



FILE NO.:	USF43.192
DATE:	Oct. 15, 2000
SUPERSEDES:	USF43.192
DATE:	July 30, 2000

**HORIZONTAL SPLIT CASE AND END SUCTION TYPE DIESEL ENGINE DRIVEN FIRE PUMP
PRE START-UP CHECKLIST (U.S. VERSION)**

This pre start-up checklist shows items that must be completed prior to a scheduled start-up. If the answer to any questions is "No"(when it should be "Yes"), is left blank or contradicts the requirements of NFPA 20, the installation is not ready for start-up. Indicate "N/A" for not applicable wherever appropriate. These questions should be answered in conjunction with the fire pump (mechanical) contractor and electrical contractor. Check list must be returned signed and dated below.

Fire Pump IO&M manuals are available on the Armstrong's website www.armstrongpumps.com

Please note the attached "CLARKE Exhaust Pipe Data Fax" sheet (C13 158) is an integral part of properly completing this checklist, specifically in confirming the exhaust piping has been properly sized. This can also be done by using the www.clarkefire.com website to obtain immediate confirmation.

The attached "ENGINE INSTALLATION CHECKLIST" must also to be completed by the installing contractor and submitted along with the other forms to the local Armstrong Darling Representative prior to scheduling start-up inspection.

The sole purpose of this pre start-up checklist is to serve as a guide only. Armstrong does not assume any liability or responsibility for the accuracy of this list or any items omitted. This list does not absolve the installing contractors of their responsibilities for proper installation in accordance with the local and national codes and standards.

Project Name: _____
 Site Address: _____, City: _____, State: _____
 Insuring Authority: _____
 Flow Test to be performed by: Company Name: _____
 Contact: _____ Tel: _____ Fax: _____
 Pre Start-Up Check Date: _____
 Pre Start-Up Checklist completed by: a). Company Name: _____
 b). Contact Name: _____
 c). Telephone: _____ Fax: _____

I. NAMEPLATE DATA (must be taken directly from each equipment nameplate):

1. Pump Model Number: _____ Pump S/N: _____
 2. Rated Flow: _____ Rated Pressure: _____ Pump Speed: _____ rpm
 3. Controller Mfg: _____ Model Number: _____
 4. Controller S/N: _____ Voltage: _____ Phase: _____ Hz: _____
 5. Engine Mfg: _____ Engine Model Number: _____
 6. Engine S/N: _____ Horsepower: _____ Engine Speed: _____ rpm
 7. Voltage: _____ Phase: _____ Hz: _____
 8. Jockey Pump Model Number: _____ Jockey Pump S/N: _____
 9. Jockey Pump Motor Mfg: _____ Model Number: _____
 10. Jockey Pump Motor S/N: _____ Horsepower: _____ Motor Speed: _____ rpm
 11. Jockey Pump Motor Voltage: _____ Phase: _____ Hz: _____

II. GENERAL INSTALLATION:

	<u>YES</u>	<u>NO</u>
1. Visual Inspection done of the overall pump assembly (No visible sign of cracks, damage, rust or watermarks).	_____	_____
2. All mechanical installation in accordance with NFPA 20 Standards.	_____	_____
3. All electrical installation in accordance with NFPA 70 Standards.	_____	_____
4. All electrical supplies correspond to all engine, motor and controller nameplates.	_____	_____
5. Entire pump assembly base securely anchored with foundation bolts of suitable size embedded in the concrete floor.	_____	_____
6. Entire pump assembly base grouted sufficiently substantial to absorb any vibration and to form a rigid support for the base plate.	_____	_____
7. Entire pump assembly base level and aligned with all connecting piping and fixtures.	_____	_____
8. Fire Pump System manual c/w certified performance curve and wiring diagrams available for start-up.	_____	_____

