SECTION 10 72 00

WINDOW GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for window guard and transom guard Work as indicated on Drawings and as specified herein, including, but not limited to, the following:
   1. Wire Guards
   2. Expanded Metal Guards
   3. Guards at windows with air conditioning units.
   4. Zinc/Aluminum Metallizing or Hot-Dip Galvanizing with Finish Coating System (exterior guards). Entire system is to be a single source responsibility by the applicator.

1.02 REFERENCE STANDARDS

A. References and industry standards listed herein and throughout this Section are applicable to the Work of this Section. Unless more restrictive criteria is explicitly called-out in these Specifications or mandated by the Building Code, the requirements described in the referenced standard shall be deemed applicable to the Work. This includes language in the documents in the form of a recommendation or suggestion, which shall be deemed as mandatory

B. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. American Welding Society (AWS)

E. The Society for Protective Coatings (SSPC, formerly Steel Structures Painting Council).

F. The American Galvanizers Association

1.03 SUBMITTALS

A. Product Data
   1. Catalog sheets
   2. Submit manufacturers' specifications for Zinc Metallizing or Hot-Dip Galvanizing.
   3. 85/15 Zinc/Aluminum wire
   4. Epoxy paint system or powder coat system

B. Shop Drawings
   1. Location schedules
   2. 2. Section and connection details at 3/4" = 1'-0" scale, minimum, of Work in this Section.
   3. Indicate how release mechanisms are coordinated with operating sash on shop drawings

C. Samples
   1. Provide 12" x 12" samples of each type of wire mesh and expanded steel sheet, framed with angles or channels. For exterior window guards, the coatings shall be stepped to show each specified coating layer on front and back of sample, with one-third of the sample having the zinc exposed. Samples shall meet the properties, performance and inspection requirements for window guards as specified herein.

D. Quality Control Submittals
   1. Test Reports: Submit test reports for zinc metallizing or hot dip galvanizing and coating system as specified herein, paragraph 2.02.H. titled “Galvanizing by the Zinc Metallizing Process or Hot Dip Galvanizing; and Finish Coating”.
   2. Certifications: Submit certification from coating applicator stating the square footage of guards zinc metalized or hot dip galvanized and coated.
   3. Qualifications:
      a. Zinc Metallizer: Provide proof of Zinc Metallizer’s qualifications specified under “Quality Assurance”; certification of qualifications by one of the following:
         1) A branch of the U.S. Dept. of Defense (DoD), or

2) A company certified by U.S. Dept. of Defense (submit DoD certification for this company), or
3) The Society for Protective Coatings (SSPC)

b. Hot Dip Galvanizer: Provide proof of Galvanizer's qualifications by submittal of the following:
1) Galvanizer's written Quality Control/ Quality Assurance manual for hot dip galvanizing and factory applied coatings.
2) Certification from the American Galvanizers Association that Galvanizer has completed all course requirements and is a certified Master Galvanizer.

E. Warranties
1. Warranties as specified in Article 1.06.

F. Extra Materials
1. For factory painted items, Manufacturer/Fabricator shall provide touch-up paint in sufficient amount for Project.

1.04 QUALITY ASSURANCE

A. Items provided in this Section shall be manufactured and fabricated by firms experienced in type of Work specified.

B. Installation shall be by Installers experienced in type of Work specified for respective item.

C. Zinc metallizer: The company and/or individuals responsible for application of zinc metallizing shall be certified as qualified to perform this process by one of the following. The firm shall also be responsible for applying the finish coatings and have single source responsibility for the entire coating system and meet the warranty requirements:
1. Certification in accordance with Mil Std 2138 or Mil Std 1687 by a branch of the U.S. Dept. of Defense, or by a company that is certified by the Dept. of Defense in accordance with either one of these military standards.
2. Thermal Spray Certification by The Society for Protective Coatings (SSPC).

