



# DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive  
Kathleen M. Falk

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Commissioner / Director  
Gerald J. Mandli

April 9, 2012

## ATTENTION ALL REQUEST FOR BID (RFB) HOLDERS

**RFB NO. 312004 - ADDENDUM NO. 2**

**CONSTRUCTION OF WASTE TRANSFER**

**STATION BUILDING & CLEAN SWEEP BUILDING**

**DANE COUNTY LANDFILL SITE #2 - RODEFELD**

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**BIDS DUE: TUESDAY, APRIL 17, 2012, 2:00 PM.**  
**DUE DATE AND TIME ARE CHANGED BY THIS ADDENDUM.**

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This Addendum is issued to modify, explain or clarify the original Request for Bid (RFB) and is hereby made a part of the RFB. **Bidders must acknowledge all Addenda on the Bid Form.**

### PLEASE MAKE THE FOLLOWING CHANGES:

**1. DOCUMENT INDEX FOR RFB NO. 312004**

Under **DIVISION 21 – FIRE SUPPRESSION**

ADD Sections in sequential order as follows:

“21 05 13 Common Motor Requirements for Fire-Suppression Equipment  
21 30 00 Fire Pumps”

**2. BID FORM (BID No. 312004)**

DELETE the Bid Form in its entirety and

REPLACE with the new Bid Form attached to this Addendum No. 2.

**3. Section 01 20 00 – PRICE AND PAYMENT PROCEDURES**

Under Article 1.6, ADD Paragraph C.8 as follows:

“8. Alternate No. 8: Contractor to install complete diesel fire pump packaged system with prefabricated enclosure building including foundations, fire pump and all associated mechanical, electrical, plumbing and fire protection materials and connections. (See Addendum No. 2 related drawings. Specifications, and Exhibit 1.)”

**4. Section 13 34 19 – METAL BUILDING SYSTEMS**

Under PART 2 PRODUCTS, ADD Article 2.7 as follows (and re-number the remaining Articles sequentially):

“2.7 COMPONENTS – TRANSLUCENT PANELS

- A. Translucent Panels: secured within a structurally extruded aluminum frame.
  - 1. Panels shall be Type I glass fiber reinforced resin.
  - 2. Light Transmission: submit samples for owner review.
  - 3. Exposed exterior surfaces of panel chemically and permanently treated to protect against surface erosion and extreme weather conditions.
  - 4. Exposed surfaces or interior surfaces to be fire retardant to a flame/smoke rating minimum 200/450.
  
- B. Metal building contractor to furnish and install structural steel H-frame to support louver at two locations on west wall of waste transfer building. Metal building contractor to locate louvers in center of translucent panel system. Infill around louver with translucent panel. Mechanical contractor to furnish louver. Metal building contractor to coordinate with mechanical contractor.”

**5. Section 21 05 13 – COMMON MOTOR REQUIREMENTS FOR FIRE-SUPPRESSION EQUIPMENT**

ADD new Section 21 05 13 – COMMON MOTOR REQUIREMENTS FOR FIRE-SUPPRESSION EQUIPMENT to the Project Manual attached to this Addendum No. 2.

**6. Section 21 30 00 – FIRE PUMPS**

ADD new Section 21 30 00 – FIRE PUMPS to the Project Manual attached to this Addendum No. 2.

**7. Section 23 34 00 – HVAC FANS**

Under PART 2 PRODUCTS, ADD Article 2.4 as follows:

“2.4 SIDEWALL PROPELLER FANS

- A. Manufacturers:
  - 1. Greenheck Fan Corporation.
  - 2. Acme Engineering.
  - 3. Loren Cook.
  - 4. Or approved equal.
  
- B. Sidewall Propeller Fan Assembly:
  - 1. Constructed of steel with angle iron reinforcing and motor support frame, cast aluminum propeller blades with a welded reinforcing gusset on backside for added rigidity, belt or direct drive as scheduled, and electronically operated control damper with blade edge and jamb seals.
  - 2. Fans and accessories shall be entirely coated with electrostatically applied epoxy powder paint.
  - 3. Provide factory fabricated wall sleeve with screened inlet guard.”

Under PART 3 EXECUTION, ADD Article 3.3 as follows:

**“3.3 SIDEWALL PROPELLER FANS**

- A. Install motorized backdraft damper and other accessories requiring field installation. Wire damper motors to fan power supply and install required transformers. Damper shall be interlocked to fan power supply so that damper opens when fan is energized.”

**8. Sheet C300**

REPLACE with new Sheet C300, issued with this Addendum.

**9. Sheet C300A**

ADD with new Sheet C300A, issued with this Addendum.

**10. Sheet C400**

REPLACE with new Sheet C400, issued with this Addendum.

**11. Sheet C901**

REPLACE with new Sheet C901, issued with this Addendum.

**12. Sheet A101**

REPLACE with new Sheet A101, issued with this Addendum.

**13. Sheet A300**

REPLACE with new Sheet A300, issued with this Addendum.

In Addition, REVISE new Sheet A300 as indicated below:

Detail 1/A300

REVISE sheet as follows:

- “A. Replace W-5 windows on the north elevation of the waste transfer building with translucent panels (see product information included in this addendum).”

Detail 2/A300

REVISE sheet as follows:

- “A. Replace W-5 windows on the south elevation of the waste transfer building with translucent panels (see product information included in this addendum).”

**14. Sheet A301**

Detail 1/A301

REVISE sheet as follows:

- “A. Replace W-3 and W-4 windows on the east elevation of the waste transfer building with translucent panels (see product information included in this addendum).”

Detail 2/A301

REVISE sheet as follows:

- “A. Replace W-6 windows on the west elevation of the waste transfer building with translucent panels (see product information included in this addendum).”

**15. Sheet S100**

REPLACE with new Sheet S100, issued with this Addendum.

**16. Sheet S500**

Detail 19/S500: DELETE Detail 19/S500 in its entirety.

Detail 22/S500: Provide epoxy-coated rebar for all rebar in this Detail.

**17. Sheet S501**

REPLACE with new Sheet S501, issued with this Addendum.

**18. Sheet S502**

Detail 11/S502 Clarification: Reinforce CMU cores as shown. Grout all other cores solid.

**19. Sheet E001**

REPLACE with new Sheet E001, issued with this Addendum.

**20. Sheet E102**

REPLACE with new Sheet E102, issued with this Addendum.

**21. Sheet E300**

REPLACE with new Sheet E300, issued with this Addendum.

**22. Sheet E402**

REPLACE with new Sheet E402, issued with this Addendum.

**23. Sheet M201**

REPLACE with new Sheet M201, issued with this Addendum.

**24. Sheet M202**

REPLACE with new Sheet M202, issued with this Addendum

**25. Sheet M211**

REPLACE with new Sheet M211, issued with this Addendum.

**26. Sheet M212**

REPLACE with new Sheet M212, issued with this Addendum.

**27. Sheet M221**

REPLACE with new Sheet M221, issued with this Addendum.

**28. Sheet M222**

REPLACE with new Sheet M222, issued with this Addendum.

**29. Sheet M800**

REPLACE with new Sheet M800, issued with this Addendum.

**30. Sheet M900**

REPLACE with new Sheet M900, issued with this Addendum.

**31. Sheet P100**

REPLACE with new Sheet P100, issued with this Addendum.

**32. Sheet P101**

REPLACE with new Sheet P101, issued with this Addendum.

**33. Sheet FP101**

REPLACE with new Sheet FP101, issued with this Addendum.

**34. Exhibit 1 – Specification for Horizontal Split Case PES Firefighter Package**

ADD Exhibit 1 to the Project Manual attached to this Addendum No. 2 (for reference only. Specification Sections 21 05 13 and 21 30 00 will govern over Exhibit 1.)

If any additional information about this Addendum is needed, please call John Welch at 608/267-8815, [welch@countyofdane.com](mailto:welch@countyofdane.com).

Enclosures (for full scale sheets, print on 30" x 42" sheets, unless noted otherwise):

Bid Form – Bid No. 312004

Section 21 05 13 – Common Motor Requirements for Fire-Suppression Equipment

Section 21 30 00 – Fire Pumps

Sheet C300

Sheet C300A (11" x 17")

Sheet C400

Sheet C901

Sheet A101

Sheet A300

Sheet S100

Sheet S501

Sheet E001

Sheet E102

Sheet E300

Sheet E402

Sheet M201

Sheet M202

Sheet M211

Sheet M212

Sheet M221

Sheet M222

Sheet M800

Sheet M900

Sheet P100

Sheet P101

Sheet FP101

Exhibit 1 – Specification for Horizontal Split Case PES Firefighter Package

Name of Bidding Firm: \_\_\_\_\_

**BID FORM – ADDENDUM NO. 2**

**BID NO. 312004**

**PROJECT: CONSTRUCTION OF WASTE TRANSFER STATION BUILDING &  
CLEAN SWEEP BUILDING  
DANE COUNTY LANDFILL SITE #2**

**TO: DANE COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAY &  
TRANSPORTATION PROJECT ENGINEER  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WISCONSIN 53713**

**BASE BID - LUMP SUM:**

Construction of waste transfer station facility and adjacent household hazardous waste collection facility. The undersigned, having examined the site where the Work is to be executed and having become familiar with local conditions affecting the cost of the Work and having carefully examined the Drawings and Specifications, all other Construction Documents and Addenda thereto prepared by Dane County Department of Public Works, Highway & Transportation hereby agrees to provide all labor, materials, equipment and services necessary for the complete and satisfactory execution of the entire Work, as specified in the Construction Documents, for the Base Bid stipulated sum of:

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price

The undersigned agrees to add the alternate(s) portion of the Work as described, for the following addition(s) to or subtraction(s) from the Base Bid, as stipulated below.

