ASSOCIATED FIRE SPECIALISTS, LLC
EXPERIENCED FIRE SYSTEM PLANNING AND COMMISSIONING

December 31, 2018

To: Foam Proportioning/Fire Water Pump Skid Vendors
Re: Minimum Provide/Build Requirements for USA/Canadian Projects

The stipulated items depicted in this document are to be incorporated into skids as a minimum build requirement subject to the AHJ in certain areas marked (*). Skids are referring to water pump, foam proportioning pump, or combination pump skids thereof. NFPA are minimum standards for fire protection published in the USA. Therefore, as a minimum, references made are that the components utilized shall be tested by a recognized third party testing laboratory. This is intended to refer to primarily Underwriters Laboratories (UL). Other recognized third party testing authorities might also be Underwriters Laboratories of Canada (ULC) and Factory Mutual (FM). However, all components utilized in the construction of the fire system shall bear the minimum of UL listing unless approved otherwise prior to the vendor's proposal submittal and acceptance.

In addition to a project specification outlining the requirements for a specific request for quote (RFQ), the following details must also be incorporated into an offering by the quoting vendor. Any deviations must be clarified with the proposal but in any case shall comply with the minimums of NFPA and UL.

Note: References to the term "skid" shall include those components necessary to complete the entire process of producing pressurized fire protection water, foam solution, or alarm/supervision if applicable of installed equipment. The vendor shall submit at the time of bid submission,

- A "preliminary" P&ID drawing in order for the buyer to assess that the vendor understands of the project specifications.
- Listing of similar projects completed by the responsible office
- List of vendor's project team; manager, Design manager, Design team
- List of subcontractors
- List of major equipment suppliers

All Systems Skids, Water pump or Foam Proportioning

- All carbon steel structures, supports, piping, and fittings properly media blasted, prime painted, and finished polyester red epoxy (matching factory painted "red" diesel or electric fire protection driver) paint with a minimum of two coats applied. Or, as the project painting specification dictates, whichever is decided.
- Pipe fitter's markings on all bolts, studs, and nuts should appear on final torqueing procedure and before hydrostatic testing.
- Protect from paint, all gauges, valves stems, and/or valve operators and other surfaces deemed finished and/or not requiring final painting.
- Valves, fittings, piping, piping system, shall be of a uniform manufacturer and as depicted on the approved equipment submittals. Equipment submittals shall have the item to be reviewed clearly identified with any other models marked out with "X" if they are not being considered in the build.

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- Mounting of pump drivers will not be using anchor bolt holes through a plate alone. Vendor to provide properly engineered support to the base frame.
- There may also include additional support channeling to capture supports for miscellaneous piping
- Sub-Skid assemblies are generally welded directly to existing steel base in modular structures and the bases are not filled with grout.
- Zinc plated hardware, i.e., flange bolts, studs, nuts shall be utilized minimum
- Batteries to be located such that they are not a “stepstool” unless support structures are constructed over them for said purpose and battery cases with covers to be marine type
- Verify battery placement is located such that the supplied battery leads will work with the lengths provided by the pump and building manufacturer but shipped loose.
- Provide Material Certs for pump shaft, impeller and casings during the acquisition of materials
- Liquid dye Penetrant test for all piping welds – Certified ASME IX welding, individual welder certificates and project welding procedures to be provided on final documentation
- Manufacturers’ Certified pump performance curves (standard) shall be provided after pump build for review and approval prior to shipping
- Use Firetrol or Eaton Controllers to ensure local support
- John Deere, Clarke, or Cummins diesel drivers are preferred for same reason as controllers
- All drain discharges are to be properly sized to accommodate the maximum flow expected and piped to a single point location on the skid as indicated by the customer. No open discharges to the floor. This includes casing relief and pressure relief valves, and pump packing drains, deluge valve priming water. Etc.
- NEMA 3R minimum rating on all wiring and electrical components, either on the skids or the entire building enclosure as applicable
- TEFC for electric motors
- All fuel lines to be of rigid piping. Fuel supply and return shall be carbon steel and have a braided stainless steel flexible hose as a final connection to the diesel drive for vibration isolation.
- Diesel fuel storage tanks are to be double wall type, Non-vacuum, with a sensing switch on the secondary containment side
- Fuel tanks should be equipped with both visual and electronic level indicators
- Use only quality gauges. They are to be Glycerin oil filled with a 3-way isolation valve and additional 1/4” valved gauge connection with an additional plugged port for testing gauge. Project specification may over-ride this with a block valve requirement which takes precedence.
- Pilot operated Relief valves are to be piped to edge of skid for return to the source, whether pond or tank
- Valve tags with function and numbering scheme these may also be of lamicoid or Stainless material, embossed or engraved, no stick-on printed labels.

