DEMYSTIFYING THE TOUCH-UP AND REPAIR REQUIREMENTS OF ASTM A780

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DELIVERING A QUALITY PRODUCT

- Poor quality touch-up & repair leads to eventual maintenance by the user

Specifier Survey:

- 12% users, 30% non-users quoted aesthetics as primary reason to avoid HDG
  - 35% “inconsistency/ difference in appearance” main factor
- AGA Touch Up & Repair Videos

KNOW YOUR REQUIREMENTS

- Common points of ambiguity or confusion between Galvanizer & Customer:
  - Maximum allowable repair size
  - Surface preparation requirements
  - Inspection of prepared surfaces
  - Amount of material application
- For each repair method:
  - Equipment & Materials
  - ASTM, SSPC & NACE surface preparation standards
  - Recent updates to specifications

ASTM INTERNATIONAL

SSPC The Society For Protective Coatings

NACE INTERNATIONAL

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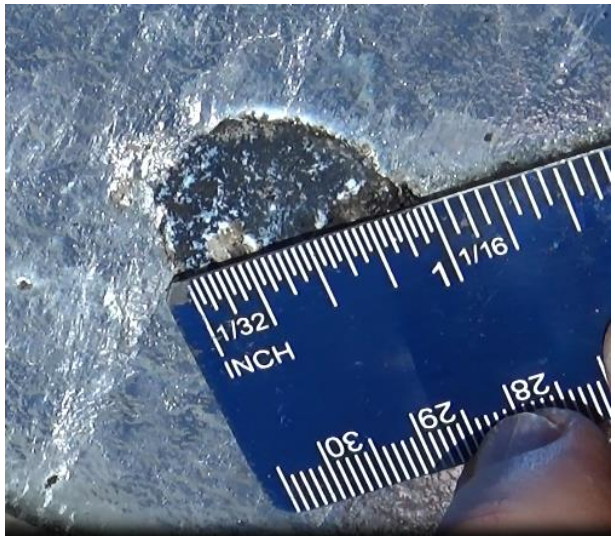
MAXIMUM ALLOWABLE REPAIR SIZE

MAXIMUM ALLOWABLE REPAIR SIZE

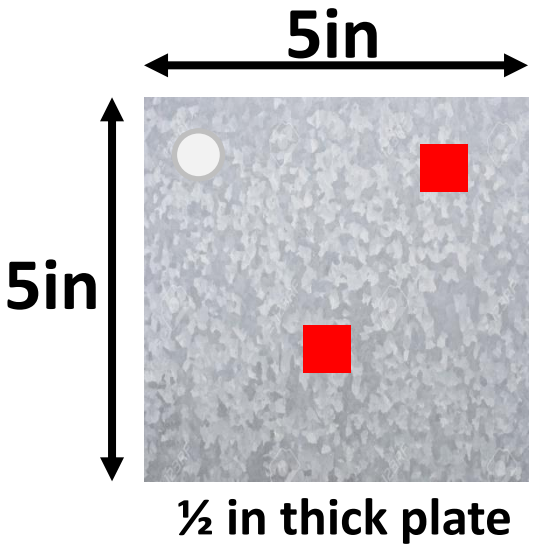
At Galvanizing Plant

- Any Individual Area:
  - ≤ 1 inch in the narrowest dimension
- Total Area (whichever is the most limiting):
  - ≤ 0.5% of accessible surface area of the part
  - ≤ 36 in^2 per short ton of the part

- Size limit applies to repair area **PRIOR** to surface preparation



0.5% SURFACE AREA VS. 36 IN²/TON



- Total Plate Area = 60 in² (includes front, back, sides)
- Each bare spot = ½ in x ½ in
- 0.5% Plate Area = **0.3 in²**
- Total bare area = **0.5 in²**