**ALTERNATE BID 1: HYDRONIC HEAT IN BOTH BUILDINGS - LUMP SUM:**

Add price for providing hydronic heat and all associated work in HHW building and Waste transfer Station building. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 2: HYDRONIC HEAT IN HHW BUILDING ONLY - LUMP SUM:**

Add price for providing hydronic heat and all associated work only in HHW building. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 3: TRAP ROCK AGGREGATE IN THE CONCRETE FOR THE WEST END OF THE TIPPING SLAB - LUMP SUM:**

Add price for providing trap rock aggregate in the west end of the tipping slab. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 4: TRAP ROCK AGGREGATE IN THE CONCRETE FOR THE ENTIRE TIPPING SLAB - LUMP SUM:**

Add price for providing trap rock aggregate in the entire tipping slab. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 5: ASPHALT PAVEMENT – PERMEABLE PAVEMENT ONLY - LUMP SUM:**

Deduct price for Contractor to install only permeable pavement. Owner to install all other asphalt pavement. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 6: ASPHALT PAVEMENT – PERMEABLE PAVEMENT AND TIPPING RAMP ASPHALT PAVEMENT - LUMP SUM:**

Deduct price for Contractor to install only permeable pavement and tipping ramp asphalt pavement. Owner to install all other asphalt pavement. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 7: BIOFILTRATION BASIN - LUMP SUM:**

Deduct price for deleting all Work associated with the biofiltration basin. Owner to perform this Work. Price for providing changes, as described in Specification Section 01 20 00, paragraph 1.6.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 8: FIRE PUMP - LUMP SUM:**

Add price for Contractor to install complete diesel fire pump packaged system with prefabricated enclosure building including foundations, fire pump and all associated mechanical, electrical, plumbing and fire protection materials and connections, as described in related drawings, Specifications, and Exhibit 1 of Addendum No. 2

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

Receipt of the following addenda and inclusion of their provisions in this Bid is hereby acknowledged:

Addendum No(s). \_\_\_\_\_ through \_\_\_\_\_

Dated \_\_\_\_\_

Assuming a Notice to Proceed is issued by May 24, 2012, what dates can you commence and complete this job?

Commencement Date: \_\_\_\_\_ Completion Date: \_\_\_\_\_  
(final, not substantial)

I hereby certify that all statements herein are made on behalf of:

\_\_\_\_\_  
(Name of Corporation, Partnership or Person submitting Bid)

Select one of the following:

- 1. A corporation organized and existing under the laws of the State of \_\_\_\_\_, or
- 2. A partnership consisting of \_\_\_\_\_, or
- 3. A person conducting business as \_\_\_\_\_;

Of the City, Village, or Town of \_\_\_\_\_ of the State of \_\_\_\_\_.

I have examined and carefully prepared this Bid from the associated Construction Documents and have checked the same in detail before submitting this Bid; that I have full authority to make such statements and submit this Bid in (its) (their) (my) behalf; and that the said statements are true and correct. In signing this Bid, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a Bid; that this Bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; that this Bid has not been knowingly disclosed prior to the Bids Due Date to another bidder or competitor; that the above statement is accurate under penalty of perjury.

The undersigned further agrees to honor the Base Bid and the Alternate Bid(s) for 60 days from date of Award of Contract.

**SIGNATURE:** \_\_\_\_\_  
(Bid is invalid without signature)

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

Email Address: \_\_\_\_\_

Contact Person: \_\_\_\_\_

**THIS PAGE IS FOR BIDDERS' REFERENCE AND NEED NOT BE SUBMITTED WITH BID FORM.**

**BID CHECK LIST:**

These items **must** be included with Bid:

Bid Form

Bid Bond

Fair Labor Practices Certification

**BIDDERS SHOULD BE AWARE OF THE FOLLOWING:**

**DANE COUNTY VENDOR REGISTRATION PROGRAM**

Any person bidding on any County contract must be registered with the Dane County Purchasing Division & pay an annual registration fee. A contract will not be awarded to an unregistered vendor. Obtain a *Vendor Registration Form* by calling 608/266-4131 or complete a new form or renewal one online at:

[www.danepurchasing.com/registration](http://www.danepurchasing.com/registration)

**DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION**

Contractors must be pre-qualified as a Best Value Contractor with the Dane County Public Works Engineering Division before the award of contract. Obtain a *Best Value Contracting Application* by calling 608/266-4018 or complete one online at:

[http://www.countyofdane.com/pwht/BVC\\_Application.aspx](http://www.countyofdane.com/pwht/BVC_Application.aspx)

**EQUAL BENEFITS REQUIREMENT**

By submitting a Bid, the contractor acknowledges that a condition of this contract is to provide equal benefits as required by Dane County Code of Ordinances Chapter 25.016. Contractor shall provide equal benefits as required by that Ordinance to all required employees during the term of the contract. For more information:

[www.danepurchasing.com/partner\\_benefit.aspx](http://www.danepurchasing.com/partner_benefit.aspx)

## SECTION 21 05 13

### COMMON MOTOR REQUIREMENTS FOR FIRE-SUPPRESSION EQUIPMENT

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes single- and three-phase motors for application on equipment provided under other sections and for motors furnished loose to Project.
- B. Related Sections:
  - 1. Applicable provisions of Division 01 shall govern all work under this Section.
  - 2. Division 26 – Electrical.

##### 1.2 REFERENCES

- A. American Bearing Manufacturers Association (ABMA):
  - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. National Electrical Manufacturers Association (NEMA):
  - 1. NEMA MG 1 - Motors and Generators.
- C. International Electrical Testing Association (NETA ATS):
  - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

##### 1.3 SUBMITTALS

- A. Division 01 – General Requirements: Submittal procedures.
- B. Product Data: Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.
- C. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

##### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Testing Agency: Company specializing in testing products specified in this section with minimum five years experience.

##### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Division 01 – General Requirements: Product storage and handling requirements.

- B. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.
- C. Protect products from weather and moisture by covering with plastic or canvas and by maintaining heating within enclosure.
- D. For extended outdoor storage, remove motors from equipment and store separately.

## **PART 2 PRODUCTS**

### **2.1 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT**

- A. Manufacturers:
  - 1. Cooper Industries Inc.
  - 2. Eaton Corp.
  - 3. General Electric Co.
  - 4. Substitutions: Division 01- General Requirements.
- B. Motors 3/4 hp and Larger: 460 volt, three-phase motor, 60 Hz.
- C. Motors Smaller Than 3/4 hp: Single-phase motor as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer's standard.
- D. Single Phase Motors:
  - 1. Permanent split-capacitor type, where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
  - 2. Voltage: 115/230 volts, single phase, 60 Hz.
- E. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

### **2.2 SOURCE QUALITY CONTROL**

- A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

## **PART 3 EXECUTION**

### **3.1 EXISTING WORK**

- A. Disconnect and remove abandoned motors
- B. Maintain access to existing motors and other installations remaining active and requiring access. Modify installation or provide access panel.
- C. Clean and repair existing motors to remain or are to be reinstalled.

### 3.2 INSTALLATION

- A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- B. Install engraved plastic nameplates in accordance with Section 26 05 53 – Electrical Identification.
- C. Ground and bond motors in accordance with Section 26 05 26 – Grounding and Bonding.

### 3.3 FIELD QUALITY CONTROL

- A. Division 01- General Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.15.

**END OF SECTION**

## SECTION 21 30 00

### FIRE PUMPS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fire pump package.
  - 2. Fire pump engine.
  - 3. Electric jockey pump.
  - 4. Controllers.
  
- B. Related Sections:
  - 1. Applicable provisions of Division 01 shall govern all work under this Section.
  - 2. Section 21 05 00 – Basic Fire Suppression Materials and Methods.
  - 3. Section 21 05 13 – Motor Requirements for Fire Suppression Equipment.
  - 4. Division 26 - Electrical: Electrical characteristics and wiring connections.

##### 1.2 REFERENCES

- A. Factory Mutual (FM):
  - 1. FM - Factory Mutual System - Approval Guide.
  
- B. National Electrical Manufacturer's Association (NEMA):
  - 1. NEMA MG-1 - Motors and Generators.
  - 2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
  
- C. National Fire Protection Association (NFPA):
  - 1. NFPA 13 - Standard for the Installation of Sprinkler Systems.
  - 2. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection.
  - 3. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
  - 4. NFPA 37 - Standard for Installation and Use of Stationary Combustion Engines and Gas Turbines.
  - 5. NFPA 70 - National Electrical Code.
  
- D. Underwriter's Laboratories, Inc. (UL):
  - 1. UL - Fire Protection Equipment Directory.
  - 2. UL 448 - Pumps for Fire Protection Service.
  - 3. UL 778 - Motor-Operated Water Pumps.
  - 4. UL 1247 - Diesel Engines for Driving Centrifugal Fire Pumps.
  - 5. UL 1478 - Fire Pump Relief Valves.

