SQS

MnDOT Supplier Qualification Standard

Standard supports the Department's Approved Supplier Program for Structural Metals Suppliers as described in the current Standard Specification for Construction

Supplier Qualification Standard for Suppliers of Fabricated Structural Metal Products

Minnesota Department of Transportation
3485 Hadley Avenue North
Oakdale, MN 55128-3307

MnDOT Supplier Qualification Standard (SQS)

Documentation Requirements

FOR SUPPLIER QUALITY MANAGEMENT SYSTEMS

FOREWORD

This Standard was developed by the Minnesota Department of Transportation's Bridge Office Structural Metals Unit. This Standard supports the Departments Approved Supplier Program for Structural Metals Suppliers. The Standard has been uniquely developed to support suppliers in their effort to have a comprehensive, exhaustive, and fully implemented Quality Management System. To that end, this Standard will guide and facilitate a supplier to develop a Quality Plan with all the necessary elements for establishing a complete program. A supplier's own Quality Plan is the foundation of the MnDOT Approved Supplier Program.

MnDOT believes that an effectively implemented, regularly maintained, and regularly audited Quality Management System is a key indicator of a Supplier's ability to produce a quality product. MnDOT will accept products from Suppliers who demonstrate a proactive Quality Management System with procedures and processes that consistently deliver quality to their transportation customers. This is demonstrated and confirmed via successful performance based audits, and on-schedule delivery of product fully meeting plans and specifications.

The desire and intent behind the architecture of this program is that suppliers can and should improve their business through this program, and as their market and profitability improve, all transportation projects can benefit. Based on this premise, MnDOT encourages suppliers to utilize this Quality Management System as a business model for all work they produce for their customers.

By implementing the requirements of this Standard, transportation projects consistently can be produced and delivered with minimum error, deviations, and rework. This in turn improves quality for MnDOT and profitability for the supplier. A net win-win is the intended ultimate outcome.

Sincerely,

Todd L. Niemann, P.E.
Structural Metals and Bridge Inspection Engineer

I concur,

Ed Lutgen
Bridge Constructions and Maintenance Engineer

I concur,

Bev Farraher
State Bridge Engineer

Table of Contents

A. Requirements for Participation 3
B. Submission Requirements 3
C. MnDOT Approved Supplier List (ASL) 4
D. Audit Results 5
E. Corrective Action 5
F. Audit Termination 7
G. Fraudulent Documentation 7
H. Audit Schedule 7
I. Audit Team 7
1 General Information 8
2 MnDOT Metals Supplier Qualification Program Categories 9
3 References/Library 10
4 Section not used 10
5 Management Responsibility 11
6 Contract Review, Order Review and Project Management 13
7 Communication of Project Requirements 13
8 Control of Quality Documents 13
9 Control of Quality Records 14
10 Purchasing 17
11 Material Identification 19
12 Process Control 20
13 Inspection 20
14 Calibration 26
15 Nonconformance 28
16 Correction and Corrective Action 30
17 Handling, Storage, Delivery and Shipment of Product and Materials 32
18 Training 33
19 Internal Audit 33

Program Rules—MnDOT

A. Requirements for Participation

a. Regular onsite Quality Management System audits

Suppliers are required to submit their quality manual at least 30 calendar days before starting work unless the Supplier is already prequalified on MnDOT's Approved Suppler List (ASL) \as maintained by the Engineer.

Suppliers are assessed on a regular basis throughout their tenure on the Approved Supplier List. A Supplier is visited to establish the consistent functioning of the Quality Management System. Frequency may be adjusted depending on the number and nature of nonconformances that are found during the assessments. Typically, initial applicants are audited every six months. As the number and severity of nonconformances moves in a positive trend, the Program Manager may adjust the frequency to annual. Conversely, if the number and severity of nonconformances does not move in a positive trend, frequency may remain at six months or increase to three months or another frequency determined by the Program Manager.

MnDOT does not require that a Supplier has MnDOT work in process when the auditor visits. The auditor will sample from work from projects in-house to verify that the Supplier's system is implemented and followed. The Supplier's business should benefit from this examination.

MnDOT projects will be the focus if there are sufficient number in house at the time of the audit to sample all the elements of this standard.

b. Objective Evidence/Access Rule

The Supplier agrees to allow access to all projects active at the time of an audit that employ processes similar to those potentially used on MnDOT work. Auditors will assess the Supplier's control of quality and implementation of the Supplier's own procedures for conformance with project specification to demonstrate an effective system. Unique requirements of the MnDOT specifications or project special provisions will not be assessed on non MnDOT projects. Suppliers who refuse to schedule a visit, receive an auditor, or allow an auditor to review records and product from non-MnDOT projects may be removed from the ASL

Auditors and staff of any assessment firm contracted by MnDOT have confidentiality agreements on file with the organization and with MnDOT. There is no discussion of the auditor's work with other Suppliers unless the Supplier who is audited is in a contractual or managerial relationship with another Supplier. In this case, only the project or product requirements that are part of this relationship may be discussed.

B. Submission Requirements

a. Application

To apply for the MnDOT Supplier Program, submit a *Metals Supplier Qualification Program Application* available from the MnDOT Program Manager or in the appendix of this document

b. Initial QMS Documentation Submission

Upon entering the program, submit the *Metals Supplier Qualification Program Application* with your quality management system (QMS) documentation for review and assessment. For more detail on what must be addressed, see QMS Documentation later in this document.

For new applicants, a written documentation review and response will be completed within 30 days after receipt. The Supplier will have the opportunity to address any missing items or clarify documentation for the reviewing Auditor.

Submit the file in a searchable PDF format that is reasonably transmittable in the smallest file format possible If possible, submit the entire quality management system documentation in one PDF instead of submitting individual PDF documents.

As part of the quality documentation that covers the elements in this Supplier Qualification Standard, include at least one sample of the following records completed with sample data:

- Nonconformity form, record or log
- Correction Action activity form, record or log
- Purchase Order form other purchasing document that defines purchasing requirements for quality
- Inspection Record (one each as applicable to company processes of: dimensional check, coating, welding, NDE)
- Evidence of Contract Review or Order Review

Biographies and Job Descriptions

Include Biographies and Job Descriptions for key personnel as identified in the Supplier Organizational Chart, Including QC Inspectors.

Facility Plan and Equipment List

Include a Facility Plan and Equipment List of major equipment. Update and submit both when changes occur.

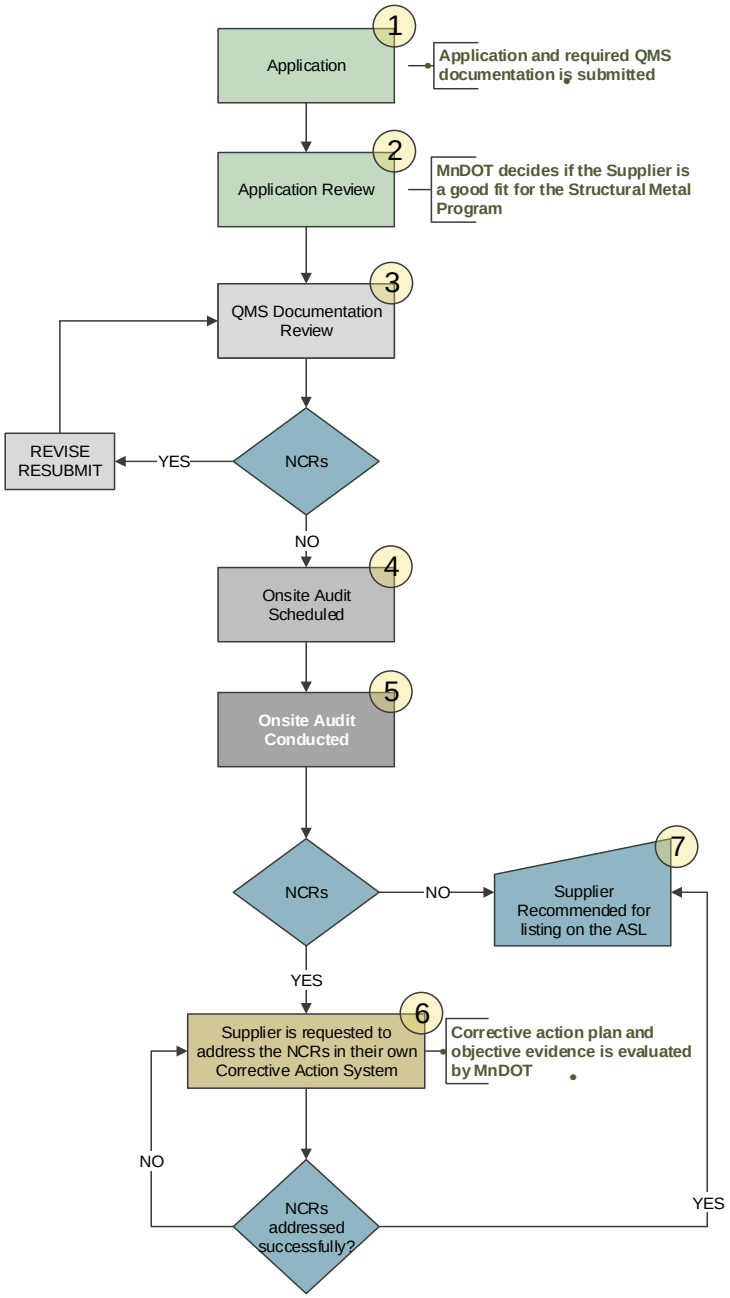

Figure 1 Application process-figure

PQR/WPS/WQTR compliance

If welding is part of the Supplier category, include the following, as applicable.

- Procedure Qualification Test Records, minimum one (1) for each process.
- Welding Procedure Specification, minimum one (1) for each process.
- Welder Qualification Test Record, minimum one (1) for each process.

QMS Documentation Updates

If major changes occur to the Quality Management System, submit QMS Documentation updates immediately for review, including any new forms and revised organizational charts. "Major changes" include: changes in key personnel; facility organization and major equipment; addition or reduction in types of fabrication, manufacturing or applications; addition or elimination of procedures covering a top level element of this Supplier Qualification Standard; losing or gaining key personnel or large layoffs; acquisition of additional facilities, etc.

If minor changes occur to the QMS, submit QMS Documentation updates at least annually for review. Assure that the MnDOT Program Manager has a current copy of the documentation no less than 30 days before a scheduled audit.

C. MnDOT Approved Supplier List (ASL)

All structural metals suppliers in the program are required to declare their scope of supply for MnDOT projects. Declaring this scope has a direct effect on the Supplier's listing on the *Approved Suppliers for Fabricated Structural Metals Products List (ASL)*. A sample is included as an appendix to this standard and can be accessed here: http://www.dot.state.mn.us/bridge/pdf/approvedsuppliers.pdf

Suppliers must declare which *MnDOT Metals Supplier Qualification Program Category(s)* that they wish to supply. This request is made in writing to MnDOT on the Supplier application form. Suppliers will not be allowed to supply categories of product for which they are not listed or audited.

The Supplier may apply to be listed for any of the Program Categories that the firm has the capability and expertise to provide. The criteria of the categories for which the supplier applies will be added to the scope of MnDOT document reviews and MnDOT audits. Contractors may only consider a Supplier for a MnDOT project if they are listed for the specified products and services.

If a Contractor chooses to select a Supplier who is not on the ASL for products or services to be supplied, the product/service will not be accepted on the project. Special arrangements may be granted in advance by the Engineer to qualify the Supplier before fabrication begins or the service begins. It is the Contractor's responsibility to obtain this consideration in advance and in writing from the Engineer.

a. Status on the ASL

The approval status of the Supplier will assist contractors in making selections for their upcoming projects. Depending on initial and continuing audit results, a Supplier may be listed on the Approved Supplier List as:

Approved: The Supplier can be selected for any work in the categories for which they are listed.

