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Quality Assurance Manual

Metal Fabrication, Rubber Lining and Coating

CONTROLLED COPY

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Table of Contents

Section A. GENERAL

- 1.0 Purpose
- 2.0 Scope
- 3.0 Applicable Documents

Section B. INSPECTION PROCEDURES: GENERAL

- 1.0 Purpose
- 2.0 Application
- 3.0 Definitions

Section C. INSPECTION PROCEDURES: QUALITY ASSURANCE

- 1.0 Purpose
- 2.0 Functions

Section D. QUALITY ASSURANCE EQUIPMENT FUNCTIONS

Section E. SPECIAL REQUIREMENTS

- 1.0 Non-Conformance

Section F. INSPECTION PROCEDURES: METAL FABRICATION

- 1.0 Raw Materials
 - 1.1 Raw Material Control
- 2.0 Welding
- 3.0 Metal Fabrication Final Inspection

Section G. INSPECTION PROCEDURES: RUBBER LINING

- 1.0 Raw Materials
 - 1.1 Raw Material Control
- 2.0 Surface Preparation
- 3.0 Priming and Cementing
- 4.0 Rubber Lining Application
- 5.0 Rubber Lining Cure
- 6.0 Rubber Lining Post Cure
- 7.0 Rubber Lining Final Inspection

Section H. INSPECTION PROCEDURES: COATINGS

- 1.0 Raw Materials
 - 1.1 Raw Material Control
- 2.0 Surface Preparation
- 3.0 Coating Material Preparation
- 4.0 Coating Application
- 5.0 Handling and Curing of Coatings
- 6.0 Coating Final Inspection

Section I. INSPECTION PROCEDURES: FINAL

Section J. SHIPPING PROCEDURE

Section K. COMPUTER TECHNOLOGY

- 1.0 Administration

Section L. QUALITY ASSURANCE FORMS

- 1.0 Metal Fabrication
- 2.0 Rubber Lining and Painting
- 3.0 Hydrostatic Test Certification
- 4.0 Shipping Release
- 5.0 Non-Conformance Notice

Section A: GENERAL

1.0 Purpose

To establish a quality assurance program for applications of elastomeric sheet linings to metal fabricated equipment.

2.0 Scope

This manual describes the methods and techniques for assuring the quality of equipment metal fabricated, rubber lined and painted by Industrial Linings, Inc.

3.0 Applicable Documents

- A. RMA Protective Linings Technical Bulletins
- B. Blair Rubber Company Engineering and Application Bulletins
- C. SSPC-PA 1, Shop, Field, and Maintenance Painting of Steel

Section B. INSPECTION PROCEDURES: GENERAL

1.0 Purpose

To communicate the responsibilities and functions of personnel involved with Quality Assurance and Control

2.0 Application

Applies to Quality Assurance personnel and those areas that are responsible for manufacturing a product to specific standards

3.0 Definitions

- A. Quality Assurance Administrator:
The Administrator is responsible for overseeing and directing work under the guidelines of the Quality Assurance Manual
- B. Shop Managers:
Shop Managers are responsible for directing production and insuring quality control in the respective areas
- C. Area Leader Man:
Area Leader Man is responsible for heading a group of workers in accomplishing productive and quality acceptable goals

Section C. INSPECTION PROCEDURES: QUALITY ASSURANCE

1.0 Purpose

To communicate the responsibilities and functions to be performed by the Quality Assurance Department

2.0 Functions

- A. Attend pre-job meetings
- B. Review
 - a. Work Order
 - b. Specifications
 - c. Prints
- C. Write a “hold points” list, if required
 - a. Deliver the “hold points” list to each Shop Manager involved with the job
 - b. Review quality assurance aspects of the job with them
 - c. Issue non-compliance reports to the Shop Managers
 - d. Document review
 - 1. Review Area Leader Man’s documentation for accuracy
 - 2. Insure all Quality Assurance documents are complete and in compliance (see shop documentation forms)
 - e. Notify Quality Assurance Administrator and Shop Manager(s) with non-compliance reports

Section D. QUALITY ASSURANCE EQUIPMENT FUNCTIONS

Equipment	Model Number	Manufacturer
Surface Profile Comparator	372/3	Keane-Tator
Spark Tester	BD-10-A	Electron Technic Products
Peak Voltage Calibrator	1270	Electron Technic Products
Mikro Test Dry Film Mil Gauge	014124	Mirkro Test
Shore A Durometer Gauge	08715	Shore Instrument & Mfg. Co.
Temperature, Humidity & Dew Point Recorder	THDx	Dickson
Magnetic Surface Temperature Gauge	315F	PTC Instruments
Wet Sponge Porosity Detector	NA	Precision Instruments