III. MAIN FIRE PUMP INSTALLATION – DIESEL ENGINE DRIVEN (HSC & ES):

- 1. Pump installed in the proper direction of flow in relation to the system (Suction & Discharge Orientation). _____
- 2. Drive to Pump Assembly direction of rotation correct. _____
- 3. Pump to drive coupling re-aligned after the entire pump assembly base installation completed and coupling lubricated (usually shipped dry). _____
- 5. Minimum of 4 to 6 pipe diameters length of straight pipe installed at pump suction connection. _____
- 6. Suction and Discharge system piping supports c/w anchors installed near to but independent of the pump assembly. _____
- 7. System piping does not exert any strain on the pump casing. _____
- 8. Eccentric reducer installed on the pump suction side (as required by NFPA 20). _____
- 9. Concentric Increaser installed on the pump discharge side (as required by NFPA 20). _____
- 10. Suction line has been tested to ensure there aren't any leaks. _____
- 11. Listed OS&Y Gate Valve installed close to pump on the suction sided of the pump. _____
- 12. Listed OS&Y Gate Valve or Butterfly Valve on pump discharge line. _____
- 13. A Listed Check Valve is installed and is in the proper direction. _____

IV. DIESEL ENGINE WITH HEAT EXCHANGER COOLING:

- 1. Engine Crankcase (lube oil) level verified full (as per manufacturers specifications-Note JDJP engines must only use John Deere Engine Break-In Oil #TY22041 during the 1-year break-in period, see page 23 IO&M). _____
- 2. Engine cooling system filled with coolant conditioner/anti-freeze ASTM-4985 Grade. _____
- 3. Engine Block heater is connected. _____
- 4. Batteries are rack supported above floor, secured against displacement and located to avoid excessive temperature, vibration, mechanical injury or flooding with water (NFPA 20 8-2.5.2.5 & 8-2.5.2.6). _____
- 5. Batteries filled, charged and connected to engine starters. _____
- 6. Battery chargers are wired correctly (typically #10 AWG 0-25', and #8 AWG 25-50' linear feet from controller to engine block). _____
- 7. Battery cables as per engine manufacturer's requirements (NFPA 20 8-2.5.2.5). _____
- 8. Heat Exchanger Main cooling line taken-off from the pump discharge line and prior to discharge check valve. _____
- 9. Heat Exchanger Main cooling line consists of an indicating manual shut-off valve, an approved flushing type strainer, a pressure regulator (NFPA 20 8-2.6.3.2), an automatic valve (solenoid valve) listed for fire protection service (NFPA 20 8-2.6.3.3), a second indicating manual shutoff valve and a pressure gauge installed on the engine side of the last manual valve, all in accordance with NFPA 20 8-2.6.3.1. _____
- 10. Heat Exchanger Water Supply Bypass line consists of manual valves, a flush-type strainer and a pressure regulator, installed around the main cooling line's manual shut-off, strainer, pressure regulator and automatic valve (NFPA 20 8-2.6.4). _____
- 11. Cooling water automatic valve (solenoid) wired correctly to the "W" terminal on the engine instrument panel. _____
- 12. Cooling water inlet & outlet connections properly installed on engine heat exchanger (NFPA 20 8-2.6.3). _____
- 13. Cooling loop strainers flushed clean (after installation). _____
- 14. Cooling loop waste outlet piped to drain. _____
- 15. Heat Exchanger Waste Outlet discharges into a visible waste cone (NFPA 20 8-2.6.5). _____
- 16. Exhaust system properly sized (see CLARKE Exhaust Pipe Data Fax sheet, complete and fax to CLARKE or go to www.clarkefire.com website, if other than CLARKE, contact manufacturer directly). _____
- 17. Exhaust system is independent, properly constructed, routed, supported, located and connected to engine in accordance with NFPA 20 8-5, including insulation, 9" away from combustible materials, etc. _____
- 18. Exhaust pipe is same size diameter or larger than engine exhaust outlet (NFPA 20 8-5.3). _____
- 19. Residential silencer installed. _____
- 20. Fuel Tank Capacity in accordance with NFPA 20 8-4.3. _____
- 21. Fuel Supply Location in accordance with NFPA 20 8-4.5. _____
- 22. Fuel lines (both supply & return) connected to fuel tank and engine. _____
- 23. Guard or protecting pipe on all exposed fuel lines (NFPA 20 8-4.2). _____
- 24. Flame-resistant flexible hoses listed for fire service at the engine for connection to fuel system piping. _____
- 25. Fuel tank drained of water and sediment. _____
- 26. Fuel tank filled with clean #2 diesel fuel (NFPA 20 8-4.7). _____
- 27. Is there a Fuel Solenoid Valve installed? If yes, can it be manually by-passed (NFPA 20 8-4.8). _____
- 28. Engine jacket water heater voltage connected to matching supply voltage (AC power) (only after coolant level verified as full). _____
- 29. Air inlet filter installed on engine. _____
- 30. Fresh air supply, adequate for engine combustion and room ventilation (NFPA20 8-3.2 to 8-3.2.2 & Figure A-8-3.2(a)). _____
- 31. Room temperature controlled for a maximum 120 degrees F at the combustion air cleaner inlet with engine running at rated load (NFPA 20 8-3.2(1)). _____