Approved Restricted: The Supplier can be selected for any work in the categories for which they are listed, however their performance in the qualification program has outstanding nonconformances that have not been resolved. The Supplier must hire third party inspection services to complete their product QC for MnDOT projects.

b. Initial Status

The audit of the Supplier's quality management system documentation must be successful to be placed on the ASL. All nonconformances identified by the MnDOT reviewer must be addressed satisfactorily to consider the documentation audit successful.

The functions typical of the category(s) must be underway for the onsite audit. If the applicant Supplier has no work in house, appropriate exercises or mock work will be determined for demonstration. Notification of a "no work situation" must be received at least 14 days before the scheduled onsite audit to allow for adequate preparation and planning for both the auditor and the Supplier.

An onsite audit can be scheduled within 14 days if project status is critical. All nonconformances identified during the onsite audit must be addressed satisfactorily to consider the onsite audit successful.

c. Maintaining ASL Status

Status on the ASL for the categories audited continues by maintaining a functioning quality management system and passing regular MnDOT audits as requested.

d. Loss of ASL status

Failure to address nonconformances in the time frames described in the Nonconformance Severity Chart or a significant number of critical nonconformances may result in loss of ASL.

e. Reinstatement

Contact the State Program Manager in writing to reapply for listing on the ASL. In order to resume active ASL status, any outstanding CARs from previous audits prior to removal must be fully resolved before the reapplication process can begin. A new set of quality management system documentation is required and an onsite audit to be listed again.

As determined by the State Program Manager, circumstances may warrant further demonstrated performance before reinstatement is considered.

f. Program Hiatus

Contact the State Program Manager in writing to voluntarily be removed from the ASL. In order to resume active ASL status, any outstanding CARs from previous audits prior to removal must be fully resolved before being granted active ASL status. A new set of quality management system documentation is required and an onsite audit to be listed again.

If the Supplier left the program under disciplinary status, that status continues during this reapplication process. A Supplier should plan 6-9 months to get reinstated working through this status.

D. Audit Results

The Program Manager will schedule an onsite audit to assure compliance with the program requirements

a. Successful Onsite Audits (Suppliers active on the ASL)

The results of the onsite audit are reviewed by the MnDOT Audit Program Manager.

A successful audit is when all elements of the quality management system are found compliant or commendable and systems are effective at controlling the quality of product. However, if there are any nonconformances found during the onsite audit, the audit can still be successful if they are addressed and closed in the time periods described in the Nonconformance Severity Chart.

Additionally, all previous requests for corrective action are closed. Closure is when the nonconformance is addressed by root cause analysis and an effective solution is implemented to prevent the condition from recurring.

b. Third Party Disciplinary

When the Supplier's performance has been unsatisfactory, MnDOT requires the Supplier hire a third party QC function. This additional cost is at the Supplier's expense. MnDOT requires that the third party representatives perform the QC functions and sign off on inspection records. This is an additional requirement. During this time, the Supplier must also continue performing and recording their regular inspection activities.

c. Factors in evaluating results

Nonconformances found across several elements of the quality management system may be considered more detrimental than the same number in only one area.

d. Status change in supply type

To request a change to supply type, complete a revised application form and QMS documentation and contact the State in writing a minimum of 30 days before a scheduled audit. The State will inform the Audit Function of a change to the audit scope and/or supply type.

E. Corrective Action

a. Corrective Action to Nonconformances

Nonconformances found during MnDOT audits require the Supplier to initiate corrective actions in their own system and share the plan with MnDOT. The Supplier must respond in writing with a formal plan to address the nonconformities cited. Include in the response the Supplier company name, the audit date, and the audit number. The Supplier's Quality

Management System forms or documents are used to document the nonconformance, correction, and corrective action within the time periods discussed below. This document must meet the minimum requirements for managing corrective action described in the Supplier Qualification Standard. It is used to communicate status and progress with the State.

MnDOT will manage the responses with input. The root cause of condition and actions to prevent a recurrence for all CARs are due within the time frames described in the Nonconformance Severity Chart. Timing begins when the Supplier receives the audit report from the State, or if a specific request is made by the Program Manager in writing (typical of critical nonconformances). Instructions to assist the Supplier in CAR closure will be left with the Supplier at the audit's conclusion

MnDOT may also require additional objective evidence of the effective implementation of the plan. MnDOT may grant a grace period of 15 days for extenuating circumstances on a case by case basis

Nonconformance Severity Chart

	Critical	Major	Minor
Definition	Issues which directly affect the quality and acceptability of the product, possibly leading to premature failure, excessive maintenance or diminished service life. This may include but is not limited to the use of defective material or consumables, unauthorized modifications or substitutions, practices violating code or specification requirements, falsification of any record, absence of proper documentation for critical items, and unqualified individuals performing critical tasks.	Issues related to the Quality System, which directly or indirectly affect production dependability and consistency, potentially leading to reductions in product performance, product and reliability. These nonconformances could result in schedule delays, repairs, and shortened service life. This may include but is not limited to employee ability, missing procedures, poor equipment condition, material quality, drawing accuracy, vendor services, and supervision.	Issues related to documentation shortcomings, or other minor infractions within the system application that are not expected to cause multiple nonconformities or significant product deficiencies in current or future projects. This may include but is not limited to insufficient calibration, inadequate training, specification not current, missing procedure steps and some illegible identification.
Supplier response	Immediate correction ▪ Written response on correction of the project specific nonconformance as soon as possible but within 7 calendar days. Provide objective evidence of the correction within 7 days. ▪ Create CAR and respond to the NC within 10 days after issue. (Add correction information to the CAR). Complete root cause analysis and determine actions to prevent occurrence, and provide objective evidence within 14 days ▪ Potential revisit within 21 days ▪ Immediately implement 100% inspection of that product/component/process for the remainder of the project. ▪ If directed by MnDOT, create a hold point for product/process within the project quality plan or a quality procedure and submit to MnDOT. If the NC is system related, ▪ An updated/new procedure and QM will be required to show how the system will be modified to resolve the issues. ▪ A full system internal audit must be completed with records of results. ▪ A monthly internal audit focused on that element must be completed with records of results. ▪ Records to be submitted after every audit.	Response to NC due in 30 days, closure by 45 days For the disposition of **Major** NCs, forward objective evidence to support Supplier's CAR closure to the MnDOT Program Manager and the Audit Function within 60 days of the receipt of the audit report from the state.	Response due in 45 days, closure by 60 days For the disposition of **Minor** NCs, forward objective evidence to support Supplier's CAR closure to the Audit Function before the next scheduled audit. A minimum of three months in advance of the next onsite audit is preferred to assure any ambiguities observed in the Suppliers CAR response are taken into consideration and addressed prior to the next scheduled audit.
MnDOT action	The MnDOT program manager is informed and work on current MnDOT may be halted. If verification at next audit is not successful: ▪ Supplier may be removed from the ASL ▪ Third Party Disciplinary action is required. ▪ Supplier will be listed as "At Risk Supplier" on the ASL, with no future additional project negotiations until resolution.	MnDOT reviews Supplier's CAR and may accept the plan and the CAR is considered conditionally closed. The plan is verified at the next audit when Supplier is expected to close their CAR successfully. Unsuccessful closure may result in a listing as an At Risk Supplier" on the ASL and Third Party Disciplinary action may be required.	Minor NCs that remain open more than two audit cycles are moved to major status
Audit action	Auditor calls the MnDOT Program Manager and follows up with a confirmation email within 24 hours. Alternately, the call can go to one of the QAIs assigned to that Supplier.	Record on audit report	▪ Record on audit report

Figure 2 MnDOT CAR severity rating and actions
Note: the severity and frequency of nonconformances may affect the classification of the item.

The Audit Function further verifies formal closure of the CARs in subsequent audits. A failure to adequately respond to or close a CAR in the allotted time will result in further disciplinary action inducing a change or removal form MnDOT's Approved Supplier List which will prevent the Supplier's participation in State projects.

b. CARs Remaining Open Past 2 cylces

If a Corrective Action Request for Audit nonconformities remains open past two cycles, the supplier will be subject to disciplinary action as defined by the State.

F. Audit Termination

The Auditor may terminate the Audit immediately for the following reasons:

(1) Safety

(2) Refusal of access to product or documentation, including non MnDOT work.

G. Fraudulent Documentation

Fraudulent Documentation does not demonstrate a commitment to quality on the part of the Supplier. The auditor investigates information surrounding the record in question to support the observation of Fraudulent Documentation. The Supplier is given every opportunity to acknowledge that the documentation is either erroneous or fraudulent. When documentation is clearly verified as fraudulent beyond a reasonable doubt, the audit is terminated immediately. The auditor reports the event to MnDOT and the Audit Function.

H. Audit Schedule

a. Audit Schedule

The Audit Function communicates the audit dates and schedule to the Supplier via email. Respond to the email in a timely fashion, usually within three business days, acknowledging the dates assigned. In case of a conflict with the assigned dates or schedule, contact the Audit Function. Failure to respond to the notice or phone calls may be cause for removal from the ASL.

b. Audit cancellation

By the Audit Function

Occasionally, circumstances beyond the Audit Function's control will occur, the audit may not proceed as planned. In such case the Audit Function notifies the supplier. Then audit is rescheduled for a mutually agreed date.

By the Supplier

Audit dates and schedules are assigned by the Audit Function to maximize geographic groupings of Suppliers while maintaining the overall audit schedule for the benefit of suppliers as a whole. A supplier's Quality Management System does not stop functioning when key personnel are not available; therefore a limited number of missing key personnel is not cause to cancel an audit.

In the event the dates do not work for the Supplier, the Audit Function assesses the reason and reschedules the audit if deemed appropriate on a case by case basis.

I. Audit Team

Occasionally, the Audit Function may assign multiple personnel to assess a Supplier for various reasons:

- Size of facility
- Training of Audit Function personnel
- Observation of the Audit Process
- Complexity of Supplier QMS.

In the event the Audit Function assigns multiple personnel, every effort is made to minimize any impact on the Supplier's day-to-day operations.

1 General Information

1.1 Purpose and Scope

The purpose of this Standard is to outline the criteria for qualification to the Minnesota Department of Transportation (MnDOT) Metals Supplier Qualification Program. It is the philosophy of the Owner that a well-designed, implemented, and maintained Quality Management System is a predictor of product quality and project success.

MnDOT is interested in using Suppliers who maintain a Quality Management System for controlling their transportation sector business. Suppliers who meet industry standards and the contract requirements of all of their transportation agency customers are the best choice to insure quality delivery of MnDOT projects.

MnDOT expects higher quality from suppliers who run their business in a consistent, controlled, sustainable way for all of their transportation clients and in accordance with a written Quality Management System

The general Quality Management System requirements described in this Standard are required of all Suppliers in the Metals Supplier Qualification Program for all work on MnDOT projects. Suppliers in the Metals Supplier Qualification Program are listed on the *MnDOT Approved Suppliers for Fabricated Structural Metals Products List*.

1.2 Entities

For the purposes of this standard, the Supplier is a firm accepted by the MnDOT certification program that supplies finished materials, services and/or purchased products. The term Vendor used here refers to a manufacturer or service provider to the Supplier. The term Subcontractor used here refers to a firm that performs tasks related to structural metals that the Supplier might perform themselves if personnel and capacity permit, including, but not limited, to:

- fabrication that includes assembly by welding or bolting;
- detailing
- cleaning and/or coating
- inspection
- Specialty services, including stress relief and bending
- Consultation

The Minnesota Department of Transportation (MnDOT) is the owner of the bridge product and is referred to as **MnDOT**. Note: This requirements of this specification may be invoked by other owners of bridge products such as a county, or municipality, or other state department in the State of Minnesota for their own projects and purposes.

The terms **Owner** or **Agency** refers collectively to the end purchaser of transportation industry products and services.

1.3 Language used in this Supplier Qualification Standard (SQS)

In an effort to increase understanding, this document deviates from the traditional style used by other industries. Where other standards say "The supplier shall…" and "The fabricator must…", this standard is written in the active voice and uses active verbs (describe, require, list, use, assure, identify, plan, control, choose, etc.) to denote requirements in a supplier's Quality Management System Documentation.