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- Minimum clearances between pumps and minimum clearances between pump/cistern walls (vertical lift type) to be clearly shown on vendor provided data sheets at submittal phase and meet all requirements of the manufacturer of the equipment and the customer's minimums for accessibility.
- UL-ULC listed fuel tanks where required
- Unless indicated otherwise, all skids should be open type with no plating on top
- Diesel drives to have oil drain extended to skid limits with cap
- All low points to be provided with a means of drainage treated per NFPA #13, no less than 3/4" plugged valve

Foam Pump Skids:

- Sensing lines to be stainless steel, Swagelok or approved equal, plumbed level, at right angles, properly reamed, and assembled per manufacturer's requirements.
- In addition to flex connections at the foam concentrate tank, these **flanged** isolation fittings shall also be installed on the suction and discharge of diesel driven foam pumps
- No grooved fittings shall be used on the suction piping of a foam concentrate pump. Use of flanged unions are preferred on suction and discharge of electric driven pumps.
- Duplex gauges shall be included on balanced pressure pump systems and shall be equipped with flushing connections; red needle is connected to foam and black needle is connected to water.
- Foam pumps shall be installed with flanged unions for ease of removal in the case of diesel driven pumps, the flexible connections is deemed appropriate.
- Foam balancing valves shall be set up with isolation valves and grooved couplings for easy removal and bypass available for standby.
- Balancing valves have two opposing female taps on the top (water side) and two taps on the bottom (foam side). Water sensing line shall connect to one tap, then, the other water tap shall continue to the flushing connection at the duplex gauge using a high pressure stainless steel braided flexible hose. Similar arrangement shall be done for the foam sensing line as well. When the water flushing connection is opened at the duplex gauge, initiating a flush on the water side, the entire upper chamber of the balancing valve is replaced with fresh water. If piped properly and in a similar fashion, foam flush will replace the foam liquid through the balancing valve as well.
- Use flanged style ratio controllers.
- Ratio controllers shall be piped at the water inlet and orifice adjusting screw port to include the ability to measure differential pressure. Other manufacturers shall have a UL-Listed flow meter upstream
- Diesel fuel tanks are to be enclosed, double wall type, Non-vacuum type, with a sensing switch on the secondary side, not less than 50 USG capacities.
- Foam Concentrate line piping to be stainless steel, complete with butt or socket weld fittings – TBD by specific project specification. The only exceptions are the

threaded jointed fittings or appliances produced by the foam equipment manufacturer which shall be immediately transitioned from threaded.

- Additional female x female ball valves on suction and discharge for flushing of entire system (This will add male and swivel and male hose connections as well). Flushing connections shall be no less than the following schedule:

Foam Pump Suction/Disch	Flush Connection Size Minimum
1 ½-2”	1 ½”
2 ½”-6”	2 ½”

- NEMA 3R or 4X protection for controllers.
- Customer supplied materials for storage tank, ratio controller, balancing valve and all connection between tank and system
- Uniformity of flange types and flange gaskets shall exist throughout the skid (raised or flat face). This piping system may be included in the project specifications.
- All foam proportioning skids shall include provisions for flow or pressure control valves in order to confine the outflows to the DESIGN FLOWS and the limits of the foam pump.