##### 1.3 DESIGN REQUIREMENTS

- A. Conform to NFPA 20.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Conform to greater of NFPA 20 or NFPA 13.

#### 1.5 SUBMITTALS FOR REVIEW

- A. Division 01 – General Requirements: Procedures for submittals.
- B. Product Data: Provide manufacturers literature including general assembly, pump curves showing performance characteristics with pump and system, operating point indicated, NPSH curve, controls, wiring diagrams, and service connections.
- C. Shop Drawings: Indicate layout, general assembly, components, dimensions, weights, clearances, and methods of assembly.

#### 1.6 SUBMITTALS FOR INFORMATION

- A. Division 01 – General Requirements: Procedures for submittals.
- B. Test Reports: Indicate results of hydrostatic test and field acceptance tests performed in accordance with NFPA 20.
- C. Manufacturer's Instructions: Indicate support details, connection requirements, for fire pump system.

#### 1.7 SUBMITTALS AT PROJECT CLOSEOUT

- A. Division 01 – General Requirements: Procedures for submittals.
- B. Project Record Documents: Record actual locations of components and accessories.
- C. Certificates:
  - 1. Certify that fire pumps meet or exceed specified requirements at specified operating conditions and that the installation complies with regulatory requirements.
  - 2. Submit summary and results of shop tests performed in accordance with NFPA 20.
- D. Operation Data: Include manufacturer's instructions, start-up data, troubleshooting checklists, for pumps, drivers, and controllers.
- E. Maintenance Data: Include manufacturer's literature, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.

#### 1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 20 and NFPA 37.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

- C. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.
- D. Design fire pump system under direct supervision of a Professional Engineer experienced in design of this Work and licensed in the State of Wisconsin.

#### 1.9 REGULATORY REQUIREMENTS

- A. Conform to UL, FM.
- B. Perform work in accordance with NFPA 20 and NFPA 37.
- C. Conform to NFPA 20 for installation and testing of fire pumps, drivers, and controllers.
- D. Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.
- E. Equipment and Components: Bear UL, FM label or marking.
- F. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., and testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

#### 1.10 PRE-INSTALLATION MEETING

- A. Division 01 – General Requirements: Pre-installation meeting.
- B. Convene one week before starting work of this section.

#### 1.11 DELIVERY, STORAGE, AND PROTECTION

- A. Division 01 – General Requirements: Transport, handle, store, and protect products.
- B. Accept fire pumps and components on site in factory packing. Inspect for damage. Comply with manufacturer's rigging and installation instructions.
- C. Protect fire pumps and components from physical damage including effects of weather, water, and construction debris.
- D. Provide temporary inlet and outlet caps, and maintain in place until installation.

#### 1.12 MAINTENANCE SERVICE

- A. Division 01 – General Requirements.
- B. Provide service and maintenance of fire pump, driver, and controller for one year from date of Substantial Completion.

### 1.13 EXTRA MATERIALS

- A. Division 01 – General Requirements.
- B. Provide one set of gaskets, screens, seals for each pump type and model supplied.

## PART 2 PRODUCTS

### 2.1 HORIZONTAL BASE MOUNTED PUMPS

- A. Type: UL 448 and UL 778, horizontal shaft, single stage, double suction, direct connected, horizontally split casing, for 250 psi maximum working pressure.
- B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze double suction fully enclosed, balanced and keyed to shaft.
- D. Bearings: Grease lubricated ball bearings, replaceable without opening casing.
- E. Shaft: Alloy steel with replaceable bronze shaft sleeve.
- F. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.
- G. Drive: Flexible coupling with coupling guard.
- H. Baseplate: Cast iron or fabricated steel with integral drain rim.
- I. Performance:
  - 1. Flow: 1000 gpm, at 120 feet head.
  - 2. Diesel motor drive.
- J. Manufacturers:
  - 1. Peerless
  - 2. Patterson
  - 3. Armstrong
  - 4. Substitutions: In accordance with Division 01 – General Requirements.

### 2.2 FIRE PUMP ACCESSORIES

- A. Eccentric suction reducer and OS&Y gate or butterfly valve on suction side of pump.
- B. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.
- C. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve.

- D. Main relief valve, UL 1478, and enclosed type waste cone.
- E. Suction pressure gage, 4 1/2 inch diameter dial with snubber, valve cock and lever handle.
- F. Discharge pressure gage mounted on board attached to pump, with snubber, valve cock and lever handle.
- G. Casing 3/4 inch relief valve.
- H. Float operated 3/4 inch automatic air release valve.
- I. Hose valve manifold with 2 1/2 inch hose gate valves with caps and chains.
- J. Flow metering system for closed loop testing.

### 2.3 DIESEL ENGINE DRIVE

- A. Diesel Engine: Conform to NFPA 1247, arranged for automatic operation and include overspeed/overcrank switch and drive, two contactor switches, low oil pressure and high water temperature warning switches, and fuel shut-off solenoid, with wiring terminating in junction box.
- B. Include following engine accessories:
  - 1. Stub shaft.
  - 2. Oil bath air cleaner.
  - 3. Water cooled exhaust manifold.
  - 4. Heat exchanger.
  - 5. Mechanical speed governor.
  - 6. Fuel filter.
  - 7. Lube oil filter and by-pass valve.
  - 8. Lube oil cooler and relief valve.
  - 9. Fuel pump.
  - 10. Instrument panel with tachometer, hour meter, oil pressure gauge, water temperature gauge, ammeter, hand speed control and start switch.
  - 11. Starting system including generator/alternator, starting motor and voltage regulator.
  - 12. Exhaust silencer, residential type.
  - 13. Flexible exhaust tubing, 24 inches long.
- C. Cooling water system: Closed system with cooling water supply to heat exchanger from fire pump discharge. Include four (4) manual shut-off valves (including by-pass line), two strainers, pressure regulating valve, automatic solenoid valve and pressure gauge.
- D. Storage batteries: Dual lead acid batteries with cables and battery racks.
- E. Fuel system: 20 gal above ground storage tank, fill pipe and cap, manual shut-off valve, flame arrestor, oil level gauge, braided bronze flexible connectors, seamless type L copper tubing with flared joints. Fill tank at completion.

- F. Automatic diesel engine controller: Enclosed in floor mounted 14 gage steel housing, UL listed and labeled.
1. Controller: Function to automatically start fire pump from water pressure control switch or test switch.
  2. Stop push button: To manually stop engine.
  3. Automatic conditions: Controller shall alternate batteries automatically on each 15 second cranking cycle. Alarm if engine not started after six attempts.
  4. Battery charger: Dual, built-in, to recharge both batteries within 24 hour period, with automatic overload protection (current limiting), individual voltmeters and ammeters for each battery.
  5. Individual pilot lights and common alarm bell for:
    - a. Charger 1 Failure.
    - b. Charger 2 Failure.
    - c. Battery 1 Failure.
    - d. Battery 2 Failure.
    - e. AC Power On.
    - f. Exercise Cycle.
    - g. High Engine Jacket Water Temperature.
    - h. Low Engine Oil Pressure.
    - i. Engine Failure to Start Automatically.
    - j. Overspeed Shutdown.
    - k. Engine Run.
    - l. Main Switch in Auto.
    - m. Low Fuel Level.
    - n. Low Water Reservoir Level.
    - o. Water Reservoir Empty.
    - p. Low Pump Room Temperature.
    - q. Low Suction Temperature.
    - r. Flow Meter On.
    - s. Relief Valve Open.
  6. Power: 208 volt, single phase, 60 Hz.

#### 2.4 PRESSURE BOOSTER (JOCKEY) PUMP

- A. Electrically operated, horizontal turbine type with standard open drip-proof horizontal motor.
- B. Control by automatic jockey pump controller with full voltage starter and minimum run timer to start pump on pressure drop in system and stay in operation for minimum period of time. Fire pump shall start automatically on further pressure drop or on jockey pump failure.
- C. Electrical Characteristics:
  1. 5 hp.
  2. 208 volts, single phase, 60 Hz.
- D. Manufacturers:
  1. Eaton.

2. Joslyn Clark
3. Metron.
4. Substitutions: In accordance with Division 01 – General Requirements.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Install in accordance with NFPA 20.
- B. Install diesel engine drive in accordance with NFPA 37.
- C. Provide access space around pumps for service; no less than minimum as recommended by manufacturer.
- D. Install piping in accordance with Section 21 05 00 – Basic Fire Suppression Materials and Methods.
- E. Decrease from line size with long radius reducing elbows or reducers.
- F. Support piping adjacent to pump such that no weight is carried on pump casings.
- G. For base mounted pumps, provide supports under elbows on pump suction and discharge.
- H. Provide drains for bases and seals, piped to and discharging into floor drains.
- I. Mount unit on vibration isolators. Refer to Section 23 05 48 – Vibration and Seismic Controls for Fire Suppression Piping and Equipment.
- J. Provide piping for fuel supply and return connected to motor. Provide piping to and from exhaust silencer with thimble at wall or roof penetrations.
- K. Insulate piping associated with pump, pump casing and exhaust silencer.
- L. Provide for connection to electrical service. Refer to Division 26 - Electrical.
- M. Lubricate pumps before start-up.
- N. Check, align, and certify base mounted pumps by qualified millwright prior to start-up.

