of equipment having a documented relationship to internationally or nationally recognized standards used to calibrate each listed piece of equipment. Where such standards do not exist, document the basis used for calibration. e.g. Pythagorean Theorem or scribe and flip method for checking squares.
6. When calibration is outsourced, document the subcontractor's traceability to a recognized national or international standard. Traceability to these standards may be included on the record from the company performing the calibration(s).
7. Reference to a calibration verification instruction for each piece of calibrated equipment at the fabricator's facility. Calibration verification instructions shall exist for all final measuring and testing equipment.
8. The acceptance criteria/tolerance for variation between the inspection gage and standard used to verify calibration of each piece of equipment, and criteria to verify the acceptable physical condition of inspection gages.
9. The action to be taken when equipment does not meet the calibration requirements. This action includes disposition of the measuring device and an evaluation of the potential impact to product that was measured using the device. When an impact to product has been determined, the Customer shall be notified in writing.
10. A calibration verification record for each gage shall include date of verification, specified measurement, actual measurements, next calibration due date, the standard used, and the technician's name/initials. Calibration logs may track actions for multiple instruments and are encouraged.
11. Define how the Galvanizer addresses a gage/measuring equipment found without a valid identification. This includes Method of preventing inadvertent use of un-calibrated or inaccurate equipment.

14.2 Master Gage/Measuring Equipment

A Master Gage is a gage that is purchased and traceable to a national standard, typically from a gage Galvanizer who also supplies documentation (certification of conformance) certifying traceability. Choose what master gages are necessary to calibrate gages used in the scope of supply and demonstrate traceability to a national standard. The table below shows examples that may be applicable.

Master Gage	Calibration Verification Frequency min	Accuracy Required min	Source
DFT Shims	When showing wear and tear	+/- 5%	External (replace)
Coated Steel DFT Panels	When showing wear and tear	+/- 5%	External (replace)

14.3 Controlled Gages/Measuring Equipment

A controlled gage is a gage that is compared against a master gage or gages which establishes its traceability and is used for determining conformance of product. These gages are often calibrated in-house by the Galvanizer. The table below shows examples that may be applicable.

Tool/Gage	Calibration Verification Frequency min	Accuracy Required min	Source
DFT Gage	Prior To Use	+/- 5% of shim reading	Internal
Recording Thermometers	Annual	+/- 5 degrees F	External
Truck and Portable Scales	Annual	+/- 10 pounds or .1%	External
Thermocouples/PLC controllers	Annual	+/- 5 degrees F	External

14.4 Records of calibration

Describe the responsibility for maintaining records and identification on gages.

Show in a calibration log or other suitable record:

- Gage
- Gage identification
- Specific frequency of calibration
- Accuracy required
- Measurements to be taken
- Actual measurements
- Standard used for calibration
- Date of Calibration
- As received and as left condition
- Next Due Date

14.5 Quality Records

- Calibration certificates of conformance
- Calibration Log/Record

15 Nonconformance

Develop and document a method for recording and controlling nonconformances. Include the correction of nonconforming product as it is discovered.

15.1 Definitions

Product Nonconformances are deficiencies in products or materials that do not conform to plan, drawings, procedures, Customer requirements, code requirements, or company requirements.

Process Nonconformances are deficiencies in methods reflected by error trends in the performance of the Quality Management System. These can be Process/System Nonconformances in support processes (like order review, purchasing and others) and operational functions.

15.2 General

Nonconformances may be identified by the Galvanizer's inspection program, by process monitoring, during internal and external audits, or by owner representatives and QAIs. Develop and implement an effective written procedure to identify, document, control and correct nonconformances as required by this Standard.

Consider the requirements for measurement of the Product Quality Performance Indicator/Goal (from Clause 5, Management Responsibility) while designing the nonconformance system.

15.3 Product Nonconformance Repair

A conforming coating is expected to be reasonably smooth and uniform in thickness.

Areas that are uncoated after the galvanizing process and are equal to or less than the limits allowed by A123 are repaired in accordance with A780 and are recorded as nonconformances.

