



WMU Design Guidelines Instructions: These guidelines are to be used by the Design Professional to inform the design process and outline WMU-specific desires for all University projects. These guidelines have been edited to reflect WMU preferences, and the intent is for the Design Professional to use this information to guide their normal specifications-writing process. Straying from what is indicated in the guidelines is not prohibited, but shall be discussed with WMU during the development of the project.

SECTION 21 3113 – ELECTRIC DRIVE, CENTRIFUGAL FIRE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Split-case fire pumps.
2. In-line fire pumps.
3. Fire-pump accessories and specialties.
4. [Flowmeter systems].

1.2 PERFORMANCE REQUIREMENTS

- A. Pump Equipment, Accessory, and Specialty Pressure Rating: 175 psig minimum unless higher pressure rating is indicated.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For fire pumps, motor drivers, and fire-pump accessories and specialties. Include plans, elevations, sections, details, and attachments to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each fire pump, from manufacturer.
- B. Source quality-control reports.
- C. Field quality-control reports.



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1.5 CLOSEOUT SUBMITTALS

- A. Alignment Certificate: Include signed certificate verifying based mounted pump alignment procedures have been completed.
- B. Operation and maintenance data.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NFPA Compliance: Comply with NFPA 20, "Installation of Stationary Pumps for Fire Protection."

1.7 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR CENTRIFUGAL FIRE PUMPS

- A. Description: Factory-assembled and -tested fire-pump and driver unit.
- B. Base: Fabricated and attached to fire-pump and driver unit with reinforcement to resist movement of pump during seismic events when base is anchored to building substrate.
- C. Finish: Red paint applied to factory-assembled and -tested unit before shipping.

2.2 HORIZONTALLY MOUNTED, SINGLE-STAGE, SPLIT-CASE FIRE PUMPS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. A-C Fire Pump Systems; a business of ITT Industries.
 - 2. Patterson Pump Company; a subsidiary of the Gorman-Rupp Company.
 - 3. Peerless Pump, Inc.
- B. Pump:
 - 1. Standard: UL 448, for split-case pumps for fire service.
 - 2. Casing: Axially split case, cast iron with ASME B16.1 pipe-flange connections.
 - 3. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - 4. Wear Rings: Replaceable bronze.
 - 5. Shaft and Sleeve: Steel shaft with bronze sleeve.



- a. Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - b. Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
6. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
- C. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
- D. Driver:
1. Standard: UL 1004A.
 2. Type: Electric motor; NEMA MG 1, polyphase Design B.
- E. Capacities and Characteristics:
1. Rated Capacity: **<Insert gpm>**.
 2. Total Rated Head: **<Insert feet or psig>**.
 3. Inlet Flange: **[Class 125] [Class 250]**.
 4. Outlet Flange: **[Class 125] [Class 250] <Insert class>**.
 5. Suction Head Available at Pump: **<Insert feet>**.
 6. Motor Horsepower: **<Insert value>**.
 7. Motor Speed: **<Insert rpm>**.
 8. Electrical Characteristics:
 - a. Volts: **[208] [230] [460] <Insert value>**.
 - b. Phase: Three.
 - c. Hertz: 60.
 - d. Full-Load Amperes: **<Insert value>**.
 - e. Minimum Circuit Ampacity: **<Insert value>**.
 - f. Maximum Overcurrent Protection: **<Insert amperage>**.
 9. Pump-Start, Pressure-Switch Setting: **<Insert psig>**.
 10. Pump-Stop, Pressure-Switch Setting: **<Insert psig>**.

2.3 FIRE-PUMP ACCESSORIES AND SPECIALTIES

- A. Automatic Air-Release Valves: Comply with NFPA 20 for installation in fire-pump casing.
- B. Circulation Relief Valves: UL 1478, brass, spring loaded; for installation in pump discharge piping.
- C. Relief Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BERMAD Control Valves.
 - b. CLA-VAL Automatic Control Valves.
 - c. Kunkle Valve; a part of Tyco International Ltd.
 - d. OCV Control Valves.
 - e. Watts Regulator Company; a division of Watts Water Technologies, Inc.



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- f. Zurn Plumbing Products Group; Wilkins Water Control Products.
- 2. Description: UL 1478, bronze or cast iron, spring loaded; for installation in fire-suppression water-supply piping.
- D. Inlet Fitting: Eccentric tapered reducer at pump suction inlet.
- E. Outlet Fitting: Concentric tapered reducer at pump discharge outlet.
- F. Discharge Cone: **[Closed]** **[Open]** **[Closed or open]** type.
- G. Hose Valve Manifold Assembly:
 - 1. Standard: Comply with requirements in NFPA 20.
 - 2. Header Pipe: ASTM A 53/A 53M, Schedule 40, galvanized steel with ends threaded according to ASME B1.20.1.
 - 3. Header Pipe Fittings: ASME B16.4, galvanized cast-iron threaded fittings.
 - 4. Automatic Drain Valve: UL 1726.
 - 5. Manifold:
 - a. Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - b. Body: Flush type, brass or ductile iron, with number of outlets required by NFPA 20.
 - c. Nipples: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with ends threaded according to ASME B1.20.1.
 - d. Adapters and Caps with Chain: Brass or bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - e. Escutcheon Plate: Brass or bronze; rectangular.
 - f. Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - g. Exposed Parts Finish: Rough brass.
 - h. Exposed Parts Finish: **[Polished]** **[Rough]** **[brass]** [, **chrome plated]**.
 - i. Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
 - 6. Manifold:
 - a. Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - b. Body: Exposed type, brass, with number of outlets required by NFPA 20.
 - c. Escutcheon Plate: Brass or bronze; round.
 - d. Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads. Include caps and chains.
 - e. Exposed Parts Finish: **[Polished]** **[Rough]** **[brass]** [, **chrome plated]**.
 - f. Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."