### **3.2 FIELD QUALITY CONTROL**

- A. Division 01 – General Requirements: Field inspection, testing, adjusting, and balancing.
- B. Perform flow test on entire system in accordance with NFPA 20.

- C. Require test to be witnessed by Fire Marshall, authority having jurisdiction, Owner's insurance underwriter, Engineer, Architect/Engineer.

3.3 DEMONSTRATION AND INSTRUCTIONS

- A. Division 01 – General Requirements: Demonstrating installed work
- B. Demonstrate automatic operation of system including verification of pressure switch set points.

**END OF SECTION**



# Exhibit 1

## Specification for Horizontal Split Case PES Firefighter Package Diesel - Enclosure

### 1.0 SCOPE

- 1.1 This specification defines the minimum requirements for the design, materials, fabrication, testing, and inspection of fire pump packages.
- 1.2 The equipment will be furnished complete with all piping, controls, instrumentation, and other accessories as set forth herein and on the data sheets as required to make a complete functional unit.
- 1.3 Definitions/Abbreviations

Company	Customer or Client
Contractor	An entity performing work under contract with above referenced Company
Vendor	Peerless Pump Company/Peerless Engineered Systems
VDRL	Vendor Data Requirements List
NFPA	National Fire Protection Association
ASME	American Society of Mechanical Engineers
NEMA	National Electrical Manufacturers Association
AISC	American Institute of Steel Construction
ANSI	American National Standard Institute
ASTM	American Society for Testing Materials
AWS	American Welding Society
HI	Hydraulic Institute

## 2.0 APPLICABLE CODES AND SPECIFICATIONS

### 2.1 Codes

NFPA 13 - Standard for the Installation of Sprinkler Systems

NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 31 - Standard for the Installation of Oil Burning Equipment

NFPA 70 (NEC) - National Electrical Code

UL - Underwriters Laboratories Fire Protection Equipment Directory

FM - Current Factory Mutual Research Approval Guides

ASME - Boiler and Pressure Vessel Code Section IX

AWS D 1.1 - Structural Welding Code For Steel

ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class R5, 125, 250, and 600

ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process

HI – Hydraulic Institute

### 2.2 Submittals

- Packaged System General Arrangement Drawing
- Anchor Bolt Requirements and Locations
- Packaged System Power and Lighting Drawing
- Pump Technical Data Sheets or Catalog Sheets
- Engine Technical Data Sheets or Catalog Sheets
- Fire Pump Control Panel Technical Data Sheets or Catalog Sheets
- Jockey Pump Technical Data Sheets or Catalog Sheets
- Jockey Pump Control Panel Technical Data Sheets or Catalog Sheets
- Valves Technical Data Sheets or Catalog Sheets
- Switches Technical Data Sheets or Catalog Sheets
- Pressure Gages Technical Data Sheets or Catalog Sheets
- Sprinkler System Data

- Fire pump proposal curve

### 3.0 MANUFACTURER

- 3.1 The packaged system manufacturer (Vendor) shall be an OEM of UL Listed Fire Pumps
- 3.2 The packaged system manufacturer (Vendor) shall construct the equipment in an ISO 9001 Revision 2000 certified facility.
- 3.3 The packaged system manufacturer (Vendor) shall fabricate and assemble a complete unit that is Third Party Listed by ETL.
- 3.4 The packaged system manufacturer (Vendor) shall have a minimum of fifteen years of design and fabrication experience of NFPA 20 compliant systems and have an excess of 500 packaged fire pump system installations.

### 4.0 EQUIPMENT

#### 4.1 Horizontal Split Case Fire Pump

- 4.1.1 The fire pump shall be designed to deliver 875 GPM at 50 PSI. The fire pump shall be rated at 1000 GPM at 65 PSI. The pump shall deliver not less than 150% of rated capacity at a pressure of not less than 65% of rated pressure. The pump closed valve head shall not exceed 140% of rated pressure. The pump shall be UL Listed for the rated duty point. The static suction pressure used for pump design shall be provided to Vendor by Contractor or Company. *The fire pump ratings and sizes are approximate and provided for bidding purposes. The fire protection contractor is responsible for final sizing of the fire pump and the drive associated with the package.*
- 4.1.2 The pump shall be a horizontal split case pump of cast iron, bronze fitted construction per UL 448 and shall be a Peerless Pump model 6AEF14 with 150# suction X 300# discharge flanges.
- 4.1.3 The pump shall be mounted on a fabricated steel base plate or pedestal that shall be welded or bolted to the package skid structure. The pump will be directly coupled to the shaft of a suitable driver by means of a flexible coupling or universal drive shaft.

- 4.1.4 The pump case casting shall be smooth, free of scale, lumps, cracks, sand holes, and defects of any nature which may make it unfit for the use for which it is intended.
  - 4.1.5 The pump bearings shall have an L-10 rating of not less than 5,000 hours based on load ratings and fatigue life.
  - 4.1.6 The pump shaft shall be sealed with a stuffing box and packing with external flush. The stuffing box glands shall exert uniform pressure on the packing.
  - 4.1.7 The bearing housing supports, suction flange, and discharge flange shall be cast integrally with the lower half of the casing assembly.
  - 4.1.8 Removal of the upper half of the casing assembly must allow the removal and/or servicing of the rotating element without disconnecting the suction and discharge flanges from system piping.
  - 4.1.9 Replaceable shaft sleeves shall be furnished and are to be of bronze construction. The shaft sleeves shall lock into position by screwed connections that tighten with the turning of the rotating element during operation. The shaft sleeves shall have integral set screws designed to prevent the loosening of the sleeves during accidental or momentary reverse rotation.
  - 4.1.10 The pump shall be provided with water slingers of bronze or other corrosion resistant material designed to seal the bearings at the inner ends.
- 4.2 Couplings, Guards, and Alignment
- 4.2.1 The coupling or drive shaft shall be sized per the coupling manufacturer's instructions for the duty point of the driver-pump design condition for a continuous 5000 hours.
  - 4.2.2 The drive shaft shall be manufactured by Clarke, Spicer (Dana) or All Power Transmission (APT).
  - 4.2.3 Guards shall be provided for flexible couplings and drive shafts to prevent rotating elements from causing injury to personnel.

- 4.2.4 The base plate or pedestal mounting of the driver shall require a minimum of 1/8" shim in the vertical direction to be in alignment with the pump. No shimming of the pump shall be allowed.
- 4.2.5 The pump shall be aligned within the tolerances defined by the coupling manufacturer's vertical, horizontal and angular criteria. The alignment values shall be verified at the manufacturer's facility using a calibrated dial indicator prior to shipment.
- 4.3 Diesel Engine Drivers for Main Fire Pump
- 4.3.1 Diesel engine drivers shall be listed for fire pump service.
- 4.3.2 Diesel engines shall be specifically listed for fire pump service by a testing laboratory.
- 4.3.3 The engine listing shall be for the rated horse power at standard Society of Automotive Engineers (SAE) conditions of 29.61 in. Hg and 77 degrees F inlet air temperature (approximately 300 ft above sea level) by the testing laboratory.
- 4.3.4 The available horsepower of the engine at the rated speed shall include deductions for temperature and altitude where applicable. A deduction of 3% shall be taken for each 1000 ft increase in altitude above the 300 ft base condition. A deduction of 1% shall be taken for each 10 degree F increase in ambient temperature over the 77 degree F base condition. The corrected engine horsepower shall meet or exceed the maximum horsepower required by the pump at the rated speed for any condition on the pump curve.
- 4.3.5 The engine shall be provided with, at a minimum, the following equipment:
- Heat exchanger with CU-NI cooling coils
  - 12 volt electric starter
  - Dual starting contactors with manual operation capability
  - Constant speed governor
  - Dry type, replaceable air filter
  - Dry wrapped, guarded, or water-cooled exhaust manifolds
  - Lube oil cooler
  - Lube oil filter with bypass
  - Fuel pump

- Engine jacket water heater
- Engine gage panel
- Exhaust outlet flexible connection

- 4.3.6 The engine shall be provided with a cooling loop for the engine heat exchanger water supply. The cooling loop shall comply with the requirements of NFPA 20.
- 4.3.7 The engine shall be provided with a governor that is capable of regulating engine speed within a range of 10% between minimum and maximum load conditions.
- 4.3.8 The engine shall be provided with an over-speed shutdown device. The device shall be designed to shut down the engine at a speed approximately 20% above the rated speed and shall be provided with a manual reset. A means shall be provided to communicate engine over-speed to the automatic control panel and the controller alarm reset shall be dependent upon the manual reset on the engine.
- 4.3.9 The following instruments at a minimum shall be provided on the engine gage panel: tachometer, oil pressure, water/coolant temperature. The tachometer shall be the totalizing type, or an hour meter shall be provided with the engine.
- 4.3.10 The engine shall be provided with a speed-sensitive switch to signal engine running and crank termination. Power for this signal shall be taken from a source other than the engine alternator.
- 4.3.11 All engine wiring shall be sized for continuous duty.
- 4.3.12 This section is to define the requirements for an electric start engine.
- 4.3.12.1 The engine shall be equipped with a reliable 12 volt electric starting device sized to comply with the crank cycle defined by NFPA 20.
- 4.3.12.2 The starting device shall draw current from a battery storage unit.
- 4.3.12.3 Each engine shall be provided with two battery storage units.