If the area exceeds that described in A123 as acceptable for renovation per A780, it is recorded as a significant nonconformance, and the product must be partially or fully re-dipped. Other conditions including, but not limited to, wet stain storage marks may be considered nonconformances and must be addressed and recorded.

15.4 Personnel

Identify personnel qualified to evaluate and disposition nonconforming product. Personnel who have responsibility for tracking both product and process nonconformances must be identified and possess documented qualifications.

Describe their specific duties and qualifications in the procedure, a job description, or other suitable document.

16 Corrective Action

Develop and document a method for identifying and implementing effective corrective action.

16.1 Definitions

Nonconformance – Non-fulfillment of a requirement related to an intended or specified use.

Correction – Action to fix a single nonconformance.

Corrective Action – a systematic method to identify a repetitive or critical nonconformance or other undesirable situation, determine the root cause, evaluate its contributing factors, establish a documented approach to correct the cause of the problem, and prevent its recurrence.

Corrective Action Record (CAR) – the document developed by the Galvanizer for a Corrective Action based upon internal stimulus (Nonconformance reports, internal audits, Management Reviews, etc.)

Corrective Action Request (CAR) - the document developed by the Galvanizer for a Corrective Action based upon external stimulus (external audits, Owner request, etc.)

Although the stimulus for the **Record** and **Request** may be different, the resulting document is the same, so both are referred to as a **CAR**

16.2 Identifying nonconformances for corrective action

16.2.1 General

Not every nonconformance is considered for corrective action. Identify the responsibility in the organization that evaluates and decides if a CAR will be issued. Issue CARs by looking at summaries of product nonconformances, the results of Quality Management System audits, or noted as a regular course of business.

Describe the methods and responsibility to close CARs after evaluating the root cause and implementing the actions developed to prevent recurrence. After the selected actions are taken, verify the deficiency has been corrected to close the CAR. Schedule a re-audit after an appropriate interval to assure continued effective implementation.

16.2.2 Causes for Corrective Actions

- Significant nonconformances
- Product or process nonconformances are repetitive
- Undesirable conditions affecting productivity, employee safety, Customer relations, or other Galvanizer goals.
- Requests or complaints from an external source
- When Performance Indicator targets are not met
- Customer complaints

Invoke the corrective action system when nonconformances are identified during external audits by a Customer. The external source may require a response using their own formats, deadlines and requirements; the Galvanizer must enter the issue into the Galvanizer's system.

17 Handling, Storage, Delivery and Shipment of Product and Materials

Store, handle, and ship product and material in a way that avoids damage and deterioration. Label material for identification on shipping documents. Agreements between the Galvanizer and the Customer or the Galvanizer and a subcontractor assure that material is

shipped in compliance with contracts. Consider including sequencing and load orientation that has been specified by the Customer to address installation needs.

17.1 Raw metals storage

Show the responsibilities and methods to assure that materials are stored to prevent damage and maintain identification. Address these items:

- Stored above ground on platforms, skids, or other supports.
- Protect material from dirt, oil, and other foreign matter.
- Provide for material to drain to assure that water is not in prolonged contact preventing wet stain storage marks.
- Replacement of damaged or defective material with new material, or repair must use a procedure approved by the Customer.
- Segregation by material traceability level and how positive identification is maintained in the storage area using location maps, weather resistant physical identification or other suitable means.

17.2 Handling and Storage of Customer Product

Handle and store the Customer's product in a manner that protects the integrity of the coating. Describe methods that protect the initial dimensions and geometry of the product as received before coating. Record and report to the Owner any such product that is lost, damaged, or otherwise unsuitable for use.

17.3 Shipping Customer Product

Assure that there are controls to prevent damage. T:

- Constructing the load,
  - Adequate dunnage to support the load vertically and laterally.
  - Softeners to separate items during shipment.
  - Nylon straps or cushioned clamps for securing the load
- Softeners for chained loads
- Specific Customer requirements for constructing the load, packaging or protection that is not the Galvanizer's standard method.