V. JOCKEY PUMP INSTALLATION:

- 1. Jockey pump inlet and outlet are in the proper location. _____
- 2. Jockey pump direction of rotation is correct. _____
- 3. Jockey pump suction line is piped ahead of the main fire pump suction OS&Y Gate Valve. _____
- 4. Jockey pump discharge line is piped after the main fire pump discharge valve (OS&Y or Butterfly). _____
- 5. Jockey Line contains 2 isolation gate valves and a check valve. _____

VI. PUMP MINIMUM FITINGS:

- 1. A 1/2" Automatic Air Release valve is installed on top of pump casing (applicable to HSC pumps only). _____
- 2. Compound Suction gauge with 3 1/2" dial face with pressure range twice the maximum suction pressure but not less than 100 psi) with 1/4" gauge valve (as per NFPA 20 2-5.2). _____
- 3. Discharge gauge with 3 1/2" dial face with pressure range twice the rated working pump pressure but not less than 200 psi) with 1/4" gauge valve (NFPA 20 2-5.1). _____

VII. SENSING LINES FOR MAIN FIRE PUMP & JOCKEY PUMP:

- 1. Main fire pump and Jockey pump sensing lines totally independent of each other and connected to their respective controllers in accordance with NFPA 20 9-5.2.1. & (a), Figures A-7-5.2.1 (a) & (b). _____
- 2. Each sensing line is 1/2" non-ferrous metallic piping. _____
- 3. Each sensing line is complete with 2 bronze check valves, each with a 3/32" diameter hole drilled in the flapper, orientated to open in the direction of the pump, and spaced 5 feet from each other as per NFPA 20 9-5.2.1 (b). _____

VIII. DIESEL FIRE PUMP AND JOCKEY PUMP CONTROLLERS:

- 1. Fire Pump Controller is located within sight of the engine (as per NFPA 20 9-2.1). _____
- 2. Fire Pump Controller installed not less than 12 inches above the floor (as per NFPA 20 9-2.2). _____
- 3. The appropriate incoming power service is connected and installed as per NFPA 20 and 70. _____
- 4. Battery chargers are wired correctly (typically #10 AWG 0-25', and #8 AWG 25-50' linear feet from controller to block on engine). _____
- 5. Proper materials used (including Liquid-tite conduit, etc.). _____
- 6. Listed termination kits used. _____
- 7. Main Fire Pump controller equipped with an automatic weekly exercise cycle _____
- 8. Fuses available and installed prior to start-up date (Jockey Pump Panel). _____
- 9. Separate manual and wiring diagram inside each controller enclosure. _____
- 10. Pressure Switch Rating verified. _____
- 11. Control Wiring, #14 AWG minimum used. _____
- 12. Controller terminals 1 to 12 wiring corresponds to engine terminals. _____
- 13. Electrical rating labels on controller, battery chargers compatible with incoming AC line, battery voltage and grounding polarity. Supply voltage to Diesel Controller is within 10% of controller nameplate. _____

IX. MAIN RELIEF VALVE (if applicable):

- 1. Listed Main Relief Valve installed. _____
- 2. Located between the pump discharge and the check valve. _____
- 3. Confirm: Maximum Suction Pressure _____, Pump Shut-Off Pressure _____
System Rated Pressure _____ _____

