



Division 05 Metals

05 05 00 Common Work Results for Metals

05 05 10 General Requirements for Metals

1. Handrails and guardrails for all UW-Madison facilities shall comply with all of the provisions of the latest version of the Division of Facilities Development & Management (DFDM) *Guideline for Exterior Stair Handrail or Retaining Wall Guardrail Post Anchorage*, which is available from the DFDM website.
2. Metal Cladding for all UW-Madison facilities shall comply with all of the provisions of the latest version of the Division of Facilities Development & Management (DFDM) *Minimum Requirements and Guidelines for the Exterior Building Envelope*, which is available from the DFDM website.
3. References within the DFDM Guidelines regarding the DFDM Project Manager shall apply to the UW-Madison Project Manager on UW-Madison Managed Projects.
4. Project Specifications shall use as their basis all appropriate sections of the latest edition of the DFDM Master Specifications.
5. Deviations from DFDM's Minimum Design Guidelines or the DFDM Master Specification sections shall be made only upon approval from the UW-Madison Project Manager.
6. The Guidelines for Planning and Design of UW-Madison Facilities shall take precedence over DFDM Guidelines, but the A/E shall discuss all conflicts within the guidelines and specifications with the UW-Madison Project Manager.
7. The goals and guiding principles of the UW-Madison Campus Master Plan (latest edition) shall be considered and referenced as part of the planning, design, detailing, and material section for every project.
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05 50 00 Metal Fabrications

05 50 90 Miscellaneous Metal for Utilities - based on DFDM specifications

05 50 93 Products for Miscellaneous Metals for Utilities

1. Structural Steel Stanchions for Pipe Anchors, Guides, and Supports:
 - 1.1 Structural and Miscellaneous Steel: W-shaped members shall conform to ASTM A992 $f_y = 50$ KS1. Structural tubing shall conform to ASTM A500 Grade B. Angle plates and channels shall conform to ASTM A36. Piping supports, guides and anchor steel for steel piping as shown on drawings, will be furnished under Division 23.
 - 1.2 Priming for Steam, Condensate and Air Pipe: Shop-primed painting of structural steel shall be one coat of ethyl silicate inorganic zinc-rich equal to TNEMEC Tneme-zinc 90-96. Primer shall be suitable for temperature to at least 500° F. Shop surface prep shall be SSPC-SP6 Commercial Blast Cleaning.



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- 1.3 High strength bolts, nuts and washers shall be made of heat treated steel; and shall conform to requirements of ASTM A325. Provide interference body bearing type where indicated.
 - 1.4 Headed welded studs shall conform to ASTM A307.
 - 1.5 Epoxy anchors shall be HIT HY150 as manufactured by Hilti, Inc., or approved equal.
 - 1.6 Anchors rods, anchor bolts, nuts and washers shall be stainless steel.
 2. Floor Supports:
 - 2.1 Fabricated steel channels, plates, etc. as detailed on drawings. Hot dip galvanize all steel members.
 3. Lintels Structural Steel:
 - 3.1 Hot dip galvanized ASTM A36 angles, shapes and plates.
 4. Utility Tunnel Grating:
 - 4.1 Sump Pit Grate: 1 inch hot dip galvanized grating with cast in fabricated steel frame. Frame hot dip galvanized.
 5. Utility Tunnel Frames and Covers:
 - 5.1 Furnish manhole entrance covers and frames as shown. Frames shall be installed as shown on drawings.
 - 5.2 Cover: ¼ inch thick aluminum diamond plate, 300 psf live load rating, mill finish, stainless steel hold open arm with aluminum release handle hinges, stainless steel hardware, recessed lock box with keyed cylinder lock and underside release knob and bitumastic coating on surfaces contacting concrete.
 - 5.3 Cover and frames shall be Halliday, WIR, Bilco or approved equal.
 - 5.4 Frame: ¼ inch thick extruded aluminum with continuous concrete anchor, with 1-1/2 inch aluminum coupling for drain.
 - 5.5 Guarantee: 10-year material.
 6. Chilled Water Vent Manhole Casting:
 - 6.1 Manhole Frames and Covers: ASTM A48; Class 30B; gray cast iron; machine finished with flat bearing surfaces. ALL applications – heavy duty frames and covers: Neenah Foundry Catalog No. R-1792-HL.
 7. Signal and Power Vault Castings:
 - 7.1 Manhole Frames and Covers: ASTM A48; Class 30B; gray cast iron; machine finished with flat bearing surfaces.
 - 7.2 ALL applications - heavy duty frames and covers:



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- 7.2.1 Power Manholes: Neenah Foundry Catalog No. R-1792-JL (Lettering “FACILITIES INITIALS - POWER”)
 - 7.2.2 Signal Manholes: Neenah Foundry Catalog No. R-1792-HL (Lettering “FACILITIES INITIALS- Signal”)
 - 7.3 Sump Pit Grate: ASTM A48; Class 30B, gray cast iron; light duty sized to fit sump pit, with frame.
 - 8. Utility Tunnel – Steam Pit / Ladders:
 - 8.1 Construct ladders of 3/8 x 2-1/2 inch steel bar side rails with 3/4 inch diameter twisted bar steel rungs, headed into rails, approximately but not over 12 inch o.c. Ream holes in side rails, plug weld solid and grind smooth.
 - 8.2 Anchor ladder at bottom and top and at intermediate points not over 5 feet o.c. with brackets secured to wall with expansion or toggle bolts. Bolts shall be Red Head stainless steel bolts and washers. Ladders shall be hot dip galvanized.
 - 8.3 Provide ladders with steel “safety post”. Manufacturer: Okeeffe, or Halliday.
 - 9. Air Vent Screens:
 - 9.1 Provide 1/4 inch stainless steel rodent screen mounted to inside face of masonry venting units. Fastened in vent opening with stainless steel clip angles and stainless steel bolts and expansion shields.
 - 10. Air Vent Grating:
 - 10.1 Grate shall be swaged aluminum rectangular bar grating, 15/16 inch spacing, 1 1/2 inch depth, mill finish, angle frame mounting, as manufactured by Ohio Gratings, Inc. (800-321-9800) or equal. Color: Black
 - 10.2 Grate frame shall be cast into concrete vent opening. Fasten grating to cast in frame per manufacturer’s specification.
 - 11. Louvers:
 - 11.1 Provide aluminum louver panels with stationary narrow profile blades. Louvers shall have a high free area and low air flow resistance as manufactured by Greenheck model ESU-130 or approved equal, phone (715) 359-6171.
 - 11.2 Louver shall have a standard channel frame with max width of 1.5 inch and frame and blade thickness shall be min. of 0.63 inch, color black, fastened in vent opening with stainless steel bolts and expansion shields.

02 50 97 Execution for Miscellaneous Metals for Utilities

- 1. Fabrication:
 - 1.1 Mechanical Contractor shall furnish anchor bolts, one piece shop fabricated and shop painted main structural steel (including embedment plates, vertical and horizontal steel) used for the support of steam, condensate, air and chilled water piping. Mechanical Contractor shall turn over the anchor bolts, one piece shop fabricated embed plates, and main pipe support steel to the General Contractor to cast in place.



Mechanical Contractor shall provide anchor steel, supports and guides that attach to the steel piping in the tunnel. Anchor bolts shall be cast in place stainless steel bolts. Turn over the one piece shop fabricated steel with embedment plates and anchor bolts to the General Contractor to form into the concrete tunnel walls. See drawings for details.