Recommended practices that are not requirements are rare, but some are included here. Where the traditional standard writing style may read "The supplier should…" this standard begins recommendations with "Consider…"

Everything in this standard is required unless specifically noted as a consideration or unless noted as a requirement specific only to a category.

The Standard uses an active voice to denote requirements and recommendations compel firms to pursue the requirements actively. "Shall" and "should" is replaced with a clear directive.

1.4 Definitions

Where specific Definitions are necessary they appear in this section or in the section to which it relates. All efforts have been made to explain and define requirements clearly in a single location in the documentation.

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

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

Supplier—Capitalized in this Standard, the term refers to the fabricator, manufacturer, galvanizer or painter who possesses or is seeking certification by MnDOT to provide products and services to the State. Suppliers are listed on the ASL based upon successful initial and regularly scheduled audits.

Engineer—The MnDOT manager, project engineer or Materials Engineer with authority to approve project notifications, accept deviations to product requirements or otherwise make judgments on the technical and quality aspects of products and services.

1.5 Lists

Specific lists and requirements are included throughout this document. They should be considered typical for the subjects that they address. However, they should not be

considered all-inclusive and comprehensive for all project conditions and requirements. It is the Supplier's responsibility to determine all that is necessary in their firm to meet project requirements per contract plans and specifications.

1.6 QMS Documentation

Suppliers must document their quality management system. Documentation can be in a suitable form that addresses the requirements of this Standard for transportation projects. It may be a single quality manual, a combination of a quality manual, procedures, and work instructions, flow charts or other method appropriate for the Supplier's organization.

Regular and successful Quality Management System audits of the implementation of this documentation by the Department are a required element of this program.

1.6.1 What must be documented?

When the term ***procedure*** or ***work instruction*** or ***"written"*** is used in reference to a requirement is used in this Supplier Qualification Standard, it must be documented graphically or in writing and may be in hard copy, electronic or both but is available and properly controlled.

1.6.2 What do I include?

All applicable requirements described in this Standard are required in your quality management system for compliance to the Supplier Qualification Standard. However you do not need to include a requirement, if the process is not part of the product you produce

Example: a bridge component supplier who manufacturers metal bearings that include elastomeric pads as a purchased part for their product, does not need to address the vulcanizing process.

Example: if you are a contract painter or galvanizer where welding is not part of your business product or service, you do not need to address how welding consumables are purchased.

A good start is to look at the table of contents of this document (elements five through 19) to understand the subjects that you will need to address at a minimum.

1.7 MnDOT specific requirements

MnDOT specific requirements are identified in this Standard. The source of these requirements is the MnDOT Standard Specification for Construction, special provisions, and generally accepted Quality Management System practices that MnDOT has observed as beneficial and successful in assuring the quality of transportation projects.

MnDOT-specific requirements are highlighted throughout the document.

1.8 Other Industry programs

The requirements of other industry certifications are assumed to be included in the scope of this program when that industry certification program is required by *The Minnesota Department of Transportation: Standard Specifications for Construction* (current revision) for the products or services a Supplier provides. Some organizations' programs that may be required are from AISC (American Institute of Steel Construction) and SSPC (Society for Protective Coatings.)

1.9 Unique requirements for some Suppliers

Most sections of this Standard apply to all MnDOT Supplier Categories. Occasionally, partial elements of this standard require more specific requirements for just those suppliers. They are highlighted and labeled.

1.10 Supplements

Complete requirements that are unique to a Supplier Category are found in these supplier-specific sections:

- Section 6: Contract Review/Order Review
- Section 7: Communicating Project Requirements to Production
- Section 11: Material Identification
- Section 12: Fabrication/Manufacturing/Application Process Control

The supplements required for each MnDOT Supplier Category are listed below. If you qualify for multiple categories, use each appropriate Supplement:

Suppliers of Metals Projects who are Bridge Fabricators or Ancillary Product Manufacturers

Requirements included in this Standard and Supplement A

Suppliers of Projects with Fracture Critical Members

Requirements included in this Standard and Supplement A

Complex Coatings Application Suppliers—Shop Applied

Requirements included in this Standard and Supplement B, Requirements for blasting (done by shops that do painting and blasting or only supply blasting services) is covered in Supplement BB

Galvanizing Suppliers

Requirements included in this Standard and Supplement C

Elastomeric Pad Manufacturers

Requirements included in this Standard and Supplement D

2 MnDOT Metals Supplier Qualification Program Categories

The descriptions and example provided for each category are general in nature and subject to engineering judgment. The contract may alter or adjust the required category for a particular product or project.

MnDOT-specific requirement

These Program Categories are important to the Supplier in several ways.

- The categories will be used in the MnDOT Approved Supplier list which will be a requirement for Contractors selection for transportation construction projects.
- Requirements to achieve compliance for a specific category are described in this standard.

Major Structural Components

(Major structural components are covered by Supplement A, Bridge Fabricators and Minor Structural Component Manufacturers.)

Advanced Bridges

- Any project requiring full or partial assembly
- Curved Steel Bridges (Including Diaphragms)
- Tubs/Boxes
- Arches
- Trusses
- Movable Bridges
- Bridges with Fracture Critical Members
- Complex or Special Bridge types.

Intermediate Bridges

- Vehicular Bridges - Projects greater than 300,000 lbs
- Uncurved Rolled Beam or I girder

Simple Bridges

- Vehicular Bridges - Projects less than 300,000 lbs.

Minor Structural Components

(Minor structural components are covered by Supplement A, Bridge Fabricators and Minor Structural Component Manufacturers.)

Pedestrian Bridges

Highmast Lighting Systems

Signs Structures (overhead and bridge-mounted), Signal Structures (monotube or other non-standard structure)

Miscellaneous Components

- Drainage Systems
- Standard Bearing Assemblies (curved Plate)
- Sole Plates
- Railing (ornamental)
- Fencing
- Conduit systems
- Protection angles
- Piling and appurtenances
- Diaphragms (non-curved bridges)
- Ballast Plates
- Shear connectors
- Expansion Joint Devices (strip seal)
- Guardrail Connections
- Electric lighting
- Traffic signs
- Signal systems

Pot Bearing (spherical bearings)

Crash railing

Modular Expansion devices

Complex Coatings Application Suppliers—Shop Applied

(Shop Coating services are covered by Supplement B, Shop Application of Complex Coatings.)

Shop coating services

Blasting

(Blasting Services are covered by Supplement BB, Suppliers of Blasting Services for Complex Coatings Blasting.)

Galvanizing Suppliers

(Galvanizing Services are covered by Supplement C, Galvanizers.)

Galvanizing Services

Elastomeric Pad Manufacturers

(Elastomeric Pad Manufacturing is covered by Supplement D, Elastomeric Pad Manufacturers.)

Non-Metal Bearing (Elastomeric or Cotton Duck or Teflon)

3 References/Library

This section of the MnDOT Supplier Qualification Standard is broken up into Supplier Category Specific Supplements.

A reference library is an important part of all MnDOT Supplier's Quality Management Systems. However, the required references of each MnDOT Supplier Category differ greatly. To reduce confusion, each Supplier Category has its own References/Library section detailed in its own Category-Specific Supplement.

Find detailed in the MnDOT SQS Supplements the requirements for topics including:

- Identification of Base Material
- Traceability
- Product Identification

Assure compliance with References/Library requirements for each applicable Supplier Category.

Find specific References for your relevant supplier categories in the following MnDOT Supplier Qualification Standard Supplements:

- Bridge Fabricators and Minor Structural Component Manufacturers – Supplement A
- Contract Painters and Shop Application of Complex Coatings – Supplement B
- Blasters– Supplement BB
- Galvanizers – Supplement C
- Elastomeric Pad Manufacturers – Supplement D

4 Section not used

5 Management Responsibility

The Supplier'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. Executive Management is defined as the CEO, President, or other individual who is responsible for overseeing the Quality Management System (QMS) and who has full authority in final decision making for all aspects of the Quality Management System. This individual is identified in the organizational chart or other method in the quality management system documentation.

The position must be structured so that quality personnel have a means or access to communicate issues that are affecting quality. This individual will assure that there are reporting systems that inform them regularly of the functioning of the quality management system, especially of the results of external assessments and customer feedback.

5.1 Policy and Goals

5.1.1 Quality Policy

Document in the Quality Management System Document a quality policy statement that defines the organization's commitment to deliver the final product or service in compliance with the contract documents, applicable codes and standards, and the Supplier's own Quality Management System.

5.1.2 Performance Indicators

Establish goals related to transportation project quality to continually demonstrate the effectiveness of the Supplier's Quality Management System. Oversee the creation of the 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 project.

Clearly describe the current achievement level and actions that are ongoing to address indicators that are not performing to a planned target. It is not required that the current Performance Indicators are described in the Quality Management System Documentation.

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

2. **Schedule status/Delivery**

Create controls for the scheduling process. Include the methods to address threats to the schedule, actions to mitigate, and how threats appear early in the process.

Include damage controls and schedule recovery plans that are devised and implemented at an early point in the schedule when indicators of potential problems are noted. Require that an effective counter measures are taken.

Develop an active scheduling process program that is readily accessible to key project management.

Track and measure project status in terms of days or hours behind and days or hours ahead of schedule against planned milestones. Evaluate the impact to customer schedule and focus on factors that are the major contributor to either positive or negative performance. Report to the customer missed milestones that impact customer schedule as soon as they are known in order to foster a collaborative effort and project focus.

Milestones in this metric may include:

- Completion of contract review process prior to project kickoff
- Purchasing material and material receipt (example: Dates material Purchase Orders submitted and dates material received and inventoried)
- Projected and actual dates for Shop drawing completion, review, submission, approval and release for production fabrication start against plan
- Projected and actual Production status milestones against plan (i.e. burning, fitting, welding, drilling, assembly, coating)
- Projected and actual dates for delivery dates to the field against plan

3. **Product quality**

Product quality is a measure of producing the physical product as specified in contract documents.

Define critical, significant, and systematic nonconformances within the nonconformance tracking system. Correlate these nonconformances to the functional area of fabrication/manufacturing (burning, fitting, welding, drilling, assembly, coating, etc.)

Track product nonconformances. Review them weekly at the QC management level and every other month at the executive management level at a minimum. Establish a target levels for frequency, recurrence, effects on critical schedule and cost where corrective actions are automatically invoked and management is notified and immediately in critical situations.

Example: Compare monthly rework and rejections by product type, deficiency, cause, shop or field discovery, time and cost for replacement or rework, and back charges by contractors. Evaluate alternates of product redesign, process changes, type and timing of NDE, employee training and frequency of QC oversight. Enact changes and monitor their effect on product quality.

Undersized weld repair, paint mud cracking, measure these as examples.

4. Customer Service

Address the relationship between MnDOT, MnDOT inspectors, and the Contractor.

Establish a method and measurement of customer relationship management. Show evidence of an active, documented plan to initiate and establish actions, conventions, communication, and program to proactively address issues.

Include a plan for communications with MnDOT and their onsite representatives. Show evidence of proactively preventing or addressing issues before they are a problem affecting quality or schedule. This should include the project service items of documentation, submittals and responsiveness to customer questions

Example: Document production and delivery delays due to material receipt, equipment, or labor problems, and their effect on the customer service metric. After reviewing the delays and causes, develop steps to avoid the problem through changes in material suppliers, equipment modifications or personnel training and supervision. Review effects of the changes internally and with customers, and establish further improvements.

Note: Categorize complaints, track and measure trends across customers and project types. Examples include formal issues that are documented from the customer or gained in formal project close out reviews. They are also a collection in any form. Complaints may be collected during a conference call, as a frustration expressed during a customer inspection on the production floor or on the erection site.
Don't rely on waiting for formal written communication from clients in an organized format. Accept commentary from multiple levels in yours and the client's organization.