- 4.3.12.4 Each battery storage unit shall be sized in accordance with the requirements of NFPA 20.
- 4.3.12.5 A battery storage unit shall contain lead-acid, dry type battery(ies). Electrolyte will be provided in a separate container and shall be added to the batteries when the engine is put into service.
- 4.3.12.6 A storage rack shall be provided that will provide secure placement of the batteries. The rack shall be elevated in order to insure that the current carrying terminals are at least 12 inches above the finish floor grade.
- 4.3.12.7 Battery cables shall have a nominal size of 2-0 for lengths up to 10 ft terminal to terminal. Cables shall be sized 4-0 for terminal to terminal lengths beyond 10 ft.
- 4.3.13 The diesel engine shall be manufactured by Clarke or Cummins.
- 4.4 Fuel System
  - 4.4.1 The fuel tank shall be sized per NFPA 20. The tank shall have a capacity equal to or greater than 1.1 gallon per rated engine horsepower. This includes the 5% for expansion and 5% for sump.
  - 4.4.2 The fuel tank shall be UL Listed.
  - 4.4.3 The fuel tank shall be of double-wall construction. The tank inner and outer shell shall be constructed of 10-gauge carbon steel minimum.
  - 4.4.4 The fuel tank shall be mounted to the skid structure and shall be elevated per the requirements of NFPA 20.
  - 4.4.5 Fuel supply lines shall be a minimum of 1/2 inch in size. Fuel return lines shall be a minimum of 1/2 inch in size. A lockable valve shall be supplied in the engine fuel supply line. No shutoff valve shall be permitted in the fuel return line.
  - 4.4.6 Fuel supply and return lines shall be constructed of schedule 40 black carbon steel pipe or .035 wall 300 series stainless steel tubing. The fuel lines shall be guarded when routed across a walk area. A check valve shall be provided in the fuel return line.

- 4.4.7 The fuel tank shall be provided with nominal or larger sized vent piping per UL 142. The vent pipes vent shall be coated with the package manufacturer's standard paint and shall be shipped loose for field installation by contractor or company. Aluminum vent caps manufactured by OPW or equal shall be provided for field installation on the vent pipes.
  - 4.4.8 A direct reading float type level gage shall be provided with the fuel tank.
  - 4.4.9 A provision shall be made to determine low fuel level and initiate an alarm signal to the diesel engine controller. The switch shall initiate a signal when the fuel quantity falls below the 2/3 capacity volume level of the fuel tank. The low fuel level switch shall be pre-wired by the packaged system manufacturer to the diesel engine control panel.
  - 4.4.10 A provision shall be made for fuel leak detection into the secondary tank (outer shell) of the double wall fuel tank. The provision shall be a float type switch that communicates with the diesel engine control panel. The leak detection switch shall be pre-wired by packaged system manufacturer to the diesel engine control panel.
  - 4.4.11 The fuel tank shall have the fuel type recommended by the engine manufacturer or the following information stenciled in 6" letters in a visible location: "#2 DIESEL".
- 4.5 Exhaust System
- 4.5.1 Each engine shall be provided with independent exhaust provisions.
  - 4.5.2 The exhaust provisions shall be sized in accordance with the allowable back pressure as defined by the engine manufacturer.
    - 4.5.2.1 On an enclosure packaged system, a residential grade silencer shall be provided. **The system shall be sized in accordance with the allowable back pressure for the engine provided.** The silencer and associated piping will be installed and mounted to the roof structure. The piping and silencer shall be supplied by the packaged system manufacturer (Vendor). The exhaust system in a house package will penetrate the roof. A fabricated steel sleeve/thimble shall be provided for the exhaust

pipings penetration. The exhaust piping will be disassembled for transportation and reassembled in the field by the Contractor.

- 4.5.3 On a complete enclosure packaged system, the exhaust system flexible connector and the exhaust piping inside the building shall be insulated by the packaged system manufacturer.
- 4.5.4 Exhaust insulation blanket shall be constructed of Lewco or similar Type E fiber mat material that shall be encapsulated with silicone impregnated fiberglass fabric. The mat shall be nominally sized one inch (1") thick. The blanket shall be secured to the exhaust piping using 304SS wire mesh, 304SS tie wire, and 304SS lacing anchors with 304SS washers.
- 4.6 Diesel Engine Controller
  - 4.6.1 General Requirements
    - 4.6.1.1 The fire pump controller shall conform to all the requirements of the latest edition of NFPA 20 and NFPA 70.
    - 4.6.1.2 The diesel engine controller shall be specifically listed for diesel engine-driven fire pump service.
    - 4.6.1.3 The diesel engine controller shall be completely assembled, internally wired, and tested by the listing control panel manufacturer.
    - 4.6.1.4 The controller shall be marked "Diesel Engine Fire Pump Controller" and shall plainly show the name of the manufacturer.
    - 4.6.1.5 The controller nameplate shall contain the manufacturer model number, the pump rated operating pressure, the enclosure type, and the complete electrical rating.
    - 4.6.1.6 The controller shall be securely mounted to the skid structure as close as is practical and within operator's sight of the appropriate engine.
    - 4.6.1.7 Working clearances around the diesel engine controller shall comply with NFPA 70, Article 110.

4.6.1.8 The controller shall have manual operation capability.

#### 4.6.2 Enclosures

4.6.2.1 The enclosure rating for the controller shall be NEMA 2 minimum.

4.6.2.2 Where controller is located outside or special environments exist, suitably rated enclosures shall be used.

4.6.2.3 When the controller is installed in an area that has damp conditions, a space heater shall be used to help keep the controller circuitry dry.

#### 4.6.3 Control Wiring

4.6.3.1 The diesel controller shall not be used as a junction box.

4.6.3.2 All controller wiring shall be sized for continuous duty.

4.6.3.3 The wiring between the diesel engine and the diesel engine controller shall be protected by a minimum of ¾" inch rigid conduit and ½" seal-tight type flexible conduit.

4.6.3.4 A field connection diagram shall be supplied and be permanently attached inside the control panel enclosure.

4.6.3.5 Field connection terminals within the controller shall be marked to correspond with the field connection diagram.

4.6.3.6 Field connection wiring terminated inside the control panel shall be labeled with nylon wrap type markers. The markers shall be "Brady PTL 18-427" or equivalent.

#### 4.6.4 Display and Alarms

4.6.4.1 A visible indicator shall be provided on the face of the control panel to indicate the operation selector switch is in the "auto" position.

4.6.4.2 The following alarms shall be provided. The control panel shall contain provisions to visually display and audibly announce the alarm condition:

Low oil pressure  
High coolant temperature  
Fail to start  
Shutdown from over speed  
Battery One failure  
Battery Two failure  
Battery charger failure  
Low fuel level

4.6.4.3 The following remote alarm contacts shall be provided:

*List alarm contacts here. Refer to manufacturer's specific options for availability*

4.6.4.4 The following additional local indicating alarm contacts shall be provided in the control panel:

*List alarm contacts here. Refer to manufacturer's specific options for availability*

#### 4.6.5 Pressure Sensing and Recording

4.6.5.1 The controller shall be equipped with a listed pressure recording device. The recording device will read pressure from the sensing line input and record data for a minimum of 7 days.

4.6.5.2 The recording device shall be capable of withstanding a minimum of 400 psi surge pressure. Any such pressure surge shall not affect the recording device accuracy.

4.6.5.3 The pressure recording device shall be a mechanical spring wound type or electrically driven type. If electrically driven, the device shall not be solely dependent upon an alternating current electric power source.

4.6.5.4 The pressure recording device shall operate for up to 24 hours after a loss of AC power.

- 4.6.5.5 The controller shall be equipped with a +/- 5% accurate volt meter to indicate battery voltage output during the cranking cycles of both battery banks
- 4.6.5.6 The controller shall contain a pressure actuated switch or pressure sensing transducer. The pressure switching mechanism shall be provided with independent high and low adjustments.
- 4.6.5.7 The pressure sensing element of the pressure switch shall be capable of withstanding a minimum of 400 psi surge pressure. Any such pressure surge shall not affect the switch accuracy.
- 4.6.5.8 The pressure sensing line for the pump controller shall be connected to the fire pump piping between the pump discharge check valve and the pump discharge control valve.
- 4.6.5.9 The pressure sensing line shall be constructed of brass, copper, or series 300 stainless steel pipe, rigid tubing, and fittings. The pressure rating for the wall thickness and the fittings shall meet or exceed 300 psi.
- 4.6.5.10 There shall be two swing check valves constructed of brass or series 300 stainless steel installed in the sensing lines. The check valves shall have a .09375 in. hole drilled in the clapper so that the valves will serve as a damper for system pressure surges.
- 4.6.5.11 Pipe, tubing, and fittings used for sensing line shall be ½” nominal size.
- 4.6.5.12 A shut-off valve is not permitted in the sensing line.

#### 4.7 Pressure Maintenance (Jockey) Pump

- 4.7.1 The jockey pump shall be designed to deliver 5 GPM at 15 PSI. The static suction pressure used for jockey pump design shall be provided to Vendor by Contractor or Company. The sizes and ratings are subject to manufacturer’s recommendations.
- 4.7.2 The preferred equipment for pressure maintenance is a vertical multistage centrifugal pump with a mechanical seal. Other pump

types may be acceptable as approved by the Company. (Firefighter packages offered with vertical multistage only.)