X. ENCLOSED DISCHARGE CONE (if applicable):

- 1. Enclosed discharge cone installed on the outlet line of the main relief valve. _____
- 2. Provides for a visual indication of water movement or has a sight glass. _____
- 3. Piped to the drain, or discharges back to the main fire pump suction line. _____

XI. FLOW METER (if applicable):

- 1. Listed for fire pump service and installed in proper direction. _____
- 2. Flow meter gauge display has a range of at least 1.75 times the rated flow of the fire pump. _____
- 3. Capable of being isolated and removed without affecting fire pump service. _____
- 4. Straight pipe length before and after flow meter in accordance with manufacturer's specifications. _____

XII. BY-PASS LINE (if applicable):

- 1. Pump by-pass line installed across the main fire pump. _____
- 2. Complete with listed check valve and isolation valves. _____

XIII. TEST FITTINGS (if applicable):

- 1. Test tee installed after the check valve and before the discharge butterfly valve. _____
- 2. Hose valve header sized and contains the right number of hose valve outlets according to NFPA 20 Table 2-20 _____
- 3. Ball drip valve installed prior to the hose valve header (NFPA 20 2-14.3.3). _____
- 4. Indicating gate valve or Indicating butterfly valve installed between Test-Tee and Hose Valve Header. _____

XIV. LOW SUCTION PRESSURE SHUT-OFF PANEL (if applicable):

- 1. Low Suction Pressure Shut-Off panel installed. _____
- 2. Sensing line and electrical connections installed in accordance with manufacturer's instructions. _____

XV. ADDITIONAL COMMENTS:

Signed: _____ Date: _____

I certify the above items are completed and were checked at the job site and the pump equipment is ready for a start-up and performance test.

Once fully completed, please return the above Pre Start-Up Checklist to _____ (local U.S. Armstrong Darling Representative) to the attention of _____ start-up date(s) will be determined based on the availability of these parties. It is the responsibility of the installing contractor to arrange for the other required parties to be present and have the installation ready on the scheduled date of the start-up. Scheduling of fire pump start-up will commence only once the installation is deemed ready for start-up as derived from the answers provided on this form.

Important: A standard start-up is based on a maximum 3 hours at the job site. Should the time required to complete the start-up exceed this standard duration or should the start-up service need to be repeated due to circumstances caused by other parties, and or situations out of our control, any additional service or incurred costs are the sole responsibility of the installing contractor.

Before performing any tests, to avoid false alarms where a supervisory service is provided, the alarm receiving facilities must always be notified by the building owner or designated representative. Prior to the Start-Up, the Installing Contractor must ensure that the Pre-Start-Up Verification has been performed and provide confirmation to the local U.S. Armstrong Darling representative ensuring:

- 1. Pump Alignment.
- 2. Pump Packing Gland Adjusted.
- 3. System Integrity.
- 4. Electrical Integrity.
- 5. All applicable items on the Pre Start-Up Checklist have been verified and answered accordingly.
- 6. The installation is ready for start-up (including all air bled from the system and ready to flow water) and is in accordance with all applicable national and local codes and standards.
- 7. All applicable documentation is on-hand at start-up (including pump certified performance curve(s), equipment manuals & wiring diagrams)
- 8. All the appropriate parties (e.g. AHJ-Fire Marshall, Electrician, Millwright/Pipe Fitter, Building Owner/Representative, etc.) will be present throughout the entire start-up.

S.A. Armstrong Limited
23 Bertrand Avenue
Toronto, Ontario
Canada, M1L 2P3
Tel: (416) 755-2291
Fax: (416) 759-9101
Visit us at www.armstrongpumps.com

Armstrong Pumps Limited
Peartree Road, Stanway
Colchester, Essex
United Kingdom, C03 5JX
Tel: 01206-579491
Fax: 01206-760532



Armstrong Pumps Inc.
93 East Avenue
Buffalo, New York
U.S.A. 14120-6594
Tel: (716) 693-8813
Fax: (716) 693-8970

Armstrong Darling Inc.
2200 Place Transcanadienne
Montreal, Quebec
Canada, H9P 2X5
Tel: (514) 421-2424
Fax: (514) 421-2436