5. Staffing

Address appropriate numbers, coverage, experience and capabilities of staffing to meet product quality requirements. Management will assess if this is a factor when product quality and planned inspections are not completed on time or to requirements.

Corrective actions must be evident to address deficiencies when staffing is a contributing root cause to identified nonconformances.

There must be evidence of a periodic evaluation of the level of staff knowledge, skill and ability for effectiveness. Managers may use elements of tenure or experience, but the evaluation must ultimately be results driven. If nonconformances are trending negatively in a specific process, document if training or staff reassignment is selected to address it.

6. Business Performance

Track other supplier-identified performance indicators as deemed important for the delivery of products meeting contract requirements for quality, function and schedule.

Any Supplier indicated performance indicators will be tracked.

5.2 Qualification of Personnel Performing Processes

Vulcanizers must be qualified to perform their duties and the associated, required documentation. Qualification can be gained on the job with experienced supervision. Determine the minimum requirements in time and specific capability. The Supplier's requirements may be satisfied by experienced senior personnel documenting the training and experience of their assigned workers under their supervision.

5.3 Quality Management System review

Require, at minimum, an annual review of the Quality Management System by Executive Management. Include in the review plan consideration for a higher frequency of reviews based on project cycles, project criticality, and Quality Management System performance levels. Describe the record of this review.

Maintain records of the management review for a minimum of two cycles. The record of the review must address:

- Changes or additions to the Quality Management System.
- Actions taken concerning:
  - Audit results both external audits and internal audits
  - Customer feedback
  - Product and process nonconformances (summaries from the activity in Clause 15 of this Standard)
  - Information from previous management reviews
  - Corrective action system
- Performance Indicator Summary or report of key performance indicators on all current and completed transportation projects since the previous management review. Include the review and discussion on how the Supplier conducted resolution and follow-up on issues related to:
  - Performance on schedules
  - problems during fabrication
  - Field/delivery/erection problems
  - Monetary claims from customers

5.4 Management Representation

Identify the management representation responsible for the implementation and success of the Quality Management System for transportation projects. Ensure that the system is reviewed and procedures are established, implemented, and maintained.

MnDOT Specific Requirement

Identify Three Key functions:

- Operational Contact for outside inspectors and who manages the daily operation of the Quality Management System.
- Manager with the ability to effect changes in the Quality Management System and authorize actions to address Quality Management System issues.
- Manager with the ability to effect changes in production operation to achieve performance goals.

Assure the executive manager is at a level in the organization to effect practice and process throughout the organization and at a knowledge level that can see the full picture of the customer experience. The operational contact can be the same person or a separate individual with responsibilities closer to daily production functions.

5.5 Approval

Show approval by the Executive Manager responsible for the operation of the facility.

5.6 Quality Records

- Performance indicators document
- Customer Service Metric
- Product quality metric
- Management review
- Quality Management System Documentation Review

6 Contract Review, Order Review and Project Management

The requirements of this section of the MnDOT Supplier Qualification Standard are addressed in each Supplier Category Specific Supplements.

Contract Review/Order Review is an important part of each MnDOT Supplier's Quality Management System, but requirements for product types differ greatly. To reduce confusion, each Supplier Category has its own Contract Review or Order Review section detailed in a Category-Specific Supplement for topics including:

- Contract/Order Review Records
- Pre-Fabrication/Pre-Production/ Pre-Process meetings
- Production Schedules and Production Planning

Find specific Contract Review or Order Review requirements for your Supplier Category(s) are in these MnDOT Supplier Qualification Standard Supplements:

(1) Bridge Fabricators and Minor Structural Component Manufacturers – Supplement A

(2) Blasting-Shop and Field – Supplement BB

(3) Contract Painters and Shop Application of Complex Coatings – Supplement B

(4) Galvanizers – Supplement C

(5) Elastomeric Pad Manufacturers – Supplement D

7 Communication of Project Requirements

This requirements of this section of the MnDOT Supplier Qualification Standard are addressed in each Supplier Category Specific Supplements.

Communication of Project Requirements, an important part of each MnDOT Supplier's Quality Management System, differs greatly among categories; Bridge Fabricators have detailing requirements while Galvanizers convey pre and post-coating requirements. To reduce confusion, each Supplier Category has its own Communication of Project Requirements section detailed in its own Category-Specific Supplement.

Specific Contract Review requirements for your Supplier Category(s) are in these MnDOT Supplier Qualification Standard Supplements:

- Bridge Fabricators and Minor Structural Component Manufacturers – Supplement A
- Blasting – Supplement BB
- Contract Painters and Shop Application of Complex Coatings – Supplement B
- Galvanizers – Supplement C
- Elastomeric Pad Manufacturers – Supplement D

8 Control of Quality Documents

Develop, document, and implement an effective procedure to control documents and data affecting the quality and conformance of the processes and products.

The document control system addresses the Quality Management System Documentation and customer contracts and communications. Drawings, procedures and work instructions are examples of quality management system documentation.

8.1 Access

Describe how Quality Documents and Quality Records are readily available to personnel who have responsibility in the quality management system.

8.2 Identification

Describe how each quality document is identified so that it is used properly by the right personnel.

MnDOT Specific Requirement

Include the following on the cover of the Quality Management System Documentation submitted to MnDOT:

- Current revision by date
- Name of supplier
- Address of supplier
- Location of supplier
- Contact of supplier
- Email of supplier
- Phone of supplier

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 the procedure or in the section of the Quality Management System Documentation where they are discussed.

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, and records and other project correspondence are controlled and distributed outside of the company using transmittal systems. 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 Supplier'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 Control of Quality Records

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

Retain project quality records for at least the contract required duration (seven years for MnDOT projects) after project completion unless a longer duration is otherwise specified in the Supplier's Quality Management System.

Retain other quality records that are not project specific as defined by the Supplier or as specifically noted in this Standard.

Control blank forms with a revision date. Require that a Management Representative controls 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.

9.1 Purchasing data submittal

MnDOT-Specific requirement

Submit purchase orders and MTRs to the Engineer for review prior to incorporation of material into fabrication of a main member at a minimum. Describe how this is recorded in the transmittal system.

9.2 Certificate of Compliance submittals

MnDOT-Specific Requirement

Certificates of Compliance are required for all MnDOT work. A full documentation package is also required to accompany the certificate of conformance for most components unless specifically exempt by the Engineer or listed in this clause.

Describe the process for how these documents are created, the responsibilities for providing information and the final format that will be used to satisfy this requirement for product.

Include a Statement that certifies the product provided by the Supplier was fabricated, manufactured and/or coated to the project contract documents. Declare compliance to specific project documents and requirements. List the documents for which compliance is claimed. These may include, as appropriate for the product, excerpts from:

- Approved shop/installation drawings
- Design Plan,
- MnDOT Specifications,
- MnDOT Special Provisions, and the
- Supplier's own Quality Management System manual, and
- And any referenced Codes and Standards

9.2.1 Certificate of Compliance format

The Certificate of Compliance format includes these items as applicable to the product at a minimum:

- Name and address of the Supplier
- Bridge #
- Project ID#
- Product description and or part numbers
- Product quantity
- Statement of Material compliance (list specifications that define compliance (e.g. ASTM A 709 Gr. 50WT3))

- Statement of Fabrication/Manufacturing Compliance with contract specifications
- Nondestructive Testing (NDT) (List the percentage done and generally the materials or joints examined. Include performance test procedures as would be required for elastomeric pads)
- A Statement that the project quality records are retained and retrievable for seven years after the completion of the project.
- A Statement of the source of supply. If the contract is a Federal aid project, domestic steel material is required. (Provide Mill Test Reports (MTRs) for Federal aid projects to document that the steel was melted and manufactured in the U.S.A.)
- A statement of adherence to the Supplier's quality system as documented in their submitted quality manual and procedures.

Close the certificate with a date and authorized signature to attest to the information on the certificate.

9.2.2 Certificate of compliance for minor components

A Certificate of Compliance alone (without a full documentation package) is an acceptable submission for these minor components

- Bearings (other than below)
- Sole plates
- Expansion devices (other than as listed below)
- Ballast plates
- Drainage systems
- Stairs, ladders and walkways
- Conduit systems
- Fencing and railing
- Guardrail
- Piling
- Protection angles
- Diaphragms on pre-stressed girders
- Bent plate diaphragms
- Lighting
- Signs (other than listed below)
- signal systems (other than listed below)

9.2.3 Certificate of Compliance for Minor Components—Special

A Certificate of Compliance alone is not an acceptable submission for these special minor components. For these components, a Certificate of Compliance is required and the Supplier must also submit a full documentation package.

- Pedestrian bridges,
- Post and truss chord materials for traffic signs,
- High mast light poles,
- Modular expansion devices,
- Pot bearings, HLMR bearings and
- Other items designated by the Engineer.

9.3 Project Management and Quality Records

9.3.1 Management Responsibility

- Performance indicators document
- Customer Service Metric
- Product quality metric
- Management review
- Quality Management System Documentation Review

9.3.2 Bridge – Contract Review

- Contract review record.
- Minutes of pre-fabrication meetings
- Schedules
- Contract Clarifications
- Design change records, including contract construction changes and addendums

9.3.3 Painter – Contract Review

- Contract review record.
- Schedules
- Contract Clarifications

9.3.4 Galvanizer Order Review

- Order review record

9.3.5 Elastomeric Pad Contract Review

- Contract review record
- Contract Clarifications from RFIs or other communication from the customer.
- Design change records, including contract construction changes and addendums

9.3.6 Bridge – Detailing and Communication of Project Requirements

- RFIs
- Customer correspondence
- Communication record/log
- As built drawings
- Schedules
- Shop and erection drawings
  - Checked copy
  - Approved copy
- New Project Administrative checklist
- PM System logs
  - RFI
  - Drawing logs
  - Contract document logs
- Detailed plans showing the dimensions and sizes of materials,
- Details and information necessary for fabrication,
- Fastener lists for shop and field erection,
- Blocking and camber diagrams,
- Match marking diagram,
- Radiographic diagram showing weld locations and identification
- Complete field erection plan showing piece marks, and
- All dimensions as measured in the field for projects that supply existing structures
- WPSs and PQRs covering the work

9.3.7 Elastomeric Pads

- Schedules
- Supplier provided design calculations
- Approval Submittals
- Shop drawings and/or cut sheets

9.3.8 Purchasing

- Purchase Orders
- Subcontractor waiver from customer
- AVL or similar listing and a record of review
- Subcontractor and supplier qualifications and evaluation.
- Certification records of subcontractors

9.3.9 Bridge – Material ID

- Supplier bill-of-lading, purchasing documents.
- Certificates of conformance
- Material Test Reports (MTR)
- Plates and shapes
- Welding consumables
- High strength Bolts

9.3.10 Elastomeric Pad – Material ID

- Purchasing documents
- Shipping/Receiving Records
- MTRs / Certificates of Conformance / Testing Records
- Customer notification

9.3.11 Bridge – Welding Process Control

- Welding Procedure Specification (WPS)
- Procedure Qualification Record (PQR)
- parameter worksheet – amps, volts, travel speed/pass locations
- CMTR of the base materials and any backing material,
- certificate of conformance for filler materials (and flux), and
- Records of destructive and nondestructive tests.
- Record of the tack consumption test
- Record the testing lab used and their A2LA lab certification.
- Welder and Weld Operator Qualification Test Records (WQTR)
- Welder qualification maintenance(Roster, Log)
- Weld nonconformance records
- Weld repair procedures
- Radiographs, if retained by the fabricator rather than the owner

9.3.12 Bridge – Bolting Process Control

- Pre-installation Bolt Testing Records
- Rotational Capacity Test Record.
- PIV
- Certificates of conformance (for fastener assembly components)
- Calibration certificates of conformance for bolt tension calibrator

9.3.13 Blasters – Blasting Process Control

- Surface preparation records, including profile measurement and replica tapes on reports
- Training records for blasters, and inspectors
- Records of compressed air and blast media checks