- 4.7.3 The pressure maintenance pump shall be rated for a minimum flow of 3 GPM at the rated condition point for the fire pump.
- 4.7.4 The pressure maintenance pump shall generate suitable pressure at shut-off to maintain the system at the design pressure.

#### 4.8 Pressure Maintenance (Jockey) Pump Controller

##### 4.8.1 General Requirements

- 4.8.1.1 The jockey pump controller shall conform to all the requirements of the latest edition of NFPA 20 and NFPA 70.
- 4.8.1.2 The jockey controller shall be UL Listed in accordance with UL 508, *Standard For Industrial Controls*
- 4.8.1.3 The jockey controller shall be completely assembled, internally wired, and tested by the listing control panel manufacturer.
- 4.8.1.4 The controller shall plainly show the name of the manufacturer.
- 4.8.1.5 The controller shall be securely mounted to the skid structure as close as is practical and within operator's sight of the jockey pump.
- 4.8.1.6 Working clearances around the jockey controller shall comply with NFPA 70, Article 110.
- 4.8.1.7 The controller shall have manual operation capability.

##### 4.8.2 Enclosures

- 4.8.2.1 The enclosure rating for the controller shall be NEMA 2 minimum.
- 4.8.2.2 Where controller is located outside or special environments exist, suitably rated enclosures shall be used.

4.8.2.3 When the controller is installed in an area that has damp conditions, a space heater shall be used to help keep the controller circuitry dry.

#### 4.8.3 Control Wiring

4.8.3.1 The jockey controller shall not be used as a junction box.

4.8.3.2 All controller wiring shall be sized for continuous duty.

4.8.3.3 A field connection diagram shall be supplied and be permanently attached inside the control panel enclosure.

4.8.3.4 Field connection terminals within the controller shall be marked to correspond with the field connection diagram.

4.8.3.5 Field connection wiring terminated inside the control panel shall be labeled with nylon wrap type markers. The markers shall be "Brady PTL 18-427" or equivalent.

#### 4.8.4 Display and Alarms

4.8.4.1 The following remote alarm contacts shall be provided:

*List alarm contacts here. Refer to manufacturer's specific options for availability*

4.8.4.2 The following additional local indicating alarm contacts shall be provided in the control panel:

*List alarm contacts here. Refer to manufacturer's specific options for availability*

#### 4.8.5 Pressure Sensing and Recording

4.8.5.1 The controller shall contain a pressure actuated switch or pressure sensing transducer. The pressure switching mechanism shall be provided with independent high and low adjustments.

- 4.8.5.2 The pressure sensing line for the jockey pump controller shall be connected to the jockey pump piping between the pump discharge check valve and the pump discharge isolation valve. The connection should be located as far from the check valve as permitted by the piping arrangement.
- 4.8.5.3 The pressure sensing line shall be constructed of brass, copper, or series 300 stainless steel pipe, rigid tubing, and fittings. The pressure rating for the wall thickness and the fittings shall meet or exceed 300 psi.
- 4.8.5.4 There shall be two swing check valves constructed of brass or series 300 stainless steel installed in the sensing lines. The check valves shall have a .09375 in. hole drilled in the clapper so that the valves will serve as a damper for system pressure surges.
- 4.8.5.5 Pipe, tubing, and fittings used for sensing line shall be ½” nominal size.
- 4.8.5.6 A shut-off valve is not permitted in the sensing line.

## 4.9 Skid Base Structure

### 4.9.1 Materials

- 4.9.1.1 All skids shall be constructed of fabricated carbon steel
- 4.9.1.2 All materials used in the construction of the skid base, equipment mounting provisions, and support materials shall be new.
- 4.9.1.3 All structural steel shapes, bars, plates shall be ASTM A36 grade meeting the requirements of ASTM A6.
- 4.9.1.4 All structural channel, I-beam, and square tubing provided as skid running members (main supports) shall be provided with MTR reports upon request.

### 4.9.2 Standards of Design

- 4.9.2.1 Load bearing beams shall be contained within and welded to a steel, I-beam or structural channel exterior.
  - 4.9.2.2 Appropriate space and clearance shall be provided for access, operation, and maintenance of supplied equipment.
  - 4.9.2.3 Skid exterior running members parallel to shaft lines of rotating equipment shall be sized to accommodate a deflection standard of  $L/1000$ .
  - 4.9.2.4 The skid shall be designed for grout fill. Provision and installation of a non-shrink grout shall be by others.
  - 4.9.2.5 Skid perimeter members for enclosure packages shall be sized a minimum of 4 inches larger than interior structural members to allow for clean uninterrupted grout surface at the top of the skid and sufficient space to recess conduit under finished floor.
  - 4.9.2.6 Firefighter commercial skid packages shall have interior and exterior structural members fit flush with top of skid.
  - 4.9.2.7 Drain provisions shall be incorporated into the supporting foundation or slab design by others. Recommended drain locations shall be shown on the General Arrangement Drawings.
  - 4.9.2.8 Lifting provisions shall be incorporated into the skid design. The preferred method of lifting provision shall be lifting lugs installed in the exterior running members of the skid structure.
- 4.9.3 Standards of Manufacture
- 4.9.3.1 All welded structural members, brackets, pipe supports, equipment supports, and racks will be completely seal welded. Plates may be stitch welded.
  - 4.9.3.2 All structural welds will be performed by AWS D1.1 certified welders.
  - 4.9.3.3 All welds shall be of high quality and ground clean. The welds shall be free of slag, pinholes, and undercut.

- 4.9.3.4 All major equipment shall be bolted or welded to main skid structural members. No equipment may be attached to floor plate or light weight (less than ¼”) angle brackets.
- 4.9.3.5 All skids shall be provided with two drilled and tapped grounding lugs located at opposite corners of the skid and seal welded to the exterior structural member web.
- 4.9.3.6 The measurement of the skid diagonal will fall within ¼” of the calculated value using the square root of the sum of the squares of the measured length and the measured width.
- 4.9.3.7 The main welded skid joints (4 corners) shall be liquid penetrant tested in accordance with ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process.
- 4.9.3.8 The lifting lugs shall be liquid penetrant tested in accordance with ASTM E1417-95a, Standard Practice for Liquid Penetrant Examination Using Solvent Removable Process.

#### 4.10 System Main Piping

##### 4.10.1 Materials

- 4.10.1.1 All carbon steel pipe used in the system shall be a minimum schedule 20 ERW API5LX-52 or ASTM A53B grade material
- 4.10.1.2 Grooved piping fittings shall be cast iron, ductile iron, or carbon steel construction and shall be third party listed for fire service. Grooved fittings shall have a maximum allowable working pressure of 300 PSI or greater.
- 4.10.1.3 Flanged cast iron fittings shall be Class 150/250 as appropriate for system discharge pressure. Flanged cast iron fittings shall be manufactured in accordance with ASME B16.1

##### 4.10.2 Standard of Manufacture

- 4.10.2.1 All pipe connection welds will be performed by ASME Section IX certified welders.
- 4.10.2.2 All welds shall be of high quality and ground clean. The welds shall be free of slag, pinholes, and undercut.
- 4.10.2.3 Piping and piping components shall be installed and supported to prevent excess strain as required by pump and valve manufacturers.

#### 4.10.3 Valves

- 4.10.3.1 All valves used in the main system suction and discharge piping shall be UL Listed for fire service. 14" and greater size valves as well as high pressure gate valves shall be provided as commercially available and acceptable to the Authority Having Jurisdiction.
- 4.10.3.2 The suction isolation valve shall be a listed OS&Y gate valve of cast iron/bronze fitted construction.
- 4.10.3.3 Required check valves in the discharge piping shall be wafer style or grooved and shall be rated for the maximum system discharge pressure.
- 4.10.3.4 Discharge isolation valves shall be butterfly type and shall be wafer, lug, or grooved construction and shall be rated for the maximum system discharge pressure
- 4.10.3.5 All valves, except for check valves, in the main system piping shall be provided with tamper switches. Tamper switch connection to a monitoring system shall be performed by the installing contractor if required.

#### 4.10.4 System Options-Select from the following of desired options for specified system:

- A) Hose Valve Header Piping
- B) City By-pass Piping
- C) Flow Meter Piping
- D) Fire Department Inlet Piping
- E) Pressure Relief Valve Piping

- F) Suction Control Valve Installation
- G) Jockey Pump Piping

4.10.4.1 Hose Valve Header Piping-The system shall include a NFPA 20 compliant provision for installation of a hose valve head to be used for system acceptance and annual testing.

Enclosure packages shall include piping and valve installed in accordance with NFPA 20. The piping will penetrate the building wall and the customer or installing contractor's connection shall be a grooved or flange fitting at the exterior of the building. Installation of the hose valve header and hose valves, caps, and chains will be by the installing contractor.

4.10.4.2 City By-pass piping- The system shall include a NFPA 20 compliant city by-pass piping arrangement. The system shall be designed to incorporate this piping inside the enclosure perimeter. The piping and valves shall be installed by the factory as part of the system piping and shall be supported from the skid structure.

4.10.4.3 Flow Meter Piping-The system shall include a NFPA 20 compliant provision for installation of a flow meter to be used for system acceptance and annual testing.