Misc. Foam Proportioning Equipment

- Polyethylene tank bulkhead fittings forming the drain, suction, and return connections shall be Stainless Steel type with proper bulkhead bolt through kits, no fused plastic or PVC threaded type fittings
- Suction line inside atmospheric storage tanks are to be located as low as possible and arranged with a downward elbow and anti-vortex plate.
- Tank suction and return isolation valves shall be provided at skid limits
- Tank suction and return flexible connections shall be provided at the tank
- Listed and manufacturer approved Foam concentrates shall be included with the proposal and those used for fixed systems applications shall have UL listings typical with the equipment being utilized. Preferably, the foam concentrate should be listed with the discharge device it will be serving.

Drawings, Product, and Material Submittals

- Diagrams, drawings, P&ID’s provided by contract documents will require vendor modification, input, and maintenance throughout the skid build until final acceptance. Proposal submitted should include ongoing engineering requirements which would include coordination, drawing revisions, design conflicts, project management, record management, and as-built drawing versions

Third Party Factory Inspections: May require up to three separate inspections, identified in a properly maintained inspection and test plan (ITP), locations may be varied based on vendor‘s manufacturing facility locations, cost of inspector (travel) is by the buyer based on schedule provided by vendor, with a minimum of 72 hours prior notice. Cost of support for and during such inspection periods is

by the vendor. Material and Welder Certifications, based on submittal information offered by the vendor. At the option of the buyer, any costs for return trips due to a failed inspection or delay shall be born by the vendor.

Manfacturer's location or pump performance testing and certifications

- Based on vendor's submitted and accepted factory performance test procedure, performance in the presence of the customer's third party inspector will take place.
- Provide necessary testing guidelines (that may be required in the specification or basis of proposal) that are to be followed and submit with proposal

Manufacturer's location for Hydrostatic testing of skid assembly

- First inspection shall also include a verification of conformity to equipment data sheets and drawings.
- The entire skid assembly shall be tested from inlet flange to discharge connection. Field piping will be addressed by others.
- Check valve clappers shall be removed or held open in order to fill and test all areas. Once filled and pressurized, valves supplied at the pumping points shall be closed, and pressurizing source removed. Calibrated test gauge shall be installed at a convenient location and easily read.
- Per NFPA, testing shall be at a testing pressure of 50 psi above the maximum operating pressure but not less than 200 psi
- Testing media shall be water or RV type anti-freeze if skid will be subjected to freezing conditions during shipping or arrival on site.
- Test period shall not be less than two hours with "zero" leakage.
- All leakages found shall be repaired and a new testing sequence repeated

Manufacturer's location final inspection prior to Shipping

- At this time, a final inspection is conducted to assure all components and issues have been addressed and the skid is ready for shipment.
- As-built drawings should be available for review
- Systems operating instructions and diagrams are posted in the pump/valve rooms as necessary.
- Certificates of material conformance, welders, and final shop testing should be available
- If not shipped in advance the Operation and Maintenance manuals shall be ready at the final inspection and one printed copy with one electronic media copy available for the inspector.
- Has the driver been aligned with the pump and by what method?

Shipment Receiving-These items will be incorporated into the basis of any Purchase Order generated and therefore must be included into the vendor's proposal .

- Foam concentrates will not be accepted prior to the receipt of skids-Notification to the buyer prior to shipment shall be made in order to provide adequate protection at the final destination.

- If accepted at the time of order, complete list of spare parts must be received preceding or accompanying the skid
- Complete Operation and Maintenance manuals must precede or accompany the shipped skid. Manuals shall include:
    1. Specific parts lists for each component on the skid
    2. Original start-up procedures
    3. Trouble-Shooting
    4. Replacement parts availability
    5. As-Built drawings, P&ID's, Equipment lists
    6. Test Reports, i.e., Pumps, Hydrostatic pressure tests, relief valves, welder certifications (if different than submitted)
    7. Material Certifications
- Laminated P&ID (24"x 36"minimum) matching the valve numbers on the skid shall precede or accompany the skid, Mounting or posting will be by others
- Laminated Operating Instructions, depicting the normal standby condition of all valves. Actual supervision of valves will be executed by the owner upon conclusion of commissioning, whether locking, car sealing, or electronically.

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