

STANDARD INFORMATION

Standard Number: NFPA 20

Standard Name: Installation of Stationary Pumps for Fire Protection

Standard Edition and Issue Date: 2019 Edition Dated May 24, 2018

Date of Revision: May 24, 2018

Date of Previous Revision of Standard: June 15, 2015

EFFECTIVE DATE OF NEW/REVISED REQUIREMENTS

Effective Date: **May 24, 2021**

IMPACT, OVERVIEW, AND ACTION REQUIRED

Impact Statement: A review of all Listing Reports is necessary to determine which products comply with new/revise requirements and which products will require re-evaluation. **NOTE:** Effective immediately, this revised standard will be exclusively used for evaluation of new products unless the Applicant requests in writing that current requirements be used along with their understanding that their listings will be withdrawn on Effective Date noted above, unless the product is found to comply with new/revise requirements.

Overview of Changes:

- Recognition of new technologies, including automated inspection and testing, distance monitoring, automated valves, and self-regulating variable speed fire pump units
- Provisions are added to require that a single entity be responsible for acceptable fire pump unit performance
- Requirements are added to clarify where manifolding of fire pump test piping is permitted
- New requirements added to help package designers through the evaluation of mass elastic systems
- The requirements for hydraulic cranking systems are revised

Specific details of new/revise requirements are found in table below.

If the applicable requirements noted in the table are not described in your report(s), these requirements will need to be confirmed as met and added to your report(s) such as markings, instructions, test results, etc. (as required).

Client Action:

Information – To assist our Engineer with review of your Listing Reports, please submit technical information in response to the new/revise paragraphs noted in the attached or explain why these new/revise requirements do not apply to your product (s).

Current Listings Not Active? – Please immediately identify any current Listing Reports or products that are no longer active and should be removed from our records. We will do this at no charge as long as Intertek is notified in writing prior to the review of your reports.



STANDARD INFORMATION

CLAUSE	VERDICT	COMMENT
		<i>Additions to existing requirements are <u>underlined</u> and deletions are shown lined below.</i>
4	Info	General Requirements
4.5	Info	Certified Shop Test
		<i>New clause added;</i>
		For self-regulating variable speed fire pump units, two additional certified test curves showing the flow, net pressure, power, and speed shall be provided for each pump operating under the following conditions:
4.5.1.5		(1) In self-regulating variable speed mode with the pump unit operating at constant discharge pressure, as measured by the discharge pressure transducer, through the design duty, and all flow rates from churn beyond 150 percent of rated flow until the maximum power draw is reached (2) In self-regulating variable speed mode with the pump unit operating at constant boost pressure through the design duty, and all flow rates from churn beyond 150 percent of rated flow until the maximum power draw is reached
4.6	Info	Liquid Supplies
4.6.2	Info	Sources
		<i>New clause added;</i>
4.6.2.3.2		The available flow at the fire pump discharge at the lowest permissible suction pressure shall be a minimum of 100 percent of rated flow.
		<i>New clause added;</i>
4.6.2.3.2		The available flow and pressure at the fire pump discharge shall be adequate to meet the maximum fire protection demand.
4.7	Info	Pumps, Drivers, and Controllers
4.7.7	Info	Maximum Pressure for Centrifugal Pumps
4.7.7.3	Info	Variable Speed Pump
		<i>New clause added;</i>
4.7.7.3.2		The set pressure plus the maximum pressure variance during variable speed operation and adjusted for elevation shall not exceed the pressure rating of any system component.



CLAUSE	VERDICT	COMMENT
4.8		<i>New section added;</i> Self-Regulating Variable Speed Fire Pump Units
4.8.1		Each variable speed self-regulating control unit shall maintain the factory-certified test data for variable speed operating conditions.
4.8.2		A self-regulating variable speed fire pump unit shall be factory assembled and listed as a unit.
4.8.3		Each self-regulating variable speed fire pump unit shall be provided with an across-the-line fire pump controller in accordance with Chapter 10.
4.8.4		When alternate power is provided for the pump, an across-the-line combination fire pump controller/transfer switch designed and installed in accordance with Chapter 10 shall be provided.
4.8.5		As a minimum, each variable speed drive control unit shall be provided in a National Electrical Manufacturers Association (NEMA), Type 4, watertight enclosure with an ingress protection (IP) rating of IP66.
4.8.6		Each self-regulating variable speed fire pump unit shall be provided with a minimum of 5 percent line reactance on the input.
4.8.7		The current rating of the variable frequency drive (VFD) shall not be exceeded when operating in the motor service factor.
4.8.8		Self-regulating variable speed fire pump units shall monitor the suction pressure, discharge pressure, the power draw, and the calculated flow rate and provide a supervisory alarm signal to the controller whenever the results do not match the design curve of the unit.
4.8.9		Self-regulating variable speed fire pump units shall monitor the variable speed drive and provide a supervisory alarm signal to the controller whenever any of the following conditions occur: (1) Pump run (2) High temperature (3) Overcurrent (4) Overvoltage (5) Undervoltage (6) Ground fault (7) Phase loss (8)* Set pressure not met (9) Overpressure (10) Bypass mode
4.8.9.1		Remote contacts that close to indicate an alarm shall be provided for connection to the controller.