4.10.4.3.1 Enclosure packages shall include piping, isolation valve, and downstream control valve installed in accordance with NFPA 20. The installation options shall be return to suction piping. A minimum of five pipe diameters shall be provided in front of the pump suction flange when this piping option is used. This will increase the enclosure length by corresponding distance. A ½" nominally sized vent provision shall be installed in the piping downstream of the control valve.

4.10.4.3.2 If the friction loss within the flow meter piping inside the skid or enclosure limits exceeds an equivalent length of 100 ft, the next size flow meter piping shall be used.

4.10.4.4 Fire Department Inlet Piping- The system shall include a NFPA 20 compliant provision for installation of fire department inlet piping.

Enclosure packages shall include piping and valve installed in accordance with NFPA 20. The piping will penetrate the building wall and the Company or installing Contractor connection shall be a grooved, threaded, or flanged fitting at the exterior of the building. Installation of the inlet connection fitting (Siamese-Y, Storz Type, etc), caps, and chains will be by the installing Contractor.

4.10.4.5 Main relief valve piping- The system shall include a NFPA 20 compliant pressure relief valve piping arrangement. The system shall be designed to incorporate this piping inside the enclosure perimeter.

4.10.4.5.1 The piping and valve shall be installed by the manufacturer as part of the system piping and shall be supported from the skid structure.

4.10.4.5.2 Enclosure packages shall include a tee connection for an angle style main relief valve sized per NFPA 20. The valve shall be mounted and support by the manufacturer. A sight glass cone shall be provided and installed in the piping. The discharge shall be piped to the exterior of the building for customer connection.

4.10.4.6 Suction control valve piping- The system shall include a NFPA 20 compliant suction control valve installed in the discharge piping. The system shall be designed to incorporate this piping inside enclosure perimeter.

4.10.4.6.1 The pressure sensing line shall be constructed of brass, copper, or series 300 stainless steel pipe, rigid tubing, and fittings. The pressure rating for the wall thickness and the fittings shall meet or exceed 300 psi. The line size shall be 1/2" minimum.

4.10.4.6.2 The sensing line shall be connected to the suction piping within the skid perimeter.

#### 4.11 Equipment, Enclosure, Structural Steel, and Piping Coatings

- 4.11.1 All equipment that is provided within the packaged system should be supplied with the respective OEM manufacturer's standard coating
- 4.11.2 Enclosure interior liner panels, exterior panels, frame joints, and roof panels should be provided with the respective OEM manufacturer's standard coating system.
- 4.11.3 Structural steel, piping, equipment support brackets, fuel tanks and other packaged system items as necessary shall be protectively coated
- 4.11.4 Coatings shall be stored in sections by type and manufacturer
- 4.11.5 Vendor or Vendor's coating Subcontractor shall label each container to indicate the usable shelf life. This shelf life shall be observed (rotate stock)
- 4.11.6 Unless otherwise specified by the manufacturer, temperature shall be maintained between 50° F minimum and 100° F maximum during storage.
- 4.11.7 Manufacturer's data sheets shall be followed for coating application.
- 4.11.8 Surfaces not to be painted shall be protected by masking or grease
  - 4.11.8.1 All operation mechanisms such as pump shafts, motor shafts, couplings, valve stems, linkages, packing glands, limit/pressure switches, etc. shall be adequately protected prior to painting.
  - 4.11.8.2 All gauges and faces, nameplates, door handles, door gaskets, valve position indicators, etc shall be adequately masked prior to painting.
  - 4.11.8.3 All masking and other protection used during the painting process shall be removed immediately after painting unless required for shipment.
- 4.11.9 Surfaces to be painted shall be free of grease, oil, dirt, rust, mill, scale, weld spatter, and moisture. Improper surface preparation can cause failure of the paint to adhere to the bare metal or the previously applied paint coat. Paint, crayon, and chalk used for identifying markings shall be cleaned off prior to painting.

- 4.11.10 Prime painting (when applicable) of unprotected metallic surfaces shall be performed immediately following cleaning. Re-cleaning is necessary if surfaces to be painted become contaminated after initial cleaning or if elapsed time after surface preparation exceeds 8 hours.
- 4.11.11 Surfaces that require painting, but are inaccessible after assembly shall be prepped and prime coated prior to the assembly operation.
- 4.11.12 All external surfaces shall have finish coat applied unless covered in 4.11.7.1 or 4.11.7.2. Additional items that may not be coated are control panels, junction boxes, power/circuit breaker panels, transformers, machined surfaces, stainless steel, copper, brass, bronze, aluminum, and galvanized material, unless otherwise specified.
- 4.11.13 System 2 Coating Description
  - 4.11.13.1 Surface preparation
    - 4.11.13.1.1 Steel surfaces shall receive a Brush-off Blast Cleaning (SSPC-7) in accordance with the requirements of the Steel Structures Painting Council.
    - 4.11.13.1.2 Coating of pre-painted major equipment items such as control panels, engines, motors, pumps, etc is not required.
  - 4.11.13.2 Finish Coat
    - 4.11.13.2.1 Top Coat – Aliphatic Acrylic Polyurethane shall be applied to all primed and/or prepped surfaces.
    - 4.11.13.2.2 Coating shall be applied in accordance with the manufacturer's instructions.
    - 4.11.13.2.3 Coating shall be applied to an overall average thickness of 1-1/2-3 mils (DFT) or as required by the coating manufacturer.
  - 4.11.13.3 Acceptable Coating Manufacturers
    - 4.11.13.3.1 Ameron - Amercoat 450HS (2-3 mils DFT) or equal

4.11.13.3.2 Carboline - Carbothane 134HG (2-2-1/2 mils DFT) or equal

4.11.13.3.3 International – Interthane 990 (2-3 mils) or equal

#### 4.12 Electrical Installation for Enclosure Packages

##### 4.12.1 Electrical Design

4.12.1.1 All electrical material shall be UL Listed.

4.12.1.2 Conduit shall be nominally sized per NEC, but shall not be less than 3/4" minimum

4.12.1.3 Flexible conduit is permitted to be 1/2".

4.12.1.4 External ground provisions shall be provided for all major equipment and main electrical devices (motors, engines, fuel tanks, control panels, power panels, transformers, disconnects, gutters, etc.)

4.12.1.5 Individual grounding shall be provided for each power circuit. Multiple grounds shall not be acceptable.

##### 4.12.2 Electrical materials and installation for below skid finish surface conduit routing.

4.12.2.1 RMC (Rigid Metallic Conduit) shall be provided and installed per NEC Article 344.

4.12.2.2 Form 85 fittings shall be provided and installed per NEC Article 314.

4.12.2.3 Wiring shall be provided and installed per NEC Articles 110, 300, 430, and 695.

4.12.2.4 Wiring for control and power circuits (except electric motor circuits) shall be labeled on the end of each circuit with heat shrink type tagging. Motor circuit wiring shall be marked with phasing tape.

- 4.12.2.5 Seal tight flex shall be provided and installed per NEC Article 350.
- 4.12.2.6 Grounding shall be provided and installed per NEC Article 250
- 4.12.3 Electrical materials and installation for above skid finish surface and building electrical
  - 4.12.3.1 EMT shall be provided and installed per NEC Article 358.
  - 4.12.3.2 Standard 4" x 11-1/2" 1900 boxes fittings shall be provided and installed per NEC Article 210, 220, and 314.
  - 4.12.3.3 Wiring shall be sized, provided, and installed per NEC Articles 110, 300, 430, 695.
  - 4.12.3.4 Wiring for control and power circuits (except electric motor circuits) shall be labeled on the end of each circuit with heat shrink type tagging. Motor circuit wiring shall be marked with phasing tape.
  - 4.12.3.5 FMC (Flexible Metallic Conduit) shall be provided and installed per NEC Article 348.
  - 4.12.3.6 Grounding shall be provided and installed per NEC Article 250.
  - 4.12.3.7 Electrical boxes and panels shall be NEMA 12 minimum.
  - 4.12.3.8 Terminal strips shall be rated for 35A at 600V and shall be suitable for #26 AWG to #10 AWG wire size.
  - 4.12.3.9 Transformer shall be general purpose dry type.
  - 4.12.3.10 Load centers shall be QO, plug-on type panels.
  - 4.12.3.11 Circuit breakers shall be plug-on type and provide protection for over current and short circuit.
  - 4.12.3.12 Disconnects shall be general duty 3PH 600V devices and shall be NEMA 12 minimum enclosure.
  - 4.12.3.13 Gutters shall be NEMA 12 minimum.