D. Hot-Dip Galvanizer
1. Certification from the American Galvanizers Association that Galvanizer has completed all course requirements and is a certified Master Galvanizer.
2. Certification from the manufacturer of the powder coatings that the galvanizer is an approved applicator of said manufacturer's material and meets all application and performance criteria

1.05 DELIVERY, STORAGE, AND HANDLING

A. Before and during shipment to Site, adequately protect products.

B. Store products in conditions required to protect from damage.

1.06 WARRANTY

A. Window guard manufacturer's written warranty shall be provided for window guards for labor and materials for two years from date of acceptance.

B. The coating applicator's/Contractor's warranty that units shall not show signs of rust, and finish shall be fully warranted against peeling, cracking, crazing, blistering, chalking and fading for a period of 5 years from date of installation of products. If rusting or failure of coating occurs, new window guards shall be provided or coating shall be refurbished in the shop. Warranty includes labor to remove and replace the items.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Window Guards:
1. Star Wire Mesh Fabricators, New York, NY
2. Kenco Wire & Iron Products, Inc., Keansburg, NJ
3. Harmony Products, Inc., Emigsville, PA

4. S & L Industries Inc., Brooklyn, NY
5. Kane Manufacturing Corp., Kane, PA
6. Avant Guards Manufacturing, Brooklyn, NY
7. MBA Bros. Inc., Maspeth, NY
8. Faith Construction Inc., Brooklyn, NY

B. Zinc Metallizing-Finish Coating Applicator:
1. Atlantic Coast Metallizing & Coatings Corp., Melville, NY
2. Avant Guards Manufacturing, Brooklyn, NY
3. East Coast Metallizing & Coating Systems Inc., Westbury, NY
4. Island Wide Sandblasting Inc., Wyandanch, NY
5. Reneuxit LLC, West Chester, PA

C. Hot Dip Galvanizing with Powder Coating Finish
1. Duncan Galvanizing Corp., Everett, MA

D. Powder Coating Materials
1. Tiger Drylac, Ontario, California; Series 38 Super Durable Powder Coating.
2. PPG Industries, Pittsburgh, PA; Coraflon Ultradurable Powder Coating.
3. The Sherwin-Williams Co., Cleveland, OH; Powdura Super Durable Powder Coatings Series.

2.02 MATERIALS

A. Provide window guard Work as shown on the Drawings and as specified herein.
1. Wire Mesh Guards
a. Steel wire: 11 gage, 1¼" diamond mesh
b. Provide 7/8" channel frames covered with 1/8" thick filler where indicated on Drawings.
2. Expanded Metal Guards
a. Carbon steel sheet: MIL-M-17194D.
b. Window Guard Type A: No. 9, 1½" Diamond Pattern, 0.110" thick, Type II (flattened), Class II
c. Window Guard Type B: No. 6, 1½" Diamond Pattern, 0.1943” thick, Type I (standard), Class II

B. Provide braces, clip angles, expansion bolts, tap screws, and other accessories required to set and secure wire mesh and expanded sheet metal Work in place.

C. Padlocks for guards are specified under Hardware, Section 08710. Rivet padlock chains to guards as directed by the Authority.

D. Hot-rolled steel members: ASTM A36.

E. Cold-rolled steel members: Grade C.

F. Connection Bolts: Stainless steel for exterior work; ASTM A307 for interior work.

G. Expansion Bolts: Zinc plated carbon steel.

H. Galvanizing by the Zinc Metallizing Process or Hot-Dip Galvanizing; and Finish Coating:
1. Zinc/aluminum metallizing (referred to herein as zinc metallizing) is the process of thermally applying an 85/15 zinc-aluminum wire over the surface of steel.
2. Zinc metallizing or hot-dip galvanizing and finish coating system shall have the following performance characteristics and results of tests performed on representative samples. Finish coating for metallizing shall be either epoxy coating system or powder coating. Finish coating for hot dip galvanizing shall be powder coating (Refer to paragraph 3 below for acceptable system):
a. Adhesion: Test zinc metallizing or hot dip galvanizing with complete finish coating (epoxy coating system or powder coating system) in accordance with ASTM D4541, Test Method E. Pull-off strength throughout the system shall be not less than 750 psi before and after environmental cycling.