18 Training

18.1 Final Inspectors

Verification of online training for Galvanizing Inspectors by the American Galvanizing Association, as well as Company designed training is required for final inspectors. Training must be presented in a language understood by assigned personnel.
Document training records for final inspection personnel.
Review the knowledge and qualifications of final inspectors periodically to ensure compliance to job qualification specifications or industry code requirement changes.

18.2 Inprocess Inspectors

Training is required for inprocess inspectors. This training is documented and may be provided by qualified in-house personnel or from qualified external sources.

18.3 Training Records

Training records include instructor, attendees (and signatures), course outline and date.

19 Internal Audit

Describe in a procedure how internal audits of the Quality Management System are conducted. Audit the requirements of all clauses of this standard at least once a year to verify compliance and effectiveness.

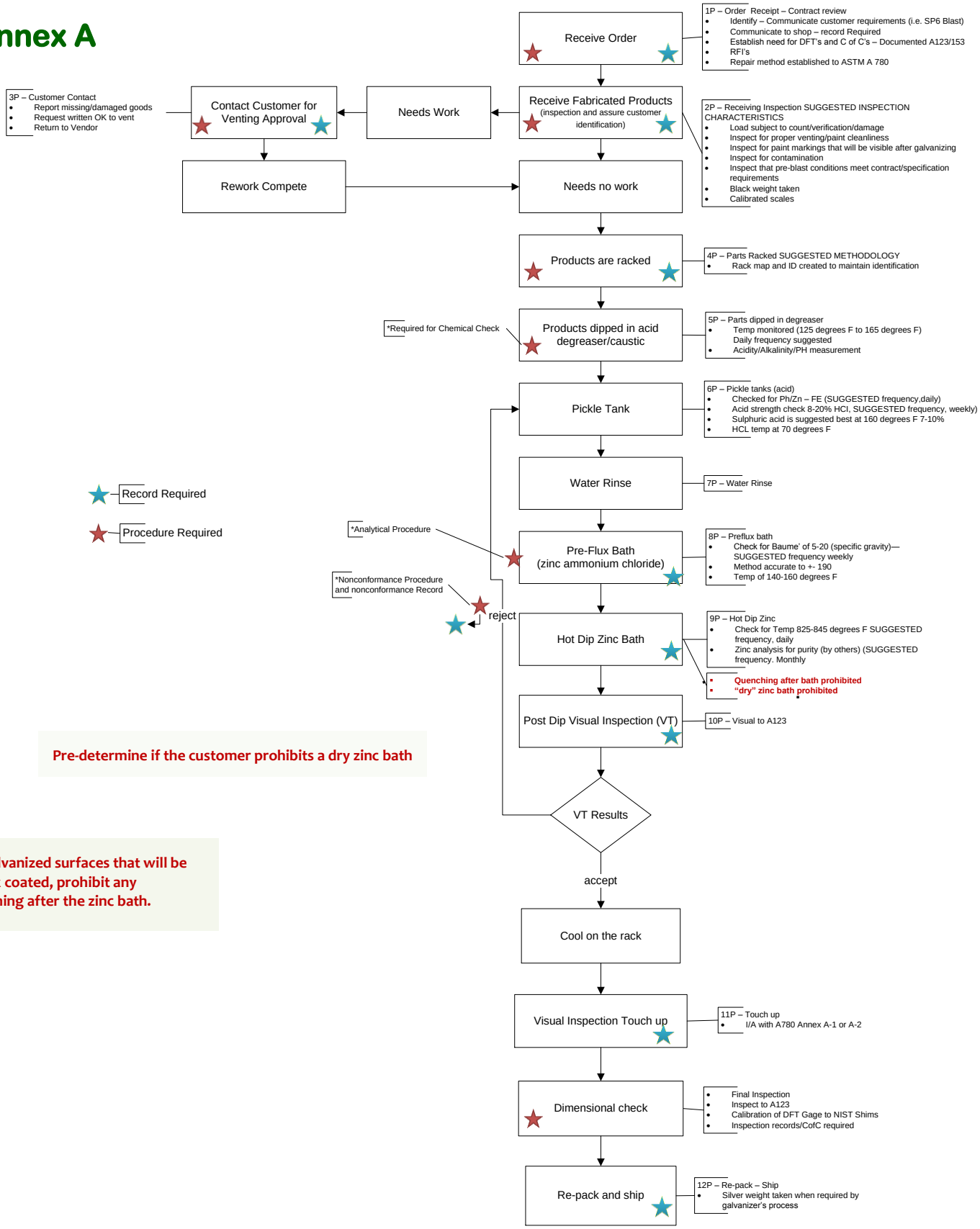
Conduct audits of the entire system at one time, or schedule recurring audits to cover different parts of the system throughout the year. Sections may be scheduled for convenience or by critical importance to the Quality Management System. Identify which personnel are assigned to perform the audit or portions of the audit and how they are qualified to conduct audits in areas other than where they work. Ensure auditors are independent of the functions they are auditing, with the exception of the Executive Manager representing the Quality Management System.