- 4.12.3.14 Distribution blocks shall be 3-pole 600V and shall be 4 tap or 6 tap load side type.
- 4.12.4 Electrical devices and components for skid and/or building enclosure packaged systems
  - 4.12.4.1 Enclosure packages shall be provided with an electric forced air heater with provisions for wall or ceiling mounting. The heater shall have a 3kW rating or higher.
  - 4.12.4.2 Enclosure packages shall be provided with electrically actuated air intake louvers that are high performance, low leakage type compliant with UL 555, UL555S, NFPA 90A, NFPA 92A, UBC, and IBC requirements. Louvers shall be “fail open” type in a diesel driven fire pump enclosure package or shall be “fail closed” type in an electric motor driven fire pump enclosure packaged system.
  - 4.12.4.3 Intake louvers shall be sized for the free area needed to provide the air exchange to maintain 120 degree F maximum interior enclosure temperature.
  - 4.12.4.4 The louver sizing parameters shall consider the heat rejection of the diesel engine, the air aspiration requirement of the diesel engine, and the maximum specified ambient temperature condition for the installation site.
  - 12.4.4.5 Enclosure packages shall be provided with a 120V ventilation exhaust fan and gravity louver accessory. The fan shall have a minimum of two (2) locally selectable speed selections with air flow range of 1150 – 2000 CFM.
  - 12.4.4.6 Enclosure packages shall be provided with one standard GFI electrical receptacle and a commercial grade 15 or 20 amp light switch located near the access doors.
  - 12.4.4.7 Enclosure packages shall be provided with a minimum of three (3) 4’ dual lamp 120V fluorescent lighting fixtures.
  - 12.4.4.8 Enclosure packages shall be provided with a battery back-up emergency light fixture and exit sign above each access doorway.

12.4.4.9 Enclosure packages shall be provided with a weatherproof exterior light above each access doorway. The light shall be equipped with a photocell for automatic operation.

4.13 Building enclosure materials and design for enclosure packaged systems

4.13.1 Environmental enclosures shall be constructed with prefabricated wall and ceiling panels formed to exact size as described below.

4.13.2 Insulation shall be 100% rigid urethane with an at temperature conductivity factor (K factor) not to exceed 0.128 Btu/hr. Urethane is to be poured in place with a density of 2.2 pounds per cubic foot. Overall coefficient of heat transfer (U factor) and R value to be as follows:

THICKNESS	“U” FACTOR	“R” VALUE
3-1/2”	.036	28

This insulation shall be a listed urethane with a rating of no more than 25 for flame spread and 450 for smoke developed per ASTM E84. This urethane will also meet the ignition properties requirements of ASTM D-1929.

4.13.3 All panels to be constructed with die-formed interior and exterior metal pans securely fastened to a perimeter frame of 18 gage galvanized structural steel stud at 16 inches on center. Perimeter frame to feature manufacturer’s standard system for positive alignment and sealing. Panel shall be filled with poured-in-place urethane, which securely bonds to metal pans and perimeter frame creating a rigid structural panel with a tough, resilient, shock-resisting surface. Standard panels shall be interchangeable for ease of assembly. Special panels (if required) shall be manufactured to the size required to obtain a specified building size.

4.13.4 Cam-lock fasteners shall provide a tight and positive seal. These fasteners reduce on-the-job installation time to a minimum. Fastener material shall be steel housing, hook and pin with high-pressure die-cast zinc cam. Hardened steel hexagonal wrench is provided to tighten panel fasteners. The hook of the fastener shall engage over the pin

when rotating the wrench and with cam-action, draw the panels tightly together. Polyethylene snap-in caps cover the wrench holes. Lock spacing shall not exceed 48" on center.

- 4.13.5 Each joint shall exhibit a polyvinyl chloride (PVC) bulb type; compression gasket to eliminate water vapor permeability. All gaskets are factory installed and require no additional handling. Gaskets shall be resistant to chemical corrosion and ultraviolet radiation. Gasket operating temperature shall be -34 degrees C to +71 degrees C (-30 degrees F to +160 degrees F).
- Interior and exterior panels are available in the following types of metal finishes:
- Galvanized Steel:
    - (1) White Embossed 24/26 gauge
    - (2) Tan Embossed 24/26 gauge
- 4.13.6 Insulated panels shall be set on galvanized "Z" base trim with non-drying butyl caulking. All openings and penetrations through insulated panels shall be sealed with silicone sealant. Clean and degrease applicable surfaces.
- 4.13.7 Door shall be seamless, constructed of two face sheets of 18 gauge cold rolled steel, stretcher-leveled quality of flatness. Vertical edges of doors shall have neat hemmed edge seam mechanically interlocked for maximum structural integrity. All hinge reinforcements shall be of 8 gauge steel projection welded to door. Observation windows are available as factory-installed options and must be specified if required. Available sizes are listed below.
- 4.13.8 Doors for both interior and exterior shall be 1-3/4" thick and 7'0" tall. One 6070 door shall be provided for combined access and equipment removal. Standard frames shall be 16 gauge cold rolled steel. Frames shall be mitered, face welded and ground smooth. All hinge reinforcements shall be of 8 gauge steel projection welded to frame. Reinforcements for strike and surface mounted hardware shall be a minimum of 14 gauge. Frames shall be furnished with a factory installed rubber mutes, 3 per strike jamb. Doors and frames shall be painted to match exterior panel color. Door hardware including pinned butt hinges with individual latch set and various accessories, if required, for both interior and exterior doors as follows:

- (1) Hinges: 1-1/2" pair (per door), 4-1/2" x 4-1/2", stainless steel. (U.S. 32D)
- (2) Passage Latchset: Cylindrical, brushed chrome finish (U.S. 26D). Keyed lockset with push button release available upon special request.
- (3) Hasp & Staple: 7" extra heavy type, cadmium plated.
- (4) Head Bolt (if required): 6" long with 24" chain, cadmium finish.
- (5) Foot Bolt (if required): 6" long, cadmium finish.
- (6) Weatherstripping
- (7) Threshold: aluminum
- (8) Door stop and latch
- (9) All doors shall be supplied with metal shield above the door to divert rain and snow from the door opening.

- 4.13.9 A prefabricated roof system shall be provided for the enclosure to provide a waterproof covering for insulated ceiling panels. Standard roof system shall be a galvanized standing seam, 22 gauge, 16 inches wide, sheet metal over ceiling panels with a slope of 1/4" per foot. Fasteners shall be corrosion resistant rubber washer "tek" screws with length and strength required for metal to be fastened.
- 4.13.10 When required, beam pockets at top of wall panels shall be used to eliminate obstructions caused by support columns. Steel beams shall be wide flange type.
- 4.13.11 Gutters and downspouts shall be provided and the finish color shall match the finish on the insulated panels.
- 4.13.12 Enclosures shall be designed to comply with 90 MPH sustained wind load and 30# SF snow load on the roof system per the standards established by IBC

#### 4.14 State Certification and Labeling For Enclosure Packages

- 4.14.1 Check the latest certification requirements for the state where an enclosure package will be installed.
- 4.14.2 Labeling requirements can vary from state to state
- 4.14.3 The specification should be tailored to the state requirement.

## 4.15 Packaging, Shipment Preparation, and Shipping Requirements For Diesel Driven Enclosure Packages

### 4.15.1 Packaging and Shipment Preparation

- 4.15.1.1 Disassemble fuel vent piping, engine exhaust system, and wall/ceiling mounted electric heater
- 4.15.1.2 Apply rust preventative to exposed motor shafts, pump shafts, and drive coupling
- 4.15.1.3 Close and secure control panel doors with the latch. Leave doors unlocked and place the keys and desiccant inside the panel.
- 4.15.1.4 Protect any exterior lighting with bubble wrap.
- 4.15.1.5 Secure fan and louver openings to prevent damage due to wind and vibration during transit.
- 4.15.1.6 Secure the access doors with wire or straps to prevent opening during transit
- 4.15.1.7 Remove interior light bulbs and pack appropriately for transit
- 4.15.1.8 Roll and secure excess wire left for field installation of electrical devices that were shipped loose for transit purposes (i.e. heater, vertical pump motor, submersible jockey pump, etc.)
- 4.15.1.9 Grease and cover all piping openings using flange covers or pipe caps as necessary
- 4.15.1.10 Package all ship loose accessories (i.e. hose valve head, hose valves, flow meter gages, fire department inlet connection, light bulbs, heaters, motors, pumps, etc.) into an appropriate box or crate.
- 4.15.1.11 Secure the accessory box(s) or crate(s) to an individual pallet or to the packaged skid structure (if space permits)
- 4.15.1.12 Protect the accessory box(s) or crate(s) from short-term weather exposure

#### 4.15.1 Shipping Document and Coordination Requirements

4.15.1.2 Provide a detailed packing list for the shipment that contains the following information:

4.15.1.2.1 Manufacturer sales order reference number

4.15.1.2.2 Client purchase order number or required reference number

4.15.1.2.3 Ship-to Address

4.15.1.2.4 Site Contact Name and Phone Number

4.15.1.2.5 Instructions for driver to contact above person 24-48 hours prior to delivery

4.15.1.2.6 Major Equipment listing including manufacturer, model, and serial numbers for the following items:

4.15.1.2.6.1 Main Fire Pump

4.15.1.2.6.2 Diesel Engine

4.15.1.2.6.3 Main Fire Pump Control Panel

4.15.1.2.6.4 Jockey Pump Control Panel

4.15.1.2.7 Additional Equipment listing including manufacturer and model for the following items:

4.15.1.2.7.1 System Valves

4.15.1.2.7.2 Jockey Piping Valves

4.15.1.2.7.3 Drive Coupling

4.15.1.2.7.4 Jockey Pump

4.15.1.2.7.5 Jockey Pump Piping Valves

4.15.1.2.7.6 Pressure Gages

4.15.1.2.8 Estimated gross shipping weights and dimensions of each shipping skid, crate, or box.

4.15.1.2.9 Signed verification by shipping personnel

4.15.1.3 Make contact with purchasing customer to coordinate delivery arrangements to the job site.