b. Environmental cycling shall be 10 cycles of the following: 4 hrs at 100% humidity per ASTM D1735; 16 hours below 0°F; and 4 hours at 140oF.
c. Corrosion resistance of zinc metallizing or hot dip galvanizing with epoxy coat system or powder coating: A rating of 10 after 1000 hours salt fog (prohesion method) when tested in accordance with ASTM D1654, Procedure A. Scribe shall be cut through all coatings to bare steel substrate. Expose specimens in accordance with ASTM G85.
d. Powder coating complying with the following ASTM standards:
    1) Adhesion: ASTM D3359, no loss.
    2) Hardness: ASTM D3363 (pencil), H min.
e. Falling Sand: ASTM D968 20L/mil.
f. Salt Spray: ASTM B117, passes 3000 hrs.
g. Humidity: ASTM D2247, 3000 hours, few #8 blisters.
h. Impact Resistance (3mm): ASTM D2794, no loss.
i. Color Retention: ASTM D2244, 5 year less than or equal to 5 delta E.
j. Chalk Resistance: ASTM D4214, #8 rating.
k. Gloss Retention: ASTM D523, greater than or equal to 30 percent retention.
l. Erosion Resistance: ASTM B244, less than 10 percent film loss.
m. Compliance: AAMA 2604.

3. Hot Dip Galvanizing with Powder Coating Finish
    a. As a system equivalent to zinc metallizing, it is permitted to use the Duncan Colorgalv Thermoset process of hot dip galvanizing with powder coat finish. Galvanizing coating thickness grade per ASTM A123 shall be 100, with DFT mil thickness coating not less than 3.6 to 3.9 mils.
    b. Powder coating thickness shall be as specified in this specification. Coating shall include an architectural grade primer.
4. Galvanizing repair paint for regalvanizing welds and damaged areas shall conform to ASTM A780 and comply with Military Specification MIL-P-21035, such as ZRC Cold Galvanizing Compound.

2.03 FABRICATION

A. Welding shall comply with requirements of AWS. Grind welds smooth.

B. Frames shall be mortised and tenoned at corners.

C. Unless otherwise indicated, hang guards with galvanized 31/2" x 21/4" fast pin steel butts and secure in place with hook rods, snaphooks, and chains. Provide interior guards with vertical slots for passage of window poles.

D. Provide padlocks for guards at windows in stair enclosures, corridors toilet rooms and at roof levels above street level, in lieu of hook rods, snaphooks, chains and pins. For padlocks, see Section 08710.

E. Window guards, unless otherwise shown, shall cover entire window opening. Where hinged guards cannot be opened due to obstructions, provide removable upper sections.

F. Provide windows at roof levels with hinged guards on lower sash

G. Provide angle steel frames and accessories of size and shown on Drawings or otherwise required to meet the requirements of this Section.

H. Window Guards over 8'-0” high shall be fabricated in 2 sections.

I. All screws and bolts shall be tamper-proof.

J. Provide an open hole for each exterior window guard where required to permit access to the operating latch for the Fire Department. These hand holes shall be provided only at locations above the first floor, or one story above low roofs. Provide trim around all 4 sides of hand hole to cover edges of wire mesh or expanded metal.

K. Provide an open hand hole for each interior window guard where required to permit access to the operating latches of projected windows. Provide trim around all 4 sides of hand hole to cover edges of wire mesh or expanded metal.

2.04 EXTERIOR WINDOW GUARDS

A. Provide exterior guards for windows and transoms as indicated on Drawings. Guards shall be of expanded metal unless otherwise shown on Drawings.

2.05 INTERIOR WINDOW GUARDS

A. Provide interior guards at locations indicated on Drawings. Guards shall be of wire mesh unless otherwise shown on Drawings.

2.06 WINDOW GUARDS AT AIR-CONDITIONER WINDOWS

A. Fabricate to enclose air conditioners on all five sides as detailed on Drawings.
   1. Opening and boxed area for air conditioners shall be large enough to allow window guard to swing open where conditions permit.
   2. Where conditions do not permit guard to open with basket fabricated as part of window guard, fabricate guard in two sections with lower basket section fixed in place and upper section operable.