9.3.14 Painters – Panting Process Control

- Certificate of Conformance for system components
- Coating manufacturers' product data sheets
- Surface preparation records including progile measurement and replica tapes on report
- Application Records
- Training records for blasters, applicators and inspectors.
- Coatings in-process and final inspection
- Records of compressed air

9.3.15 Galvanizers – Galvanizing Process Control

- Supplier bill-of-lading, purchasing documents.
- MTRs
- Certificates of conformance
- Certificates of Analysis
- Router/traveler/ticket
- Surface preparation documentation

9.3.16 Elastomeric Pads – Process Control

- Surface preparation and application records for shims and other inserts
- Load tests records for proof and max load tests
- Material Mix Batch Records
- Curing/Vulcanizing Records
- Maintenance Logs
- Inspection Records

9.3.17 Inspection applicable to the product

- Delivery documentation
- MTR
- Certificate of conformance
- receiving copy of the purchasing information
- Purchase Order
- Final inspection record
- Training records of final inspectors.
- Record of qualification of QC personnel

9.3.18 Calibration

- Calibration certificates of conformance
- Calibration Log/Record

9.3.19 Nonconformance

- Nonconformance log
- Nonconformance report
- Management review of nonconformances (management review record)
- Repair inspections records (inspection procedure)
- Corrective Action Records (corrective action procedure)
- MnDOT specific Nonconformance Report

9.3.20 Correction and Corrective Action Records

- Corrective Action Records
- Summary of corrective actions for management review

9.3.21 Training

- Training records
- Training records of final inspectors
- Training records of fracture critical inspectors

9.3.22 Internal Audit

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

10 Purchasing

Develop, document, and implement an effective procedure to define and document purchasing requirements. Ensure that all purchased products, materials, services and subcontractors that have a direct impact on quality conform to project requirements. This procedure applies to all products and services provided for transportation projects covered by the MnDOT Metals Supplier Qualification Program Categories.

10.1 Purchasing Data

Develop and use a document that functions as a purchasing agreement and notice to the vendor for materials included in the product, and for services that affect 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.

Purchasing documents address the following items when applicable to the Supplier's operation:

a. Raw materials (plate, rolled shapes, tubes, sheet, etc.)
b. Engineering services
c. Fabrication Services such as blasting, coating, stress relieving, plate rolling and bending, heat treating, machining and other services.
d. Detailing services
e. High Strength Fasteners
f. Fasteners (other than high strength)
g. Blast cleaning and Coating supplies
h. Inspection services including non-destructive testing, welder or procedure qualification, and survey by conventional and laser methods.
i. Material testing services
j. Weld consumables
k. Fracture Critical steel and welding consumables
l. CVN requirements for the appropriate zone
m. Source of supply and quality

Describe the method and responsibility to assure that the full requirements of each contract are accurately included in the purchasing document.

This includes the use of "blanket" purchasing documents that are used to cover multiple shipments against an order over an extended time period.

10.1.1 Steel, Aluminum, Stainless Steel Purchasing Data

Request enough information in Certificates of Conformance, original markings, and mill test reports to create a traceability program that positively identifies all products supplied.

Bridge Fabricators & Minor Structural Component Manufacturers

Require at a minimum:

- ASTM or AASHTO material, grade, finish or class,
- Required physical properties and chemistry
- Manufacturer and country where melted and manufactured. Projects with federal aid require steel to be melted and manufactured in the USA.
- Record serial numbers on the Material Assignment Sheets covering each Fracture Critical Member.

Identify and describe in the procedure:

- The methods, records and personnel positions responsible for timely transmittals
- How this information is furnished to the Engineer before fabrication or manufacturing begins.
- How records clearly demonstrate that the material meets the physical, chemical and source requirements of the contract.
- The responsibility and methods to perform further testing or obtain the required information if the documentation is found to be incomplete.
- The responsibility and methods to provide scale weights of individual members or sections.
- The method and responsibility for verifying MTRs are compliant with the applicable specification. The cataloging, filing and storage of the MTRs and other supporting documentation.

MnDOT-Specific Requirement

Include a procedure that requires written notation or a stamp on the filed MTR verifying review and acceptance by the Supplier. Describe how the record includes the individual and date of inspection.

Address steel Purchase Orders for materials, including requiring Certified MTRs to attest "melted and manufactured in the USA".

10.1.2 Coatings Purchasing Data

Assure that the purchasing documents clearly identify the product or system and request a certificate of conformance with the paint name and a statement from the manufacturer indicating that the test performed meet or exceed the coating specification

Note: purchasing requirements for galvanized coatings is addressed separately later in this Standard.

Complex Coatings Category Requirement--Purchasing

Ensure the purchasing document requests a certificate of compliance/conformance/analysis from the manufacturer as well as the manufacturer's product data sheets for all product components. Request this quality record for each specific batch of thinner, catalyst/activator, and primer. Ensure the certificate certifies that the batch has met the manufacturer's testing requirements and applicable ASTM requirements and has these items as a minimum:

- Manufacturer name
- Product name and ID number
- Batch number
- Date of manufacture

Request that the container clearly identifies the contents with these details at a minimum

- Color (federal standard number, or manufacturer's number)
- Lot/batch number
- ID/stock number
- Container quantity
- Date of manufacture and shelf life
- Manufacturer's name and address
- Storage condition limitations

MnDOT Specific Requirement

Address how controls are in place to assure that complex coating components are purchased only from the MnDOT approved listing. Define who is responsible for reviewing and verifying approved lots of specified types and colors are received.

MnDOT specifies color by federal color number. A draw down sample of the "color coat" (finish color) required to send to MnDOT laboratory for color verification. Assure that this requirement is clearly identified on purchasing documents.

www.dot.state.mn.us/bridge/docsdown.html#metals

Describe how orders assure that MnDOT approved systems are supplied.

10.1.3 Purchasing documents for subcontracted coatings

Communicate the required coating system specification:

- Request records of profile and coating thickness measurements
- Request records of inspection and application data
- Additionally, communicate any required witnessing hold points and inspection required by the Supplier

10.1.4 Purchasing requirements for Fracture Critical Members (FCMs)

Fracture Critical Category Requirement—Base Materials

Clearly define in the purchasing procedure how all FC material is identified and delivered from the vendor. Include ordering and testing information from the contract documents. Also include necessary information about the material grade, zone requirements, mill methods and restrictions, and marking restrictions in the Purchasing Contract for mill orders.

Fracture Critical Category Requirement--Consumables

Clearly define in the purchasing procedure how purchasing documents assure that consumables meet the testing, documentation, packaging, and specific diffusible hydrogen requirements for FCM welding consumables ordered by the supplier.

Make available certificates of conformance to the QAI upon request.

Certificate of Conformance (CofC) for the shielding gas address required dew points and cylinder marking requirements in accordance with *AWS A5.32/A5.32M: Welding Consumables - Gases and Gas Mixtures For Fusion Welding and Allied Processes.*

10.1.5 Purchasing requirements for products that will be Galvanized

Assure that there is a method to include appropriate directions to the galvanizer to

a. Provide a written certification of contract compliance to ASTM A123
b. Require separate records of zinc coating thickness measurements for each MnDOT project.
c. Batch sampling for DFT readings needs to represent typical members (geometry and member thickness) for each structure included in the batch.
d. Within a batch, the corresponding structure number is to be identified with each individual DFT reading reported.
e. Require that Purchase Order(s) for galvanizing inform the galvanizer which items are to be duplex coated and not quench dipped Assure that the purchasing document provides any additional treatment required by the galvanizer for "Post Galvanizing Procedures"
f. Assure that the purchasing document describes any visual criteria for aesthetic, ornamental products.
g. Inform the galvanizer if materials to be galvanized are reactive.
h. Note: it is desirable to include information on the requirement to not allow quenching

10.1.6 Purchasing Data Requirements for Galvanizers

Zincs, Touch Up Paint and Brightener Bars;

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

Fluxes

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

Acids

- Container marking to verify Compliance with OSHA
- Type and acid strength

- Need for Certificates of conformance and MSDS Sheets

10.1.7 Subcontracted Services Purchasing Data

Subcontract services may include but are not limited to:

- Fabrication (including plate rolling and bending, heat treating, machining and other services)
- Engineering
- Detailing
- Blasting
- Inspection

Describe how applicable contract requirements, drawing information, customer approved and shop standard practices, inspection criteria, documentation requirements, and hold points are communicated to the Subcontractor.

Show in the purchasing documents what qualifications and qualification documents are submitted from the Subcontractor and when they are due.

10.1.8 Welding consumables Purchasing Data

a. Filler materials;
   - Specify accurate AWS classification and specification
   - Packing and delivery requirements
   - Manufacturer and trade name
   - As for base materials, filler materials (metal) must meet buy America requirements

b. Fluxes
   - Specify accurate AWS classification and specification
   - Packing and delivery requirements
   - Manufacturer and trade name

c. Weld Shielding Gasses
   - Container marking to verify Compliance with ASWS A5.32.
   - Type and ratio of mixed gasses

d. Order Consumables for Fracture Critical welding in accordance with Clause 12 of the AASHTO/AWS D1.5 edition current at time of contract advertisement.

10.1.9 High Strength Fastener componts Purchasing Data (High Strength Bolts)

Ensure purchasing documents specify the diameter, length, type and grade of bolts, nuts and washers, requirements for certificates of conformance by assembly lot number, specification (ASTM A325, A490), and the results of any required manufacturer testing. Assure that the methods to maintain acceptable condition of fastener components is clearly communicated.

10.1.10 Vendor and Subcontractor Evaluation

Vendor Initial Selection and the Approved Vendor List (AVL)

Describe the methods used and responsibilities to evaluate and approve new vendors and subcontractors before they are permitted to furnish any product or service. Evaluate new vendors based on an on-site visit, references, reputation, facilities and equipment, work samples, or possessing the necessary capabilities for supplying goods or services. Describe methods for how the vendor ranking status on the AVL is determined and periodically reviewed.

Ongoing Evaluation (approved vendor list)

Evaluate all vendors and subcontractors at least annually and more frequently if job conditions change or products and services are questionable.

- Quality of the finished products; [may include adherence to specifications/drawings/quality requirements; Accuracy of product in size, cutting, marking and overall appearance; Accuracy of support documents (test reports, certificates of compliance, etc.)]
- Delivery of products in accordance with schedules (on time);
- Delivery of product in proper manner;

Obtain proof of current status if contract requires certification of subcontractors by another organization.

MnDOT specific requirement

Selection of Subcontractors for MnDOT projects

Subcontractors who perform Structural Metals fabrication and provide end items for the Supplier must be on the MnDOT Approved Supplier List for the appropriate component category that covers the work to be subcontracted, except as provided below:

Subcontractors who perform fabrication activities on material subsequently fabricated by the Supplier such as machining, forming and cutting are qualified by the Supplier. The work of these subcontractors may be inspected by State QAIs. Other services potentially changing material properties, including stress relieving and heat bending, must be approved by the Engineer.

Subcontractors providing NDT services must be listed on the MnDOT "Approved NDT Suppliers". Note: Suppliers that perform their own NDT must also be maintained on the list.

Personnel conducting vendor and subcontractor evaluation

Identify qualified positions to perform evaluations. Include the appropriate qualifications of an evaluator to perform different types of evaluations. This can be described in procedures, job descriptions or other effective means.

10.2 Quality Records Generated in Purchasing

- Purchase Orders
- Subcontractor waiver from customer
- AVL or similar listing and a record of review
- Subcontractor and supplier qualifications and evaluation.
- Certification records of subcontractors

11 Material Identification

This requirements of this section of the MnDOT Supplier Qualification Standard are addressed in each Supplier Category Specific Supplements.

