

## SECTION 05501 - IN-PLANT GUARDING SYSTEMS

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. This section includes the following:
  - 1. Handrail system
    - a) Knuckle fitting handrail system

#### 1.2 SUBMITTALS

- A. Product Data for products used in Guardrail, bumper post, or handrail fabrication or installation including anchor bolts, concrete and grout.
- B. Shop drawings showing fabrication and illustrating erection of bumper post, handrail or guardrail. Include plans, elevations, sections and details showing component connections and anchorage. Provide templates for anchors installed under other sections.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURER

- A. IDEAL SHIELD  
2525 Clark Street  
Detroit, Michigan 48209-1355  
Phone # 800-731-1722

## 2.2 MATERIALS

- A. Rolled Plates and Shapes: ASTM A36.
- B. Steel Pipe: ASTM A53, Grade B, Type E or S, Schedule 40 unless otherwise noted.
- C. Tubing: Cold formed shapes per ASTM A500 or hot-formed shapes per ASTM A501. Wall thickness for either category shall be in accordance with the thickness and tolerances specified in ASTM A501.
- D. Bolts: ASTM A307, Grade A, with hexagon heads or nuts where exposed in the finish work, with flat heads for countersinking where flush bolting is specified or required.
- E. Plastic Cover: Polyethylene Thermoplastic (HDPE) tubes having ultra-violet resistance and anti static properties, nominal thickness 0.250 inches. Color shall be OSHA yellow unless otherwise noted. Size covers for pipe diameters.
- F. Grout: Nonshrink, nonmetallic type per CE CRD-621 and ASTM C1107. Grout shall be pre-mixed and factory-packaged. Formulation shall be nonstaining, noncorrosive, nongaseous properties. Provide grout similar to Dayton Superior "Sure-Grip Utility Grout" or as recommended by grout manufacturer for interior or exterior applications.
- G. Anchor Bolts:
  - 1. Expansion Anchors: Threaded stud type with two independent expansion anchor wedges per Fed. Spec. FF-S-325, Group II, Type 4, Class 1 for concrete expansion anchors. Stud, wedges, washer and nut shall be zinc-plated steel.
    - a. Hilti Fastening Systems, "Kwick Bolt".
    - b. Molly Fastener Group, "Parabolt".
    - c. Red Head, Phillips Anchors, "Wedge Anchors".
  - 2. Adhesive Anchor System: Self contained glass vial containing pre-measured amounts of quartz sand, hardening agent and polyester resin. Studs shall be threaded rod conforming to ASTM A307 with compatible washers and hexagon nuts furnished by the anchor manufacturer.
    - a. Hilti Fastening System, "HVA".
    - b. Molly Fastener Group, "Parabond".
    - c. Ramset Fastening System, "Chemset".
- H. Concrete: Provide 3000 PSI, 28-day strength concrete unless noted otherwise. ASTM C94, slump of 4 inches  $\pm$ 1 percent.
  - 1. Exterior Concrete: Include air-entrainment of 6 percent  $\pm$ 1 percent.
  - 2. Cement: ASTM C150, Type 1.
  - 3. Aggregates: ASTM C33 normal weight, natural coarse aggregate, maximum 3/4-inch diameter.
  - 4. Water: Potable.

## 2.6 HAND RAIL SYSTEM

- A. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads based on 2000 international building code, without exceeding allowable design working stresses of materials for handrails, railings anchors, and connections:
1. Top Rail of Guards and hand rails: Capable of withstanding the following loads as indicated:
    - a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
    - b. Uniform load of 50 lbf/ft: (730 N/m) applied in any direction at the top and to transfer this load through the supports to the structure.
    - c. Concentrated and uniform loads above need not be assumed to act concurrently.
  2. Intermediate rails, balusters and filler panels: Capable of withstanding the following loads applied as indicated:
    - a. Applied normal load of 50 pounds (0.22kn) on an area not to exceed 1 square foot including openings and space between rails.
    - b. Reactions due to this loading are not required to be superimposed with the proceeding section.
- B. Provide handrail system complying with the following requirements:
1. Slip on fitting system with exposed knuckle connectors.
    - a. Rails and Posts
      - 1) Steel pipe scheduled 40. Posts and rails 1¼ inch, with high-density polyethylene thermoplastic coating, nominally 0.125 inch thick.
      - 2) Extruded Aluminum Pipe ASTM B429, Aluminum alloy 6061-T6., Finish AA M10C22A41. Posts – 1 ½ inch IPS Schedule 80, Rails – 1 ½ inch IPS Schedule 40.
    - b. Mechanical Connectors
      - 1) Post and handrail connector fittings
      - 2) Sand-cast of aluminum alloy 535 (ASTM B26)
      - 3) Anodize finish 0.7 mil minimum thickness.
      - 4) Design – Fittings shall be the type, which fastens to the exterior of the pipe by means of a stainless steel internal/external knurl cup point set screw (ASTM F880).
      - 5) No other fasteners will be accepted.

- c. Flanges
  - 1) Sand cast from aluminum alloy 535 (ASTM B26)
  - 2) Supplied with anodize finish.7mil minimum thickness.
  - 3) Design – Fittings shall be the type, which fastens to the exterior of the pipe by means of a stainless steel internal/external knurl cup point set screw (ASTM F880).  
All anchoring hardware shall be 300 series stainless steel.
- d. Fasteners
  - 1) All fasteners to be 302 or 304 stainless steel.
  - 2) No pop rivets of sheet metal screws will be accepted.

#### C. Infill material

- 1. Intermediate rail: {steel 1¼ inch scheduled 40 with polyethylene thermoplastic}{aluminum 1½ inch scheduled 40}
- 2. Wire cloth - {specify type of material, gauge of wire, size of mesh opening}
- 3. Wire mesh, welded - {specify type of material, gauge of wire, size of mesh opening}
- 4. Perforated polymer – {specify type of material, thickness, perforation size and shape, arrangement of perforations}
- 5. Pickets- {7/16” OD solid rod with 0.625 polyethylene thermoplastic}{1/2” OD aluminum anodized tube}
- 6. Custom

#### D. Finish

- 1. Polyethylene thermoplastic: {OSHA yellow} {as selected by Architect/Engineer from 27 earthtone colors}.
- 2. Aluminum: {anodized} {powder coating} {custom}

### PART 3 EXECUTION

#### 3.1 INSTALLATION

##### A. Installation Options

- 1. Core
- 2. Base Mount

END OF SECTION