Section E. SPECIAL REQUIREMENTS

1.0 Non-Conformance

- A. The Area Leader Man will be responsible for resolving all discrepancies through the proper channels. When the discrepancy has been resolved, written documentation will be sent to the Quality Assurance Administrator
- B. Shop Managers are responsible for instructing their workers as to how necessary repairs will be made

Section F. INSPECTION PROCEDURES: METAL FABRICATION

1.0 Raw Materials

All metal raw materials will be checked for the following:

- A. Material shall be free from laminations or other physical imperfections
- B. Plates shall be flat and contain no warping or buckles

1.1 Raw Material Control

- A. As raw materials come in, the Shop Manager will properly tag and date materials
- B. Dated raw materials will be listed on the Material Certification Sheets

2.0 Welding

- A. All joints to be rubber lined are to be continuous solid welds
- B. All joints to be rubber lined are to be free from porosity, holes, lumps, pockets, high spots and undercuts
- C. Body seams to be butt-welded with continuous solid welds throughout, unless specified otherwise
- D. Body welds to be rubber lined are to be ground flush
- E. Weld splatter is to be entirely removed
- F. All corners and weld seams to be ground to a minimum radius of 1/8"

2.0 Metal Fabrication Final Inspection

Prior to calling Quality Assurance for final inspections, the Shop Manager will insure the following has been properly performed:

- A. All checklists are properly documented (see checklist for required items to be checked)
- B. All non-conformance documents are complete

Section G. INSPECTION PROCEDURES: RUBBER LINING

1.0 Raw Materials

All elastomeric raw materials will be checked for the following:

- A. Shipping damage
- B. Proper identification (compound code, manufacture date, lot number)
- C. Proper size (thickness, width, length)
- D. Within shelf life recommended by the manufacturer

1.1 Raw Material Control

- A. As raw materials come in, the Shop Manager will property tag and date materials
- B. Dated raw materials will be listed on the Material Certification Sheets
- C. All raw materials will be properly stored in accordance with the manufacturer's recommended practices

2.0 Surface Preparation

Prior to blasting, the following will be checked:

- 1. Grit in the blasting unit will be inspected for contamination
 - 2. The compressed air used for blasting and grit removal shall be free of oil and water contamination
 - 3. Temperature, humidity and the dew point will be monitored to prevent sweating of the metal surface (see chart on page 4)
-
- A. The surface shall be blasted to a clean gray white metal surface with a minimum profile of 2.0 mils (see chart on page 4), unless specified otherwise
 - B. Blasting material will be removed from the surface using clean oil-free brushes, filtered compressed air or vacuuming

3.0 Priming and Cementing

- A. The primer cement will be applied before any "flash rusting" occurs, if it does, the surface will be reblasted
- B. Manufacture's instructions shall be followed in accordance when applying cement applications, separate brushes and rollers will be used for each type of cement applied
- C. Drying time of the cement will be kept in accordance with the manufacturer's instructions
- D. Cement surfaces will not be exposed to sunlight and/or weather

4.0 Rubber Lining Application

- A. Prior to application, the rubber lining shall be clean and free of defects
- B. The rubber lining shall be rolled tightly against the material surface to remove any trapped air
- C. After the rubber lining is applied, visual inspections are to be done to insure that seams are straight and all edges are stitched down tightly
- D. The rubber lining will be checked for blisters, physical damage, looseness and uniformity of splices
- E. A pre-cure spark test will be conducted (see chart on page 4) to determine that the lining is clean, free of trapped air and that all seams are straight and tightly stitched
 - *Spark tester will be calibrated per RMA Bulletin 13
 - *Voltage of spark test will be in accordance with elastomeric lining manufacturer's recommendation
- F. Any unacceptable areas will be marked with chalk and reworked before curing

5.0 Rubber Lining Cure

- A. Temperature, time required, ect. of the cure will be in accordance with the manufacturer's written procedure for the type of rubber lining material used
- B. During the cure process, a uniformed temperature will be maintained
- C. Temperature and pressure will be monitored during the entire curing process
- D. The rubber lining will be cured to attain the hardness value recommended by the lining manufacturer

6.0 Rubber Lining Post Cure

- A. A durometer hardness check of the cured lining will be conducted (see chart on page 4) at various places to insure that all areas are properly cured
 - *Durometer hardness will be in accordance with lining manufacturer
- B. The rubber lining will be checked for blisters, physical damage, looseness and uniformity of splices
- C. A post-cure spark test will be conducted (see chart on page 4) to determine that the lining is clean, free of trapped air and that all seams are straight and tightly stitched
 - *Spark tester will be calibrated per RMA Bulletin 13
 - *Voltage of spark test will be in accordance with elastomeric lining manufacturer's recommendation
- D. If any unacceptable areas are found after the cure, they will be marked with chalk and reworked before re-curing