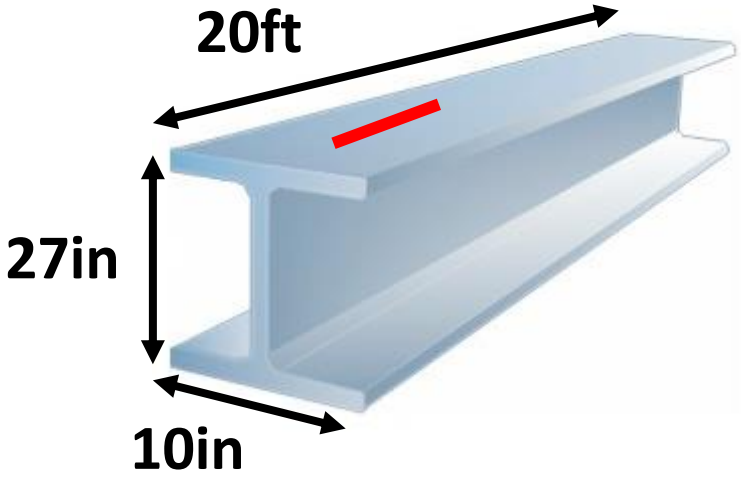
Each Repair Area ≤ 1 inch (Narrowest Dimension) (✔)

Total Bare Area ≤ 0.5% of Surface Area (X)

Total Bare Area ≤ 36in²/ton (✔)

Strip & Re-Galvanize

0.5% SURFACE AREA VS. 36 IN²/TON



- Beam Area = ~10,000 in^2
- 0.5% Area = 50 in^2
- Bare spot (1 x 40 in) = **40 in^2**
- Beam weight = **1 short ton**

Each Repair Area ≤ 1 inch (Narrowest Dimension) (✔)

Total Bare Area ≤ 0.5% of Surface Area (✔)

Total Bare Area ≤ 36in^2/ton (X)

Strip & Re-Galvanize

MAXIMUM ALLOWABLE REPAIR SIZE

In-Field

- After delivery to job site
- Under customer ownership
- No maximum repair size defined per ASTM standards

SURFACE PREPARATION

SOLVENT CLEANING

When is this required?

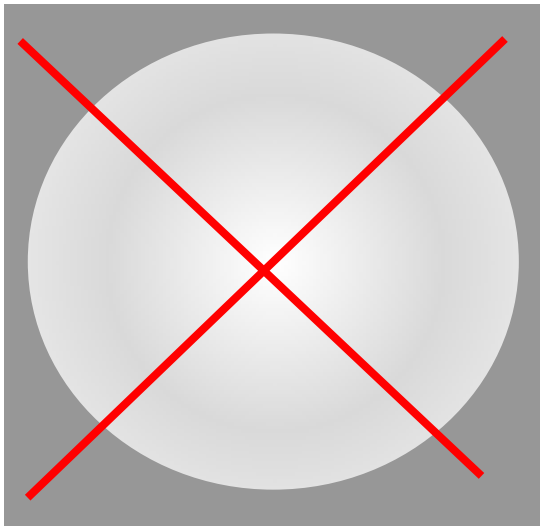
- If contaminants (dirt, oil, grease, etc.) found during required visual inspection prior to mechanical cleaning

- SSPC-SP1
  - Final cleaning with fresh solvent and clean rag/brush
  - Do not use same solvent and rag area used during the main cleaning
- Afterward, perform inspection: no visual contaminants remain

MECHANICAL CLEANING

- Remove weld flux residue or spatter
- 3 options based on material & application:
  - Abrasive Blast Cleaning
  - Power Tool Cleaning
  - Hand Tool Cleaning
- Extend cleaning to the surrounding, undamaged coating

- Do not clean excessively beyond area of repair



ABRASIVE BLAST CLEANING

When is this required?

- Zinc Spray Metallizing
  - SSPC-SP5/NACE No. 1
- Zinc-Rich Paint (for steel in immersion applications)
  - SSPC-SP10/NACE No. 2
- ZRP & zinc-solder if area contains adherent mill scale (not typical)

- Use appropriately sized unit and hose to contain prepped area / physically isolate area
- Blotter Test ASTM D4285
- Inspect blast media SSPC-AB1

POWER TOOL CLEANING (SSPC-SP11)

When is this required?