2.4

2.5 GROUT

- A. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink and recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.6 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect fire pumps according to UL 448 requirements for "Operation Test" and "Manufacturing and Production Tests."
 - 1. Verification of Performance: Rate fire pumps according to UL 448.
- B. Fire pumps will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine equipment bases and anchorage provisions, with Installer present, for compliance with requirements and for conditions affecting performance of fire pumps.
- B. Examine roughing-in for fire-suppression piping systems to verify actual locations of piping connections before fire-pump installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.
- B. Equipment Mounting:
 - 1. Install fire pumps on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in Section 03 3000 "Cast-in-Place Concrete."



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2. Install fire pumps on cast-in-place concrete equipment bases. Comply with requirements for equipment bases and foundations specified in **[Section 03 3000 "Cast-in-Place Concrete.]"** **[Section 03 3053 "Miscellaneous Cast-in-Place Concrete."]**
 3. Comply with requirements for vibration isolation and seismic control devices specified in Section 21 0548 "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment."
 4. Comply with requirements for vibration isolation devices specified in Section 21 0548.13 "Vibration Controls for Fire-Suppression Piping and Equipment."
- C. For pumps located on elevated floors, set fire pumps on a concrete inertia base on top of a concrete equipment bases. Inertia base shall be fabricated from welded structural steel with the height of the base being 1/12th of the longest dimension. Inertia base shall be mounted on spring isolators, employing height saving clips. Disconnect coupling before setting. Do not reconnect couplings until alignment procedure is complete.
1. Support pump baseplate on rectangular metal blocks and shims, or on metal wedges with small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches between pump base and foundation for grouting.
 2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.
- D. Install fire-pump suction and discharge piping equal to or larger than sizes required by NFPA 20.
- E. Install flexible connectors at fire-pump suction and discharge piping connections to fire pump **[mounted on inertia base]**.
- F. Support piping and pumps separately so weight of piping does not rest on pumps.
- G. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Division 21 fire-protection piping sections.
- H. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in **[Division 21 Section "Fire-Suppression Standpipes.]"** **[Division 21 Section "Wet-Pipe Sprinkler Systems."]**
- I. Install pressure gages on fire-pump suction and discharge flange pressure-gage tappings. Comply with requirements for pressure gages specified in Division 21 fire-protection piping sections.
- J. Install pressure gages on fire-pump suction and discharge flange pressure-gage tappings. Comply with requirements for pressure gages specified in **[Section 21 1200 "Fire-Suppression Standpipes.]"** **[Section 21 1313 "Wet-Pipe Sprinkler Systems."]**
- K. Install piping hangers and supports, anchors, valves, gages, and equipment supports according to NFPA 20.
- L. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.
- M. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.



3.3 ALIGNMENT

- A. Align split-case pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
- B. Align split-case pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
- C. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
- D. Align piping connections.
- E. Align pump and driver shafts for angular and parallel alignment according to HI 1.4 and to tolerances specified by manufacturer.

3.4 CONNECTIONS

- A. Comply with requirements for piping and valves specified in Division 21 fire-protection piping sections.
- B. Comply with requirements for piping and valves specified in [**Section 21 1200 "Fire-Suppression Standpipes."**] [**Section 21 1313 "Wet-Pipe Sprinkler Systems."**] Drawings indicate general arrangement of piping, fittings, and specialties.
- C. Install piping adjacent to pumps and equipment to allow service and maintenance.
- D. Connect relief-valve discharge to drainage piping or point of discharge.
- E. Connect fire pumps to their controllers.

3.5 IDENTIFICATION

- A. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.

3.6 FIELD QUALITY CONTROL

- A. Test each fire pump with its controller as a unit. Comply with requirements for electric-motor-driver fire-pump controllers specified in Division 21 Section "Controllers for Fire-Pump Drivers."
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.



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1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

- D. Tests and Inspections:
 1. After installing components, assemblies, and equipment including controller, test for compliance with requirements.
 2. Test according to NFPA 20 for acceptance and performance testing.
 3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 4. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- E. Components, assemblies, and equipment will be considered defective if they do not pass tests and inspections.

- F. Prepare test and inspection reports.

- G. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Hoses are for tests only and do not convey to Owner.

- 3.7 STARTUP SERVICE
 - A. Engage a factory-authorized service representative to perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.

- 3.8 DEMONSTRATION
 - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire pumps.

END OF SECTION 21 3113