Show in the record generated what elements were audited. Include the performance of recent projects against the Performance Indicators.
Review the results of the audit with the management personnel responsible for the efficient operation of that particular function.
Address how nonconformities are noted during the audit and how they are evaluated to be considered for corrective action. Findings from the audit must be described in detail to allow management to determine what actions will address the issues identified.
Initiate a Corrective Action depending upon the severity, frequency and importance of the nonconformity.

Quality Records

- Record of internal audit results
- Internal and external Quality Management System audit records

20 Annex A


Receive Order
1P – Order Receipt – Contract review
Identify – Communicate customer requirements (i.e. SP6 Blast)
Communicate to shop – record Required
Establish need for DFT's and C of C's – Documented A123/153
RFI's
Repair method established to ASTM A 780
Receive Fabricated Products (inspection and assure customer identification)
2P – Receiving Inspection SUGGESTED INSPECTION CHARACTERISTICS
Load subject to count/verification/damage
Inspect for proper venting/paint cleanliness
Inspect for paint markings that will be visible after galvanizing
Inspect for contamination
Inspect that pre-blast conditions meet contract/specification requirements
Black weight taken
Calibrated scales
Needs Work
Contact Customer for Venting Approval
3P – Customer Contact
Report missing/damaged goods
Request written OK to vent
Return to Vendor
Rework Compete
Needs no work
Products are racked
4P – Parts Racked SUGGESTED METHODOLOGY
Rack map and ID created to maintain identification
Products dipped in acid degreaser/caustic
*Required for Chemical Check
5P – Parts dipped in degreaser
Temp monitored (125 degrees F to 165 degrees F)
Daily frequency suggested
Acidity/Alkalinity/PH measurement
Pickle Tank
6P – Pickle tanks (acid)
Checked for Ph/Zn – FE (SUGGESTED frequency,daily)
Acid strength check 8-20% HCl, SUGGESTED frequency, weekly)
Sulphuric acid is suggested best at 160 degrees F 7-10%
HCL temp at 70 degrees F
Water Rinse
7P – Water Rinse
Record Required
Procedure Required
*Analytical Procedure
Pre-Flux Bath (zinc ammonium chloride)
8P – Preflux bath
Check for Baume' of 5-20 (specific gravity)—SUGGESTED frequency weekly
Method accurate to +- 190
Temp of 140-160 degrees F
*Nonconformance Procedure and nonconformance Record
reject
Hot Dip Zinc Bath
9P – Hot Dip Zinc
Check for Temp 825-845 degrees F SUGGESTED frequency, daily
Zinc analysis for purity (by others) (SUGGESTED frequency. Monthly
Quenching after bath prohibited
"dry" zinc bath prohibited
Post Dip Visual Inspection (VT)
10P – Visual to A123
Pre-determine if the customer prohibits a dry zinc bath
VT Results
For Galvanized surfaces that will be Duplex coated, prohibit any quenching after the zinc bath.
accept
Cool on the rack
Visual Inspection Touch up
11P – Touch up
I/A with A780 Annex A-1 or A-2
Dimensional check
Final Inspection
Inspect to A123
Calibration of DFT Gage to NIST Shims
Inspection records/CofC required
Re-pack and ship
12P – Re-pack – Ship
Silver weight taken when required by galvanizer's process