7.0 Rubber Lining Final Inspection

Prior to calling Quality Assurance for final inspections, the Shop Manager will insure the following has been properly performed:

- A. All checklists are properly documented (see checklist for required items to be checked)
- B. All non-conformance documents are complete

Section H. INSPECTION PROCEDURES: COATINGS

1.0 Raw Materials

All coating materials will be checked for the following:

- A. Shipping damage (punctures, broken lid seal)
- B. Proper identification (type, manufacture date, batch number)
- C. Within shelf life recommended by the manufacturer

1.1 Raw Material Control

- A. As coating materials come in, the Shop Manager will property tag and date materials
- B. Dated coating materials will be listed on the Material Certification Sheets
- C. All coating materials will be properly stored in accordance with the manufacturer's recommended practices

2.0 Surface Preparation

Prior to blasting, the following will be checked:

1. Grit in the blasting unit will be inspected for contamination
 2. The compressed air used for blasting and grit removal shall be free of oil and water contamination
 3. Temperature, humidity and the dew point will be monitored to prevent sweating of the metal surface (see chart on page 5)
-
- A. The surface shall be blasted to a clean gray white metal surface with a minimum profile of 2.0 mils (see chart on page 5), unless otherwise specified
 - B. Blasting material will be removed from the surface using clean oil-free brushes, filtered compressed air or vacuuming
 - C. Surfaces that are not be coated are to be adequately protected from the blasting and coating procedures

3.0 Coating Material Preparation

All coatings will be mixed in accordance with the manufacturer's written instructions

4.0 Coating Application

- A. Prior to application, the surface to be coated will be clean
- B. The application method used shall be in accordance with the manufacturer's written instructions
- C. Temperature, humidity, and dew point will be monitored (see chart on page 5) and will be within the range indicated by the manufacturer's written instructions
- D. After each coat (prime, intermediate and finish), a dry film thickness test (see chart on page 5) will be conducted to insure that the proper mils have been achieved
- E. If the minimum thickness is not achieved, additional coats will be applied in accordance to the manufacturer's written recoating instructions

5.0 Handling and Curing of Coatings

- A. After each coat (prime, intermediate and finish), the minimum and maximum curing times before recoating will conform to the manufacturer's written instructions
- B. Equipment will be protected from condensation, contamination and weather until coating has cured for exterior exposure
- C. Equipment will not be moved, loaded for shipment, or shipped until the coating has cured, except as necessary in turning for coating and drying purposes

6.0 Coating Final Inspection

Prior to calling Quality Assurance for final inspections, the Shop Manager will insure the following has been properly performed:

- A. All checklists are properly documented (see checklist for required items to be checked)

- B. All non-conformance documents are complete

Section I. INSPECTION PROCEDURES: FINAL

- A. After all equipment is complete and assembled, the Quality Assurance Administrator will be called for a final inspection
- B. The Quality Assurance Administrator will:
 - 1. Review all quality assurance documentation
 - 2. Review all non-conformance reports
 - 3. Issue a shipping release
 - 4. Retrieve all documentation and place it in the customer main file

Section J. SHIPPING PROCEDURE

After a shipping release is issued from the Quality Assurance Administrator, each Shop Manager will insure that all equipment is loaded and/or packaged properly for shipping

Section K. COMPUTER TECHNOLOGY

1.0 Administration

- A. Work Order Processing and Control
 - 1. After an order is placed, a work order is entered into our database system
 - 2. Each work order created will contain the following information:
 - a. A unique work order ID number
 - b. A unique work order number
 - c. Customer shipping information
 - d. Customer purchase order number
 - e. Customer requested shipping dates
 - 3. Work orders are then reviewed with the Quality Assurance Administrator and the appropriated Shop Manager
 - 4. Work orders will be tracked through our database to insure that the shipping dates required are met
- B. Purchasing Order Processing and Control
 - 1. All purchase orders will be entered into our database system
 - 2. Purchase orders relating to a specific work order will be referenced to that work order for material/purchasing control
 - 3. Purchase orders will be tracked through our database to insure prompt delivery dates
- C. Digital Pictures
 - 1. After each work order is completed, digital pictures will be taken prior to and after equipment is loaded for shipment, the pictures will then be stored in our database and referenced to the work order
 - 2. All repair work that is received will have digital pictures taken before, during and, after the repair work