Material Identification is an important part of each MnDOT Supplier's Quality Management System, but requirements differ greatly; Bridge Fabricators have traceability requirements for steel plates (especially with Fracture Critical requirements) while Painters for ensure complex coating system components are MnDOT approved. To reduce confusion, each Supplier Category has a Material Identification section detailed in its Category-Specific Supplement for topics including:

- Identification of Material
- Traceability
- Product Identification

Specific Contract Review requirements for your Supplier Category (ies) are in these MnDOT Supplier Qualification Standard Supplements:

- Bridge Fabricators and Minor Structural Component Manufacturers – Supplement A
- Blasting-Shop and Field – Supplement BB
- Contract Painters and Shop Application of Complex Coatings – Supplement B
- Galvanizers – Supplement C
- Elastomeric Pad Manufacturers – Supplement D

12 Process Control

This requirements of this section of the MnDOT Supplier Qualification Standard are addressed in each Supplier Category Specific Supplements.

Process Control is an important part of each MnDOT Supplier's Quality Management System, but requirements differ greatly; Bridge Fabricators qualify and perform welding processes, while galvanizers control the chemistry and temperatures of preparation and galvanizing baths. To reduce confusion, each Supplier Category has its own Process Control section detailed in its Category-Specific Supplement for topics including:

- Process Control
- Immediate actions for non-compliance

Specific Contract Review requirements for your Supplier Category(s) are in these MnDOT Supplier Qualification Standard Supplements:

- Bridge Fabricators and Minor Structural Component Manufacturers – Supplement A
- Blasting-Shop and Field – Supplement BB
- Contract Painters and Shop Application of Complex Coatings – Supplement B
- Galvanizers – Supplement C
- Elastomeric Pad Manufacturers – Supplement D

13 Inspection

Product inspections conducted by owner's inspectors and representatives as considered an oversight verification function that the owner may or may not choose to perform. It is not a replacement or substitute for any portion of the Supplier's complete Quality Management System Documentation. It is expected that the Supplier's inspections on a particular element or process are complete before an owner's representative is presented with the option to verify acceptability. Owner's verification inspectors should not perform, reinforce, or supplant Quality Control duties for the Supplier or direct production personnel, except to note hazardous conditions that might result in injury or damage.

It is the Supplier's responsibility to determine and document the acceptability of the product before proceeding with subsequent processing or shipping, in accordance with their documented inspection procedure(s).

In this procedure, at a minimum the Supplier defines

- quality control inspection types and frequency
- personnel qualification and assignment
- acceptance criteria
- reporting forms
- notifications
- minimum level of inspection
- methods of testing
- Equipment for testing
- Non Destructive Testing (NDT)
- Frequency of testing.

Responsible personnel must be aware of customer specific marking systems for pieces and welds to be inspected. Describe how the systems initiated in the receiving process and at first fit up are carried through to delivery and submittal documents.

13.1 Contract Review and Supplmental Project quality plans.

Review the inspection requirements for each project or order. In the event a specific project requirement for inspection exceeds the Supplier's minimum level, document a supplemental quality plan or ITP (inspection and test plan) to address that project.

Define the type and percentage of NDE required by weld and member type. Before fabrication begins, identify any NDE or testing that will be required for materials. Describe in the procedure how this information is communicated to the inspection and production functions.

13.2 Customer Verification

Ensure the customer or the customer's representative has access to the Supplier's operation to verify conformance of their projects. This includes any of the Supplier's subcontractors providing work to the customer's projects.

13.3 Inspection Methods

Describe the NDE and destructive tests planned for each type of product the Supplier produces. Describe what inspections are performed by the Supplier's personnel and which ones are outsourced.

13.4 Inspection Equipment

Possess the necessary inspection equipment to perform required inspections based on the complexity of the product. Ensure the equipment calibration is maintained in accord with manufacturer or contract requirements and documented.

13.5 Quality Control function

Ensure Quality Control personnel report to a QC management position, QA management position, or the chief executive. Show this in the organizational chart. Ensure Quality control personnel do not report to production management. Ensure Quality Control personnel have the authority to stop production and responsibility to inform production management of nonconforming work. Use forms, records, and other methods to demonstrate this function.

Describe how production variations from the approved shop drawings or the Contract documents are addressed and documented by the inspection function.

13.6 Qualification and Assignment

Document specific experience level, certification or training that qualifies the inspection personnel. Designate weld, bolt installation, paint, and/or dimensional inspectors, and maintain their qualification records for at least 5 years.

Define in logs, forms, records, or other suitable means the specific areas of inspection that each inspector performs. Address how the Supplier plans to accomplish this work on all shifts. Also, ensure that the planned work is adequately covered with qualified personnel during all operations.

Clearly communicate the information for the use of QC management, production, and the Owner.

13.6.1 Welded Products Inspection Personnel Qualifications and Requirements

Ensure that each inspector responsible for final acceptance or rejection of welds and workmanship is a current AWS Certified Welding Inspector (CWI), unless otherwise approved or specified by the Owner. In-process inspections before and during the welding process are performed in addition to final acceptance.

Require all inspectors of welds have an annual eye exam maintained on file. When Fracture Critical welds are inspected, the inspector (including lead inspectors) must meet the requirements of the AWS D1.5 Clause 12 Fracture Control Plan.

Require that the inspectors personally perform and document the inspections they sign off. Require that the inspector either creates the inspection reports or reviews the report created by others from the data collected by the inspector. Ensure that the inspector is familiar with the approved shop drawings, Owner Standard Specifications, welding codes and contract provisions applicable for the work.

MnDOT specific requirement for both major and minor components

Describe how each work shift is covered by a CWI when welding is performed. Describe methods for assigning CAWIs or other responsible personnel for adequate coverage where the quantity of work or the area(s) of fabrication is too large for one CWI to perform final inspections and adequately monitor the production welding.

FC Nondestructive Testing (NDT) Inspection Personnel

Define how NDE personnel are trained and qualified, and maintain their credentials in accordance with an ASNT SNT TC-1A written practice for nondestructive testing of technicians employed by the Supplier as a Level II for each method. Include all testing methods that are performed at the facility on transportation projects. Make available specific written inspection procedures for each method and equipment type for review. Reference the specific written inspection procedures in the inspection procedure.

When NDT is performed by a subcontractor, evaluate and keep on file the firm's qualifications and individual certifications. Ensure the subcontracted firm's personnel qualifications are current, and their written inspection procedure is followed and available to the Supplier and the Quality Assurance Inspector (QAI).

Employ or contract an ASNT certified Level III qualified in the specific methods used by the Supplier.

MnDOT Specific Requirement

The Engineer reviews and approves in-house NDT programs in advance of a project.

Ensure outside vendors used for inspection services are on the MnDOT preapproved list.

All level II Technicians must have two years' documented experience as a Level II.

13.6.2 Paint Inspection Personnel Qualifications and Requirements

Assure that each inspector responsible for the acceptance of complex coatings receives documented training in accordance with company policy relative to the coating types being applied. Describe what training and experience is necessary in the procedure. Maintain records of qualifications, training and experience to demonstrate that personnel have met the minimum requirements set forth by management for at least 5 years. The use of ASTM D 3276, Standard Guide for Painting Inspectors of latest issue is encouraged but not required.

13.6.3 Galvanizing Inspection Personnel Qualifications and Requirements

Designated 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. Assure that personnel performing tank analysis have received documented training in their tasks. Online training for Galvanizing Inspectors by the American Galvanizing Association is encouraged but not required. Retain training records for at least 5 years.

13.6.4 Elastomeric Pad Inspection and Testing Personnel Qualifications and Requirements

Personnel performing testing on final product (including "first pull" tests) or incoming raw materials must be trained to perform the required tests. Document training given internally or from external sources for all inspection personnel who perform incoming elastomer analysis, prepare coupons for tests, perform tests, perform dimensional inspections including "first pull" inspection, etc. Retain training records for at least 5 years. The Supplier describes in their procedure what training is relevant and pertinent to the supply types offered.

13.6.5 High Strength Bolting Inspection and Testing Personnel Qualifications and Requirements

Personnel performing testing on ASTM High Strength Fasters are trained in both receipt and installation methods of the fastener types being used. Personnel performing testing on fastener assemblies for rotational capacity and preinstallation verification tests must possess the skills necessary to perform these tests in accordance with the Supplier's documented testing procedures. Testing skills are demonstrable during the audit activity with training records on file. Training is performed and documented by a competent internal or external source. Bolt inspection training is based on the requirements of the RCSC Specification for Structural Joints Using High-Strength Bolts and the FHWA High Strength Bolts Procedures for Performing Rotational Capacity Test. Comprehension of course material is desirable but not mandated. Retain training files for at least 5 years.

Fracture Critical Category Requirement

Assure that records exist that document the unique identification, authority, experience, and designation as a Lead Inspector compliant with the *AASHTO/AWS D1.5—Bridge Welding Code.* Assure that the procedure, inspection record forms, or other method to assure appropriate sign off is in place and effective.

13.7 Receipt Inspection

Identify the sequence of steps, checks, inspections, and records that receiving personnel follow when transportation project materials arrive.

Describe how materials are made available for production after receipt acceptance. Include records, notification, marking, location and other suitable means to ensure that production personnel use appropriate product.

Describe the responsibilities and methods for checking the material, grade, size and quantity, material marking or identification, customer specific requirements for conformance with the purchase order requirements. Define who is responsible to check *MTRs* and *Certificates of conformance* for base materials, fasteners, welding consumables, coatings, and any other product that becomes part of the customer's product for compliance with the purchase order requirements.

Define the receiver's responsibility to document and report visible shipping damage. Receipt Inspection for Galvanizers

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.

Notify the client (Fabricator) when the results of receipt inspection reveal damage or a need to alter the part for the galvanizing process. The client must make any physical alterations required and resubmit the parts for galvanizing. Galvanizers are not authorized to perform fabrication (drilling, hole making, welding on lifting attachments or straightening) on MnDOT projects for.

- venting and part geometry
- Identification or Marking
- Visible shipping damage including straightness of panels and rails.

Receipt inspection for Fracture Critical Member (FCM)

Ensure receiving personnel are aware of the special marking and handling requirements for fracture critical material. Ensure that procedures address how marking is checked and transferred.

Address how discontinuities are investigated by an NDE technician using magnetic particle testing (MT) with a yoke and/or ultrasonic testing (UT) methods for subsurface defects. Document any methods that are excluded, such as a prohibition for using prods for MT, and convey that documentation to NDE personnel.

13.8 In-Process Inspection

Conduct in-process inspections to ensure that projects are compliant with specified requirements and inspection acceptance criteria. Choose which in-process inspections are documented.

Document:

- How compliance with operational functions (i.e. bolting procedures, WPSs, welder qualifications, etc.) are verified.
- How each worker (i.e. fit-up technician, welder, installer, painter, etc.) is trained and responsible for the in-process inspection of their own work.
- How materials, preparation and consumables are checked prior to beginning work on the piece.
- What attributes are inspected in process. such as dimensions (length, hole and attachment locations), cutting quality, weld tack quality, weld quality are typical

- Describe how in-process inspections are recorded and conveyed.
- Hold points for approval (e.g. fracture critical repairs, the attachment of groove welded parts) must be added to the in-process inspection procedure for products that require such specific inspections.

13.8.1 In-process Inspection for Galvanizers

- Prior to caustic dip, ensure removal of paint, varnish, weld flux and other deleterious substances
- Visually inspect for surface cleanliness after acid dip and rinse
- Test tanks for acid concentration, Baume, iron/zinc concentrations, and lead and other deleterious contamination, preferably on a daily basis but weekly at a minimum
- Prior to dipping in molten zinc, visually inspect the product for adequate venting and drainage, and foreign material pick-up if laid on the ground
- Visually inspect the coated product upon removal from the zinc bath for gross dross inclusions, excess zinc deposits and bare spots.