B. New Guards
   1. For new window guards, provide expanded metal, Type A or Type B as indicated in Par. 2.02 A.2

C. Existing Window Guards
   1. Where existing guards need to be extended or modified in existing installation, match new work with construction of existing guards, unless indicated otherwise on Drawings or specified herein.
   2. Alter existing guards, where applicable, to suit conditions and location of new air conditioner.

2.07 GALVANIZING BY THE ZINC METALLIZING PROCESS AND COATING

A. Cleaning and Surface Preparation
   1. Clean in accordance with SSPC-SP10 before zinc metallizing. Surface shall have a 3.0 to 4.0 mil anchor pattern. Moisture cannot be present on steel and temperature cannot be less than 5oF above the dew point. Thermal spray must be applied within 4 hours of blasting.

B. Shop Coat - Zinc Metallizing: provide for galvanized items to have finish paint.
   1. Thermally spray material at a rate of 4.0 to 6.0 mils DFT. Sprayed coating shall be free of lumps, blisters, and loosely adhering particles. Coating shall be capable of passing the inspection requirements of Mil Std 2138A(SH) of 5/13/92, but with adhesion 750 psi minimum per ASTM D4541, Test Method E.
   2. After material has cured, apply epoxy coat system, or powder coating system, as described in the Article below titled “Painting”.

2.08 GALVANIZING BY THE HOT-DIP PROCESS AND POWDER COAT FINISH

A. Provide coating for iron and steel fabrications applied by the hot-dip process. Galvanizing bath shall contain special high grade zinc and other earthly materials.
   1. Comply with ASTM A123 for fabricated products and ASTM A153 for hardware, with zinc coating thicknesses not less than those specified in this specification Section 10720, 3.6 to 3.9 mils DFT.
   2. Fill vent holes after galvanizing, if applicable, and grind smooth.
   3. Galvanizing shall exhibit a rugosity (smoothness) 4 rug or less (16-20 microns of variation) when measured by a profilometer over a 1” straight line on the surface of elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments.
   4. The incoming material shall be inspected, material hung on a rack or chain to be galvanized.
   5. Material submerged into caustic cleaner removing the organics from the surface and rinsed with water.

6. Material pickled with hydraulic acid removing iron oxides from the surface and rinsed with water.
7. Material submerged into a flux removing any oxides that have formed after pickling and protecting the material from further formation of additional oxides before being galvanized.
8. The material submerged into Zinc bath at 850°F.
9. The material shall be allowed to naturally cool and not quenched with water or chemicals.
10. The galvanizing shall be inspected and pre-finished, removing edge tears, spikes, drips, or sharp protrusions which could cause potential harm to someone handling or using the material.
11. The Galvanized material shall be abraded to create a 1-1.5 mil profile for surface preparation. The profile shall be produced by abrasive blasting and or hand abrading.
12. The galvanized material shall be inspected prior to powder coating to determine conformance of the material to ASTM A123 and this specification section for quality and thickness of zinc coating, not less than 3.6 to 3.9 mils DFT.
13. The galvanized surface profile shall be measured at 1-1.5 mils and recorded utilizing Press-O-Film tape.
14. All galvanized material shall be outgassed after profiling and before powder coat application.
15. A coating inspection form shall be filled out completely with material information, application conditions, and quality standards.
16. All powder coating products shall be electrostatically applied following the recommendations of the powder supplier and the requirements of the powder coating Manufacturers Technical Data Sheet, and with Dry Film Thickness not less than is specified in this specification.
17. The first coat shall consist of an Epoxy Primer powder applied at not less than 2.0 - 3.0 mils Dry Film Thickness. The powder shall be heated to 400°F to provide adhesion with the next coat of powder, and in accordance with the manufacturer's recommendations.
18. The next coat of powder to be applied shall be Sherwin Williams Powdura Super Durable or approved equal applied at a dry film thickness of not less than 4.0-5.0 mils. The surface of the fabrications after applying the powder shall be heated to 400°F for at least 10 minutes to cure the powder and in accordance with the manufacturer's recommendations. The color of the powder shall match the approved color sample that will be approved by the Project Architect.
19. All repairs of galvanizing shall follow ASTM A780.
20. All repairs to powder coating shall be sanded and feathered with the surrounding area. The damaged area shall be cleaned and abraded to receive a powder or liquid coating. The liquid coating can be applied using either a spray or brush method.
21. Apply powder coating system within time frame after galvanizing as part of the Duncan Colorgalv process to ensure oxides will not form and GoldGalvthermoset process will be complete.