- Minimum requirement for (non-immersion) zinc-rich paint applications
- Prior to zinc-solder if the area contains loose rust or other loose matter

- Grinding/impact tools only
  - Abrasive cloths, discs, wheels or flaps, rotary flap, cutter bundle, needle gun, wire bristle impact

HAND TOOL CLEANING (SSPC-SP2)

When is this required?

- Areas which cannot be accessed by blast or power tool cleaning
- Removal of loose matter prior to zinc-solder application

- Approved methods:
  - Wire brush, scraping, chipping, and sanding
  - Cannot use stiff-bristle or nylon brush for cleaning

DEBRIS REMOVAL

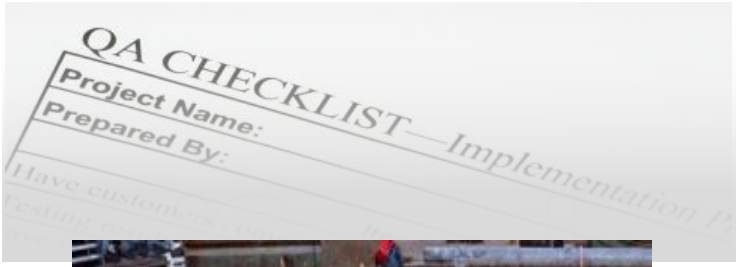
When is this required?

- Always right after:
  - Abrasive Blast Cleaning;
  - Power Tool Cleaning;
  - Or Hand Tool Cleaning

- Remove loose debris such as dusts
  - Brushing (stiff bristle), vacuuming, blowing off with clean dry air, compressed air
- Do not wipe with glove
- Air source must be confirmed dry & clean
  - Blotter Test ASTM D4285

INSPECTION OF PREPARED SURFACES

INSPECTION OF SURFACE PREPARATION & QUALITY CONTROL PLAN



- Full inspection not required after every preparation
  - Visual inspection always required
  - Quality Control Plans should require to inspect repairs on a regular basis to ensure methods consistently meet specification
- Repeat full inspection for any change in method or equipment used

INSPECTION: SURFACE CLEANLINESS

When is this required?

- Visual inspection is always required after mechanical cleaning

- Hand Tool Cleaning
  - No loose mill scale, loose rust, or other loose foreign matter
  - Adherent matter can remain (cannot be removed by putty knife)
  - Optional use of VIS 3 cards

INSPECTION: SURFACE CLEANLINESS

- Power Tool Cleaning
  - No visible oil, grease, dirt, dust, rust, coating, oxides, mill scale, corrosion products, and other foreign matter without magnification
  - VIS 3 cards recommended
- Abrasive Blast Cleaning
  - No mill scale, rust, oxides, corrosion products, or other foreign matter without magnification
  - Some staining allowed (5% per unit area)
  - VIS 1 cards recommended

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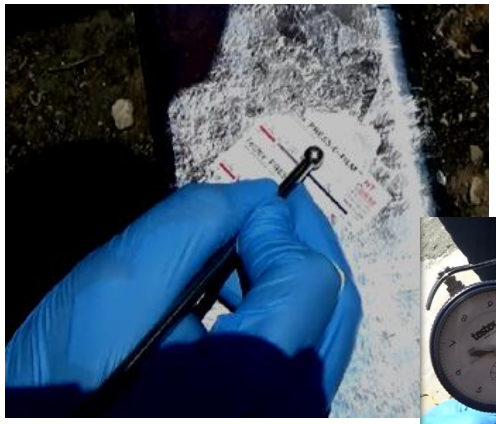
INSPECTION: SURFACE PROFILE

- Hand Tool Cleaning
  - No requirement
- Power Tool Cleaning
  - Min. surface profile 1 mil
  - Surface profile depth micrometer (unless otherwise agreed)
- Abrasive Blast Cleaning
  - Min. surface profile 1 mil
  - ISO visual comparator, surface profile depth micrometer, or replica tape



INSPECTION UPDATES: SURFACE PROFILE DEPTH MICROMETER

Surface Profile Depth Micrometer

Large areas (field repair) require 1 measurement from three 6in x 6in areas i.e. 30 readings