CLARKE

Exhaust Pipe Data Fax

THIS FORM TO BE USED AS A *MASTER* FOR COPYING AND RETURNED TO YOUR MANUAL FOR FUTURE USE

ATTN: Sales Engineering **DATE:** _____
FAX: 1-513-771-8930 **SENT BY:** _____
PHONE: 1-513-771-2200 **Company:** _____

FAX: _____

INSTALLATION DATA: **PHONE:** _____

COMPANY/FACILITY

ADDRESS

CITY/STATE/POSTAL CODE

COUNTRY

ENGINE S/N & M/N: _____

ENGINE RATED RPM: _____

TYPE EXHAUST SYSTEM: SINGLE SILENCER _____ *Check one*

DUAL SILENCER _____

EXHAUST PIPE SIZE: _____ (SPECIFY DESIRED DIAMETER)

EXHAUST PIPE LENGTH: _____ (SPECIFY TOTAL FEET, HORIZ & VERT)

EXHAUST PIPE 45° ELBOW(S): _____ (SPECIFY QUANTITY IN EACH PIPE)

EXHAUST PIPE 90° ELBOW(S): _____ (SPECIFY QUANTITY IN EACH PIPE)

EXHAUST PIPE 'Y' CONNECTION: _____ (YES/NO)

COMPLETE ALL BLANKS ABOVE THE DOUBLE LINE

Exhaust Pipe Recommendation

MAXIMUM ALLOWED BACKPRESSURE: _____ H2O TOTAL SYSTEM

RECOMMENDED PIPE SIZE: _____ = _____ H2O BACKPRESSURE

MAX ALLOWED SILENCER BACKPRESSURE: _____ H2O (SEE NOTE BELOW)

COMMENTS: _____

NOTE: *SILENCER BACKPRESSURE* MUST BE ADDED TO PIPE BACKPRESSURE TO GET TOTAL SYSTEM BACKPRESSURE. THE *SILENCER MANUFACTURER* MUST ADVISE SILENCER BACKPRESSURE.

ENGINE INSTALLATION CHECKLIST

TO BE COMPLETED BY THE INSTALLING CONTRACTOR THEN SUBMITTED TO CLARKE SERVICE DEALER BY ARMSTRONG DARLING FIRE PUMP SERVICE DEPARTMENT PRIOR TO SCHEDULING START-UP INSPECTION

Section I: Project & Equipment Data

- Facility Identification (Name) _____
- Address: _____
- State/Province _____ Postal Zone _____ Country _____
- Contact Name _____ Phone _____ Fax _____
- Pump Mfg. _____ Pump Model _____ Pump S/N _____
- Pump Rating _____ (gpm/lpm); Pressure _____ (psi/kpa); Speed _____ (rpm)
- Controller Mfg. _____ Model _____ ; S/N _____
- Engine Model _____ S/N _____ Speed (rpm) _____

Section II: Sequential Checklist for Installing Contractor**

	Initial	Date
A. Engine-Pump alignment check; Service coupling/shaft as required.	_____	_____
B. Unit properly mounted & secured; Base grouted.	_____	_____
C. Controller wiring connected to engine junction box.	_____	_____
D. Batteries serviced and charged 24 hours; connected to engine.	_____	_____
E. Cooling water connections properly installed on engine heat exchanger, Both inlet and outlet; Confirm cooling water by-pass solenoid operation.	_____	_____
F. Exhaust system properly sized, routed and connected to engine.	_____	_____
G. Cooling system filled to proper level with premixed solution of water and coolant conditioner (see engine manual for details).	_____	_____
H. Add engine oil to proper level (see engine manual for oil type & quantity).	_____	_____
I. Fuel lines (both supply and return) connected to fuel tank and engine.	_____	_____
J. Fuel tank filled with clean #2 diesel fuel; drain water & sediment from tank.	_____	_____
K. Engine jacket water heater connected to correct AC power (after item G).	_____	_____
L. Air inlet filter installed on engine; Fresh air supply adequate for engine combustion and room ventilation.	_____	_____

****These items are to be completed *before* Installation Review and Start-up Inspection**

Submitted by: _____ Date: _____
 Company: _____ City: _____