Sales Order #		Customer:		DWG:	
Description:					
Spool Number:		Size/Diameter:			
Orientation:					
Dimensions:					

Material Type:		Specification:		Material Certified:	<input type="checkbox"/> Yes <input type="checkbox"/> No
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CODES	1 – None	2 – Minor, acceptable	3 – Major rework	4 – Rejected
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Weld #	Welder	Code	Checked By	Date	Comments
1		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
2		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
3		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
4		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
5		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
6		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
7		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
8		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
9		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
10		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
11		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
12		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
13		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			
14		1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			

Shop Manager **Date**

QA Administrator **Date**

Sales Order #		Customer:		DWG:	
Description:					
Materials Certified:	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Rubber Type and Thickness:		
INTERNAL SURFACE PREPARATION					
Area Tested		Date		Profile	
Sandblasting Spec:	SSPC-SP5				
Materials:	1242 Black Beauty				
INITIAL SPARK TEST					
Area Tested		Date		Voltage	Holidays
					<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes <input type="checkbox"/> No
CURE					
Cure Type: <input type="checkbox"/> Auto-clave <input type="checkbox"/> Exhaust <input type="checkbox"/> Chemical					
Date		Temperature		Pressure	Duration
FINAL SPARK TEST					
Area Tested		Date		Voltage	Holidays
					<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes <input type="checkbox"/> No
					<input type="checkbox"/> Yes <input type="checkbox"/> No
DUROMETER					
Area Tested		Date		Shore A	
EXTERNAL SURFACE PREPARATION					
Area Tested		Date		Profile	
Sandblasting Spec:	SSPC-SP5				
Materials:	1242 Black Beauty				
PAINT (MIL THICKNESS)					
Coating		Date		Mils	
Prime					
Finish					
Coating Spec:					
Materials:					

_____ **Shop Manager** _____ **Date**
 _____ **QA Administrator** _____ **Date**

Testing Equipment	Manufacturer
Surface Profile Comparator	Keane-Tator
Spark Tester	Electron Technic Products
Peak Voltage Calibrator	Electron Technic Products
Shore A Durometer Gauge	Shore Instruments and Mfg. Company
Magnetic Surface Temperature Gauge	PTC Instruments
Dry Film Mil Gauge	Mirko Test
Wet Sponge Porosity Detector	Precision Instruments

COMMENTS



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SHIPPING RELEASE

Sales Order #:		Customer:		PO #:	
Carrier:					
Document Type:	<input type="checkbox"/> Freight Bill <input type="checkbox"/> Delivery Ticket				
Order Completed	<input type="checkbox"/> Yes <input type="checkbox"/> No		Tags Required	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Packing List Required	<input type="checkbox"/> Yes <input type="checkbox"/> No		Billing Info	<input type="checkbox"/> Prepaid <input type="checkbox"/> Collect <input type="checkbox"/> Third Party	
Est. Total Shipping Wt.	LBS				
# of Packages	Type of Package	Description	Estimated Weight	Hazardous	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
	<input type="checkbox"/> Pallet <input type="checkbox"/> Carton <input type="checkbox"/> Crate <input type="checkbox"/> Box <input type="checkbox"/> Loose			<input type="checkbox"/> Y <input type="checkbox"/> N	
Pictures Taken?	<input type="checkbox"/> Yes <input type="checkbox"/> No		Load Checked?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Shop Manager _____ **Date:** _____
 Signature Required

QA Manager _____ **Date:** _____
 Signature Required

Sales Order #		Customer:	
Description:			
Inspection Area:	<input type="checkbox"/> Metal Fabrication	<input type="checkbox"/> Rubber Lining	<input type="checkbox"/> Coating
Discrepancy(s):			
Metal Fabrication	Rubber Lining	Coating	
<input type="checkbox"/> Raw Materials	<input type="checkbox"/> Raw Materials	<input type="checkbox"/> Raw Materials	
<input type="checkbox"/> Welding	<input type="checkbox"/> Surface Preparation	<input type="checkbox"/> Surface Preparation	
<input type="checkbox"/> Fabrication	<input type="checkbox"/> Priming/Cement	<input type="checkbox"/> Application	
<input type="checkbox"/> Cleanup	<input type="checkbox"/> Application	<input type="checkbox"/> Cure	
	<input type="checkbox"/> Pre-cure		
	<input type="checkbox"/> Post Cure		
Comments:			
Checked By			
Date			
Area Foreman:			

Shop Manager	Date
Corrected By:	Date
QA Administrator	Date