- ASTM D4417
- Zero-out the gauge out prior to each use
- 1 measurement = highest of 10 readings
  - Do not average readings
  - Standards do not address outliers

INSPECTION UPDATES: REPLICA TAPE

- ASTM D4417
- 1 measurement = 2 readings
  - Average the readings
- Profiles between tape sizes require 2 measurements (4 readings):
  - Measurement 1: average 2 readings obtained from each tape size
  - Measurement 2: repeat
  - **Final Measurement:** average measurements 1 & 2

Replica Tape

Large areas (field repair) require 1 measurement from three 6in x 6in areas (6 or 12 readings)

APPLICATION OF HDG REPAIR MATERIALS

ZINC SOLDER

- Do not overheat the surface
- Do not burn the surrounding galvanized coating

ZINC RICH PAINT & ENVIRONMENTAL REQUIREMENTS

- Technical Data Sheets
- Mix the paint
- Be Aware & Record:
  - Application temp, relative humidity, minimum surface temp above dew point
- Methods to inspect:
  - Digital hygrometer, sling psychrometer, surface temperature gauge

ZINC-SPRAY METALLIZING

- A780 does not recommend a specific metallizing procedure
- AWS C2.23M/NACE No. 12/SSPC-CS 23.00 specification often cited, especially for larger field repairs
- Use of a sealer coat not specified by A780

APPLICATION REQUIREMENTS

- Apply material at least 2 mils thick in one pass
  - Do not apply multiple passes in one application

- Limit the amount of repair material applied to the surrounding area (as small as possible)

CONFIRMATION OF COATING THICKNESS

- Calibrate gauges for each shift and per manufacturer instructions
  - Recalibrate if large number of measurements taken or gauge is dropped
- 1 Spot Measurement = average 3 gauge readings within a 1.5 in [4 cm] circle
- Do not take wet readings, wait until “dry time” per spec sheets

INDUSTRY CHALLENGES FOR APPLICATION

Zinc-Solder

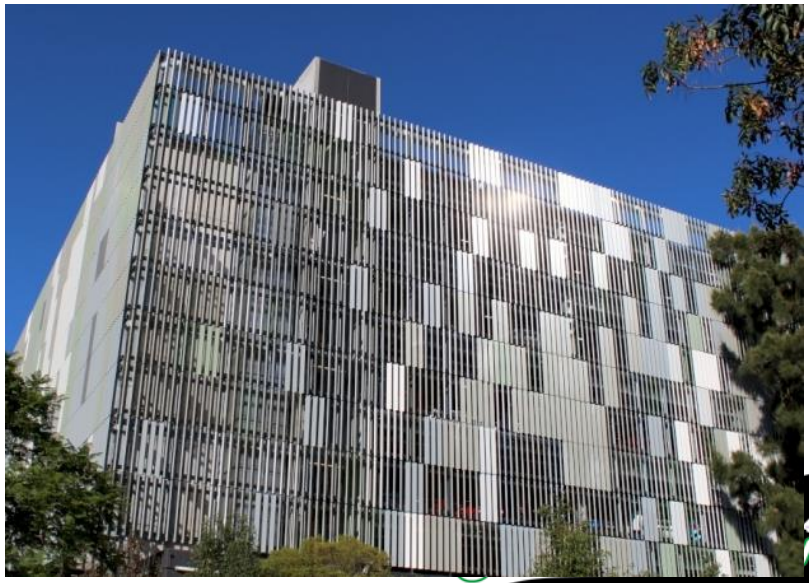
- No multiple passes
- Edges and corners
- ~0.5 – 1.0 mil typical

Zinc-Rich Paint

- ~0.5 mil typical for spray-application (cosmetic only)
- Wait time between coats can be anywhere from 12-24 hrs

Abrasive Blasting

- Control of prepped area size



SUMMARY

- Requirements of ASTM A780, including all referenced specifications
- QC Processes can help with managing inspection requirements
- Strict adherence to touch up and repair requirements increases user satisfaction and ensures project longevity
- AGA Touch-Up & Repair Videos

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QUESTIONS & COMMENTS?