13.8.2 In-Process Inspection for Plain and Reinforced Elastomeric Pads

Prior to Load Build

Include these checks at a minim:
- Ensure no grease or oil exists on shim plates prior to blast
- Ensure appropriate surface profile exists on shim plates

During Load Build

Include these verifications at a minimum
- If natural or neoprene elastomer is required
- Durometer required f the lot/batch number is documented
- # of sheets of elastomer required
- No plastic sheeting bits or pieces are adhered to the elastomer. This will cause failure
- If shim plates are required, ensure adhesive on shims is continuous
- If shim plates are required, that shim thickness, material and count
- Number of elastomer sheets between shims or number of elastomer sheets is correct
- If shims are used, that outside edge and top/bottom cover distance for shims is correct
- Correct time and temperature is listed and used
- Parallelism top and bottom, sides
- Length, thickness and width
- Destructive test bearing as required by contract documents

First Pull Lab Tests

Include these tests at a minimum:

Tests Required	ASTM #	Characteristic
Physical	D 2240	Hardness
Properties:	D412	Tensile Strength
		Ultimate Elongation
Heat Resistance:	D 573	Specific Test Temperature
		Aging Time
		Change in Durometer Hardness
		Change in Tensile Strength
		Change in Ultimate Elongation
Compression Set:	D395 per Appropriate Method	Specific Temperature of Test
		Change
Low Temperature Brittleness:	D 746 per Appropriate Procedure	Grade
		Pass/Fail
Shear Modulus	Section 8.10 Annex B	

13.9 NDE Tracking

Describe a method to plan and track the NDE for projects as a listing of material and welded joints to be inspected. Include a method to show current progress against planned inspections. Also assure there is a clear method to identify the parts that have been inspected. Verify NDE was done before material is used in fabrication and anticipate the need for contractual NDE.

13.10 Final Inspection

Define the sampling plan, frequency, and recording method. Review which frequency and sampling plan will work for each final inspection and how it will be clearly documented. Describe how the sampling plan or frequency is adjusted when nonconformances increase without a clear cause. Describe the plan application by: percentages, critical aspects, specific product types, specific projects, or any other effective method for the Supplier's process. Final inspection for completeness of assembly and 100% visual inspection of welds alone are not sufficient for final inspection.

Define inspection of all processes included in the production of the supplier's product, such as:
- Welding
- Bolting
- Coating*
- Straightening and Cambering
- Dimensionality
- Field splice condition
- Assembly
- Final Galvanized Surface
- Elastomeric Pad Final quality (visual or weight measurement of excess)
- Blast, surface cleanliness, paint quality and DFT (for coatings)

* Fabricators preparing materials for galvanizing:

If the receipt inspection from the galvanizer reveals the need for alterations to successfully and safely galvanize the part, those alterations must be performed by the Fabricator.

Assure that the vent hole, lifting device or other alteration is shown on approved drawings and quality meets code and specification requirements. Alterations may need further permission from the owner if not pre-approved.

13.10.1 Final Inspection for Galvanizers

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.

Visual inspection for all product will verify the absence of coating discontinuities that will interfere with the intended use 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.

13.10.2 Final Inspection for Elastomeric Pads

Describe 100% dimensional inspection and testing of elastomeric pads

Include these final inspections:

- Dimensional size
- Load testing
- Visual inspection for surface imperfections (no back rinding, bursts, voids or exposed lamination plates
- Laminate alignment and laminate parallelism
- Durometer (hardness and density)
- Hole or slot size
- Hole location
- Cracks in outer rubber surface
- Rubber thickness (layers)
- Adhesion to laminates, and
- Other final inspections required by the owner's specification.

Load testing

Load testing is to be performed per specific state requirements that are found on contract documents and drawings.

MnDOT Required Testing

- Hardness (Durometer)
- Shear Modulus
- Bond strength
- Compressive strain
- Compressive load
- Inspection
- Dimensional
- Visual
- Marking
- De-bonding test

MnDOT Specific requirement Testing rate

Two full size per lot where a lot is up to 100.

13.11 Inspection Records

Identify the inspection records required, the position/individual responsible for each type of record, and the information to be documented. At a minimum, show the item, type and extent of inspection, inspection results, inspector identity, date of inspection, and clear indication of acceptance or rejection. Record disposition in project file and if product is not accepted due to deficiencies, record in an appropriate place such as a nonconformance record.

Report any deviations exceeding contract tolerances and subsequent corrections to QC Management and in accordance with the Supplier's nonconformance procedure. Document all final inspections that are performed, including acceptance by the Quality Control function. Make records available to the QAI and for the Owner's review.

Include the following specific types of inspection records for individual members or elements:

- Material quality and NDE results
- Material identification and traceability
- Fit up accuracy and tolerance
- Welding
- Dimensionality
- Cleanliness before coating
- Coating

13.12 Inspection records for assembly

Requirement for any category when contracts require partial or full assembly of bridges

In addition to inspection records for individual members or groups, produce records for shop assembly inspection performed when assembly is required by contract. Assemblies may include line (individual line of girders or beams for splice drilling), component (HLMR bearings for load testing, modular expansion devices for seal installation, cable anchorages), partial structure (one truss panel), geometric (upper and lower portions of truss panel separately), full (entire structure) or special (as defined by the contract).

Assembly inspection records verify that dimensions and details on the applicable shop drawings were verified. Any deviations shall be recorded and compared with applicable contract tolerances. Record the final inspection results after all adjustments to bring the assembly within tolerances.

Include the minimum requirements and frequencies for recording in-process and final inspections. Ensure Inspection reports and test results are consistent with the requirements of each transportation contract and specification. At a minimum, record the following inspections:

- Camber
- Curvature
- Alignment of field splice components (weld joints or bolt holes)
- Field Splice location and elevation

- Bearing location (end to end, and distance between locations)

13.13 Inspection Records for Complex Coatings

Include the minimum requirements and frequencies for recording in-process and final inspections. Ensure Inspection reports and test results are consistent with the requirements of each transportation contract and specification. At a minimum, record the following inspections:

- Environmental conditions for each coat applied (temperature of air, coating and surface, relative humidity, dew point)
- Surface Preparation (degree of cleanliness achieved; surface profile achieved; condition of surface immediately prior to beginning coating application)
- Coating component identification (mfg., trade name, batch number) , pot life, mixing time, sweat in if applicable, beginning and ending time of application
- Dry film thickness (DFT) including any specific data required by SSPC-PA 2 or contract documents.
  - Visual inspection for visible coating defects (recording by exception only does not meet this requirement)
  - DFT gage accuracy verification record (in accordance with SSPC-PA 2)

13.14 Quality Records

- Material Delivery documentation
- Certified MTR
- Certificate of conformance
- receiving copy of the purchasing information
- Purchase Order
- Final inspection record
- Training records of final inspectors.
- Record of qualification of QC personnel

14 Calibration

Develop, document, and implement an effective procedure to control, calibrate, and maintain inspection, measuring, and test equipment used to demonstrate that products and processes comply with specified requirements.

Identify the gages that are used to demonstrate the conformance of product, or gages which provide direct process measurements that determine product compliance.

14.1 Procedure

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 ~~MnDOT~~ the Owner's specification or the Supplier'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 based upon manufacturer's recommendations, project requirements, and specification requirements. In the case of infrequently used measuring devices and standards, or gages where the calibration frequency is not mandated by code or specification, the Supplier may override the suggested interval recommended by the manufacturer.
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 traceability ito 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.
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 that includes date of verification, specified measurement, actual measurements, next calibration due date, the standard used, and the technician's name/initials. Logs may be used to track calibration actions and are encouraged.
11. How the Supplier addresses a gage/measuring equipment found without a valid identification. This includes Method of preventing inadvertent use of un-calibrated or inaccurate equipment.

Notes:

- That determination must meet industry requirements as described in codes, standards and specifications required by MnDOT specification or the Supplier's industry certification requirements.
- Tapelines must be verified for calibration accuracy over the full dimensional range of anticipated production measurements and not just the first few feet.
- Long tapes ($\geq 50'$) must list the tension in pounds of pull required to match the accuracy of the master tape.

14.1.1 Master Gage/Measuring Equipment

A Master Gage is a gage that is purchased and traceable to a national standard, typically from a gage supplier 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. MnDOT auditors may ask to demonstrate the applicability of the master gage choice. The table below shows examples that may be applicable.

Master Gage	Calibration/Verification Frequency	Accuracy Required	Source
DFT Shims	When showing wear and tear	+/- 5%	External
Coated Steel DFT Panels	When showing wear and tear	+/- 5%	External
Master Tape	10 Years or damage	Lab or Mfr. Certification	External
IIW Block(s) DC, DSC, DS, RC, SC	10 Years or damage	Per D1.1 & D1.5	External
Weight Block (MT yoke)	20 Years or damage	Per ASTM E309	External
Gage Blocks	10 Years or damage	Per grade of blocks used	External
Load Bank	Annual	Per Mfr. Std.	External
Amp and Volt Meters	Annual	Per Mfr. Std.	External
Wire Feed Speed Meter	Annual	Per Mfr. Std.	External
Master Square	10 Years or damage	+/- 1/64" in 2 feet	External

14.1.2 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 Supplier. The table below shows examples that may be applicable

Tool	Calibration/Verification Frequency	Accuracy Required	Source
Skidmore Wilhelm	Annual	Mfr. Certification	External
QC Tapes	3 Months (verification)	+/- 1/32" per 25'	Internal
DFT Gage	Prior To Use	+/- 5% of shim reading	Internal
Calipers	Annual	+/- .0005	Internal/External
Micrometers	Annual	+/- .0005	Internal/External
Undercut Gage	Annual (verification)	+/- 1/64"	Internal
Weld Fillet Gage	Annual (verification)	+/- 1/64"	Internal
Bridge Cam Gage	Annual (verification)	+/- 1/64"	Internal
.010 Undercut Gage	Annual (verification)	+/- .0005	Internal
Welding power source gages	1-3 months (verification)	+/- 3% of gage reading	Internal/External
Welding Wire Feeders (when wire speed is used to control current)	3 months verification	+/- 10 IPM	Internal/External
Framing Squares	Annual (verification)	+/- 1/32" in 2 Feet	Internal
Recording Thermometer	Annual	+/- 2 degrees F	External
Recording Humidistat	Annual	+/- 2%	External
UT Wedges	per D1.5	per D1.5	Internal/external
UT unit	per D1.5	per D1.5	Internal/external
MT Yoke	monthly (verification)	Lift required weight	Internal
Dial Thickness Gage	Annual	+/- .0005	Internal/External
Feeler Gages	Annual	+/- .0005	Internal/External
Torque Wrench	Annual	+/- 5 ft. lbs.	External
Micrometer	Annual	+/0.0010"	Internal/external
Truck and Portable Scales	Annual	+/- 10 pounds or .1%	External
Total station		Per manufacturer's recommendation	External

14.1.3 Records of calibration

Detail 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
- Next Due Date

14.2 Quality Records

- Calibration certificates of conformance
- Calibration Log/Record

15 Nonconformance

Develop and document a method for recording and controlling nonconformances.

15.1 General

Nonconformances may be identified by the Supplier'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.

Describe the QC inspectors' stop work authority and their responsibility to inform the operating supervisor and the owner's representative/QAI of the nonconformance.

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

Consider the timing and level of involvement of the owner and the owner's onsite QAI during the nonconformance process. Product Nonconformances require owner approval for resolution.

15.2 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.

15.3 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 detailing, contract review, purchasing) and operational functions.

15.4 Significance

A nonconformance can be considered significant if it is associated with a defect that jeopardizes the safety, functionality, ease of erection/installation, and/or serviceability of the structure. This may include improper material, numerous or repetitive nonconformances, significant dimensional errors, or incorrect joints and connections.

15.5 Nonconformance Log and tracking

15.5.1 What to Record

Record and track nonconformances in reports and/or one or more logs of a desired format.

Define what will be recorded. Include the pieces affected, the nature of the nonconformance and disposition of affected items still at the Supplier or already shipped, and potential ramifications for similar items on previous projects.

Recording Re-inspection. When nonconforming product is repaired or reworked, it is subject to the original inspection criteria; record the results, including the inspector who made the re-inspection and date of acceptance. Link the new record to the original deficiency record if they are separate documents in your system

Include other pertinent information so that you can periodically track and analyze nonconformance trends and recurrence rates.