- 1.2 Work shall be made and erected square, plumb, straight and true, smooth, accurately fitted joints and intersections. Work shall be adequately reinforced and anchored in place. Shearing and punching shall leave clean, true lines and surfaces. Weld permanent connections. Insofar as possible, work shall be fitted and shop assembled, ready for erection. All materials exposed to skin welds shall be ground smooth. Grind off sharp areas of exposed steel including sheared edges.
- 1.3 Do cutting, fitting, drilling, welding, tapping, etc., as may be required to complete this work and to join or accommodate work of other trades.
- 1.4 New steel pipe anchors, guides and supports shall be shop primed and intermediate coat applied in accordance with paint requirements of Section 09 90 00 Painting.
- 1.5 Welding shall be in accordance with code of American Welding Society. Before welding, clean surfaces of loose scale, rust, paint or other foreign matter and properly align. After welding, brush welds with wire brushes. Welds shall show uniform section, smoothness of weld metal, weather edges without overlaps and freedom from porosity and clinkers. Where necessary to achieve smooth connections, joints shall be dressed smooth. All welding shall be done by certified welders.

2. General:

- 2.1 Include fabrication and erection of all metal work complete, including all required shapes, clip angles, bolts, hangers and accessories to complete metals work. Grind off sharp areas of exposed metals including sheared edges.
- 2.2 Except as amended herein, materials and workmanship shall be in accordance with each applicable and appropriate standard practice issued by National Association of Architectural Metal Manufacturers.
- 2.3 Fabricate structural steel connections, parts and accessories in accordance with current edition of Specifications and Code of Standard Practice adopted by AISC.
- 2.4 Metals shall be made with structural properties to safely sustain and withstand stresses and strains to which normally subjected, true to detail, clean, straight, with sharply defined profiles, lines and angles and unless otherwise noted, with smooth finished surfaces.
- 2.5 Contractor shall be responsible for location and levels of work of this Section, except such parts as may be delivered to others and set by them. In such cases, this Contractor shall assist others in properly locating those parts.
- 2.6 Coating of aluminum utility tunnel frames, clips and louvers: Coat aluminum frames, clips and louvers that come into contact with concrete with bitumastic coating.
- 2.7 Coat bolts of bolted manhole covers with "Never-Seize".



05 51 33 Metal Ladders

1. Permanently installed roof access ladders shall be provided on every level of roofing.
2. Alternating tread ladders are not to be used without approval by the UW-Madison Project Manager.
3. Ships ladders are to be used in lieu of alternating tread ladders.

05 52 00 Exterior Metal Railings

1. Method of anchoring shall apply a surface mounting plate to the vertical concrete surface and then attach the railing support to the mounting plate. In doing so, the railing posts will not be susceptible to water pooling and rust which would cause the railing and adjacent concrete to fail. Surface mounting can also be easily updated or replaced should the building code require or maintenance be needed.
2. Reference UW-Madison standard details for handrails.
3. If side mounting is not an option, the railings shall be surface mounted on the treads,
4. Wherever a plate touches the concrete, a plastic shim shall be placed so the metal will not touch the concrete directly and will not cause rust to develop from underneath.
5. If embedding the railing supports within the concrete is the only viable option, a pocket shall be detailed whereby the railing can be set in non-shrink grout. In using this method, a detail shall also be designed such that a bead of high quality, long life exterior caulk will be applied at the metal rail, designed to reject water.
6. Fully welded connections shall be used. If approved by UW-Madison Project Manager, a sleeve detail can be used with recessed locking anchors.
7. All new or refurbished exterior handrails shall follow DFDM guidelines including roof access ladders. These ladders shall be powder coated to match caps and copings, but can also be finished in black.
8. New railings for existing buildings shall be designed to match existing railings unless there is a compelling reason for change and approved by UW-Madison Project Manager.
9. The preferred finish for new exterior handrails on the campus is a non-corrosive metal finish (i.e. bronze or 316 stainless steel) or galvanized. If a painted finish is desired, the rails shall be fabricated from galvanized steel, primed, and then powder coated.
 - 9.1. If a handrail is painted, the color shall be matte black.
10. All anchors, no matter from what material the railing is made, shall be stainless steel.
11. Railing supports at the top and bottom of stairs shall be designed and located to minimize the potential of snow removal damage and not create a protruding object hazard by extending into adjacent pedestrian circulation. .
12. Design exterior railings to discourage use by skateboarders. This may be done through appropriate site design or railing details.