2.09 PAINTING

A. Interior window guard Work, including frames, wire mesh, and accessories shall have one shop coat of Tnemec 115 Unibond paint. After erection or installation, all damaged shop coat and surfaces of bolts and rivets shall be touched up with type of paint. For finish painting, see Section 09900.

B. Exterior window guard work consisting of steel wire mesh and expanded steel sheet, including frames, hinges, connection bolts, expansion bolts, and miscellaneous parts and fittings, shall be factory-coated with zinc metallizing and then painted with epoxy coating system finish or powder coating finish.
   1. Epoxy Coat System over zinc metallizing - factory-applied
   2. 1st Coat - Polyamide Epoxy Paint
   3. such as Tnemec Series 27 FC Typoxy,
      a. applied at the rate of -- 4.0 to 6.0 Mils DFT.
         SSPC-PS Guide 13.01.

4. 2nd Coat (Top Coat) - Acrylic
5. Aliphatic Polyurethane
6. such as Tnemec Series 73
7. Endura-Shield,
    a. applied at the rate of -- 2.0 to 3.0 Mils DFT.
    SSPC-PS Guide 17.00 Type 5.
8. Powder Coating System over zinc metallizing - factory-applied
    a. Oven bake item for 20 minutes at 450°F, and remove all oil and grease. Cool surface to 72°F, clean with an organic solvent. Apply paint within 3 hours of final cleaning.
    b. Apply an out-gas-forgiving primer at the rate of 2-3 mils DFT. Oven cure material at 400°F for 10 minutes.
    c. In order to avoid oxidation, final topcoat must be applied within 12 hours.
    d. Apply a lead-free TGIC polyester powder topcoat finish at a rate of 4-5 mils DFT. Colors, as selected by the Project Architect.
    e. Oven cure at 400°F to 450°F, for 30 minutes, or as recommended by coating manufacturer.

C. Paint finish shall be smooth and even, without bubbles, blisters, cracks, pinholes, peeling, crazing, drips, runs, or other defects.

2.10 SOURCE QUALITY CONTROL

A. Verification of Coating Thickness
1. The Authority may measure coating thickness and will reject work that does not conform to required minimum thicknesses. At its discretion, the Authority may evaluate the zinc metallizing, hot dip galvanizing, and paint coatings using a modification of the procedures described in The Society for Protective Coatings, Measurement of Dry Coating Thickness with Magnetic Gages, SSPC-PA2.
2. The Authority may at its discretion reject all similar units if a significant quantity of units is found to be deficient and the Contractor shall remove, refinish, and reinstall them at no additional cost to the Authority.
3. The Authority may perform destructive probes of the coating to verify thickness if the non-destructive means are non-conclusive or there is a question as to the thickness of each coat of material. The contractor shall include in its bid the cost of shipping and refurbishing of coatings used for such destructive testing (Provide for a minimum of 5). If found defective, additional tests will be taken and any refurbishment will be at no cost to the Authority.).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install continuous steel angles and angle clips at masonry jambs for hanging of window guards. Anchor angles to masonry with 3/8" diameter zinc plated sleeve anchors at 16" o.c. max.
1. Erect guards and other Work of this Section, rigid, straight and plumb, with horizontal lines level.
2. Secure all connections and attachments.

3.02 ADJUSTING

A. Adjust guards and hardware and leave in “like-new” working order.

3.03 CLEANING

A. Clean Work of this Section upon completion.

B. Remove debris resulting from Work of this Section.

END OF SECTION