15.5.2 When to record

Clearly define the threshold for recording a nonconformance. For product nonconformances, consider basing it on structural severity, costs, time to correct, or other criteria appropriate to your organization.

Process nonconformances may have similar criteria and may be based on significance. However, they are often recorded regardless if only one occurrence is found. A nonconformance in a quality management system process may have exposed the system to multiple errors.

15.5.3 Evaluating nonconformance records for trends

Evaluate logs or summaries of all nonconformances during internal audits and management reviews, and scan logs for similar events whenever a new nonconformance is added.

Show the consideration, action and follow up taken for nonconformance types or trends that are judged significant. Use records, meeting minutes or other quality management system document to demonstrate and track actions.

MnDOT Specific Requirement

Properly document ALL nonconformances for projects using a Nonconformance Report form. Submit the Nonconformance Report form to the QAI, documenting the deviation and disposition.

The Nonconformance Report form shall include the following items at a minimum:

- Company name and address
- Report title
- Nonconformance Report number
- Date
- Company job number
- Piece mark
- Owner of bridge/structure
- Contractor
- MnDOT Project Number

- Location
- A detailed description of the nonconformance
- Photo, sketch, or drawing
- Proposed repair/disposition of the nonconformance
- The Quality Control Manager's signature and date

15.6 Product Nonconformance

Assure that nonconformances are identified and prevented from reaching the next operation and, ultimately, a project site.

If product is found to be nonconforming, require evaluation by a qualified individual for use, rework, repair, or scrap.

If nonconforming product is to be proposed for use as-is, describe how its deficiencies are documented and authorized by the owner before any further processing occurs.

15.6.1 Nonconforming Product at Receipt Inspection

Identify nonconforming raw materials, coatings, welding consumables, fasteners and other product. Include the method of effective physical marking, documentation of the issue and how deficiencies are reported to the Purchasing function for resolution

15.6.2 Nonconforming Product Identification (in-process and final)

Provide for clear identification of deficient product or its segregation from production, and for evaluation by a QC Inspector. Clearly define the responsibility for disposition. Disposition can be:

- Repair
- Rework
- Scrap
- Use as is

If the treatment involves rework or repair, inspect the results per drawing, specification, project requirements, and the Supplier's documented inspection procedure.

MnDOT Specific Requirement

Describe how (methods and responsibilities) a MnDOT approved repair procedure is used when the disposition of a nonconformance is rework or repair and how it is noted in the Supplier's NC log or report. Verify and record the corrective measures and final disposition.

Provide for the completed work to be re-inspected for conformance to contract specifications and approved shop drawings and recorded per the Supplier's inspection procedure. Document the date and the QC inspector making the re-inspection, as well as the MnDOT authorization.

Do not perform any repairs involving a deviation from the approved shop drawings or Project Plan without authorization from the Owner.

Consider developing and submitting routine repair procedures for pre-approval, including repairs by welding. Notification is still necessary.

The QAI may assess the worker's and the QC Inspector's understanding of this specific requirement.

15.7 Process Nonconformance

Identify process nonconformances during QC or QA inspection operation, internal or external audits, or review of process control records such as the RFI log, contract review, records of vendor performance, and customer feedback information. Perform process reviews at random or during regular management reviews of the quality system.

15.8 Quality Records

- Nonconformance log
- Nonconformance report
- Management review of nonconformances (management review record)
- Repair inspections records (inspection procedure)
- Corrective action records (corrective action procedure)
- MnDOT specific nonconformance report

16 Correction and Corrective Action

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

16.1 Definitions

Nonconformance (NCR) – Non-fulfillment of a contract requirement.

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 Supplier for a Corrective Action based upon internal stimulus (Nonconformance reports, internal audits, Management Reviews, etc.)

Corrective Action Request (CAR) - the document developed by the Supplier 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 the issue 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 root cause and the actions presented to prevent recurrence. At that time, consider rescheduling a re-audit of the actions to close the CAR or to assure continued effective implementation. Describe how those decisions are made.

16.2.2 Causes for Corrective Actions

- Significant nonconformances
- Product nonconformances are repetitive
- Undesirable conditions affecting productivity, employee safety or other Supplier goals.
- Requests from an external source

Invoke the internal corrective action system when nonconformances are identified during external audits by a customer or agency. Although the agency may have their own formats, deadlines and requirements, enter the issue into the internal system.

- When Performance Indicator targets are not met

Targets for Performance Indicators are required and described in Management Responsibility. Invoke the internal corrective action system to address the root cause and actions to return the indicator to target levels. Include in the actions discussed and implemented activities to prevent the target from reaching unacceptable levels again. Consider customer involvement when appropriate.

16.3 Recording and Tracking a corrective action activity

Develop a form, log, database, or other suitable method to record the required information for a correction action. The method must clearly communicate the identification, actions and status of each activity. Ensure the system captures this information at a minimum:

reference	The reference or requirement that has not been met. This can be from a code, specification, contract documents, or the Supplier's quality manual and procedures documentation.
observation	The specific issue/objective evidence/observation that was non-compliant.
correction	Actions taken to eliminate or contain the nonconformance (if required)
responsibility	Identify the individual, manager or team assigned the responsibility for evaluating and addressing the situation/Quality Management System function
schedule	The timeframe for completion. Due dates for identification of root cause, analysis and action to prevent recurrence completion dates
root cause	Identification of the root cause, including contributing factors to ensure appropriate corrective actions.
actions	Action to eliminate or control the causative factors and prevent a recurrence.
verification	Verification of implementation and effectiveness of measures taken can predictably lead to closure. When a corrective action is generated, conduct a follow up to verify it was implemented in a timely and effective manner, and to ensure the steps taken continue to be effective in avoiding recurrence.
closure	document completion of the corrective action process, including name and signature of the person verifying closure of the issue

16.4 Review and Monitoring

Identify the responsibility for maintaining the CAR system and monitoring the progress of closing the actions. Prepare a summary of closed and open CARs for assessment at management reviews of the quality system.

Perform adequate root cause analysis and reassessment after implementation of the fix.

Include any closed and open CARs in the scope of the internal audit of that element. This assures that the actions taken continue to be monitored for effective implementation.

16.5 Quality Records

- Corrective Action Records / Corrective Action Requests (CARs)
- Summary of corrective actions for management review

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 Supplier and the customer or the Supplier and a subcontractor assure that material is shipped in compliance with contracts. Consider including sequencing that complies with erection needs. Coordinate shipments by subcontractors, and monitored them for compliance with shipping instructions.

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 at a minimum:

- 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 with the surface.
- Replacement of damaged material with new material or repair must use a procedure approved by the Engineer.
- 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.

Fracture Critical Category Requirement

Assure receiving personnel and production personnel are aware of the s Fracture Critical pecial marking and handling requirements for fracture critical material. Assure that procedures address how marking is checked and transferred at each operation. Include how the material is handled with straps, clamps with softeners, or other means to prevent marks and gouges that will need repair.

17.2 Raw metals and fabricated assembly handling

Address how lifts are planned and rigged in the shop to prevent damage, including:

- How the type of lifting mechanism is planned/selected. A work instruction may be necessary to assure decisions that are appropriate. Some decision point examples might be:
  - Magnets to minimizing damage to the plate material. Clamps often put indentations into the plate which may not be acceptable.
  - Chains with softeners at corners prior to painting operations, nylon slings after painting operations.
- Qualification and training of rigging personnel
- Work instructions detailing the type of lifting device to be used at various stages of the work
- Annual certification of overhead cranes and all lifting devices by a qualified outside inspector
- Monthly record of inspection by a certified rigger of all lifting devices. Inspection records would indicate that the capacity tag is on the device, and is readable. It would also indicate that the device is not damaged.
- Specifically address how the condition and cleanliness for blasted and painted surfaces are maintained.

Intermediate and Advanced Category Requirement

Identify difficult and heavy lifts for the facility. These are lifts and positioning activities that challenge the lifting equipment, terrain, or available space at the facility. These lifts may use more than one crane or may use more than 75% of crane capacity. These lifts require pre-planning to achieve and maintain the final position safely, considering blocking and other positioning aids. Include the qualification and training of rigging personnel, including the designation of a competent person who is available and in charge when lifts are in process.

Complex Coating Category Requirement

Do not handle, load for shipment, or ship coated steel until the coating has cured sufficiently. Touch up coated steel that has been damaged in handling (beyond that permitted by the contract) in accordance with the contract requirements.

Implement measures to avoid damage to the coated surfaces while handling, storing, and loading for shipment. Utilize blocking to prevent damage. Unless specifically required by the contract, do not handle steel with chains. Handle coated materials with nylon rigging or padded hooks, in accord with equipment restrictions and contract provisions.

17.3 Shipping product

Document the precautions for shipping by rail, truck or barge. Assure that there are controls to prevent damage. Address these items at a minimum:

- 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 of any painted structure.
  - Any shop bolted connections to be fully tensioned. Bolt to ship elements shall be sufficiently tightened to avoid loosening in shipment
- Softeners for chained loads,
- Evaluation of straps vs. chains,
- Procedures to determine the acceptable amount of unsupported overhang based on vertical and lateral stiffness of any cantilevered elements. Provide warning lights and proper flagging
- Secure permits for oversize/overweight loads

Address how the following is achieved:

- How shipping pieces are legibly marked according to the field erection plan
- Where fascia beams are marked on inside faces

- How duplicate pieces are marked
- How connection plates for members are secured in position for shipment
- How pins, bolts, nuts, and washers are shipped and packaged
- How coated material is protected to keep it clean and prevent damage during loading, transporting, unloading, handling, and storage.
- How beams and girders are positioned for shipping with strong axis vertical and how blocking material is arranged to prevent harmonic oscillation ("galloping"), buckling, warping, loss of camber or twisting during transportation.

17.4 High strength fastener assembly storage

Assure that procedures address how fastener components are stored and accessed before installation by the Supplier or shipping to the field for installation including:

- How fastener components are drawn from storage to prevent drying and contamination,
- How tested fastener assemblies (bolt, nut and washer) are stored to maintain lot integrity
- Provision for permanent or temporary weather protection over tightly closed containers

17.5 Owner and customer supplied material

Protect Owner-supplied material or material paid for as "material on hand" before *fabrication* to prevent use other than its intended purpose. Record and report to the Owner any such product that is lost, damaged, or otherwise unsuitable for use.

18 Training

18.1 Initial and Periodic Training

Ensure personnel responsible for the quality of products and services receive initial and periodic training in their specific job functions. Consider periodic training whenever there is a change in specific duties or whenever a procedural change in a particular job is implemented. Consider training when industry codes and specifications are updated or customer requirements change.

When required, conduct training by in-house qualified employees or by a qualified source or institution outside the company. Assure that the requirements for documenting training are met.

Address how personnel maintain understanding and focus on requirements that may be infrequent to the shop schedule. Special meetings, refresher training and specific quality plans may be necessary for jobs that include fracture critical or complex coating systems that are not part of the Supplier's daily work routine.

Specific training requirements may be detailed in Supplier specific supplements.

18.2 Documented Training

18.2.1 Final Inspectors

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.

18.2.2 Training Records

Training records include instructor, attendees, course outline and date.

18.3 Quality Records

- Position-specific training records for equipment operators, welders, tackers, painters, detailers, and other skilled individuals
- Safety, Quality Goals, and general subject training for all employees
- Training records of final inspectors
- Training records of fracture critical inspectors

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:

Include the performance of recent transportation projects against the performance indicators of project quality and schedule status/delivery.

Conduct audits of the entire system at one time, or schedule recurring audits of parts of the system throughout the year 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. 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. Initiate a Corrective Action depending upon the severity, frequency and importance of the nonconformity.

19.1 Quality Records

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

This page is intentionally left blank.

This page is intentionally left blank.

Minnesota Department of Transportation:
Metals Supplier Qualification Program