CLAUSE	VERDICT	COMMENT
4.8.10		Self-regulating variable speed fire pump unit shall have a visible display panel capable of showing, as a minimum, set pressure, maximum permissible power draw, all phase-to-phase voltages, all phase amperages, boost pressure, calculated rpm, calculated flow, alerts, and faults with an accuracy within ± 2 percent.
4.8.11		Suction and discharge transducers for self-regulating variable speed fire pump units shall be provided and protected from mechanical damage.
4.8.12		Self-regulating variable speed fire pump units shall capture and maintain all operating information for a minimum of 2 years.
4.8.13		A minimum clear working space in accordance with 110.26(A)(1) of NFPA 70 shall be provided for the pump, variable speed driver, and self-regulating control unit.
4.8.14		The unit shall have no resonant first-order harmonic critical speed below 120 percent of maximum operating speed in either self-regulating or manual operator mode, whichever is greater.
4.8.15		Means shall be provided on each self-regulating variable speed fire pump unit to field adjust the set pressure.
4.8.15.1		The adjustment shall be secured by password protection or other equivalent means.
4.8.16		When operating under no-flow conditions, each self-regulating variable speed fire pump unit shall operate at a speed that provides at least 25 percent of its rated pressure.
4.8.17		Within 20 seconds after a demand to start, pumps shall supply and maintain a stable discharge pressure (± 10 percent) throughout the entire range of operation.
4.8.18		All motor-starting contactors shall comply with 10.4.5.1.
4.8.19		An automatic bypass shall be provided in accordance with 10.10.3 and 10.10.4.2.
4.8.20		An emergency-run mechanical control shall be provided in accordance with 10.5.3.2.
4.8.21		Circuit protection shall be provided in the VFD path in accordance with 10.10.5.
4.8.22		The assembly shall be marked with the short-circuit current rating.
4.8.23		Local control shall be in accordance with 10.10.7.1 and 10.10.7.3.
4.8.24		The maximum operating frequency shall not exceed line frequency.
4.13	Info	Circulation Relief Valve
4.13.1	Info	General Requirements
4.13.1.1		Where an electric variable speed pump is installed, the automatic circulation relief valve shall be set to a minimum of 5 psi (0.34 bar) below the operation set pressure open at the minimum speed.
4.14	Info	Equipment Protection
4.14.1	Info	General Requirements
4.14.1.2	Info	Outdoor Fire Pump Units



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
4.14.1.2.1		Fire pump units that are outdoors shall be located at least 50 ft (15.3 m) away from any buildings and other fire exposures.
		<i>New clause added;</i>
4.14.1.2.2		Outdoor installations shall be required to be provided with protection against possible interruption in accordance with 4.14.1.
4.14.2	Info	Equipment Access
4.14.2.1.1		Except as provided in 4.14.2.1.1.1, fire pump rooms not directly accessible from the outside shall be accessible <u>through a fire-resistant-rated corridor</u> from an enclosed stairway or exterior exit.
		<i>New clause added;</i>
4.14.2.1.1.2		Where a fire pump is installed in a parking garage or some other portion of a building separated from the rest of the building by fire-rated construction equivalent to the pump room, and the portion of the building containing the fire pump is protected by a sprinkler system that does not rely on the fire pump, the protected access to the pump room shall not be required.
		<i>New clause added;</i>
4.14.2.1.2		The portions of the building needed for the access, as required by 4.14.2.1.1, shall have a fire resistance rating not less than the fire resistance rating of the fire pump room.
4.15	Info	Pipe and Fittings
4.15.2	Info	Joining Method
		<i>New clause added;</i>
4.15.2.3		The piping around check valves installed per 4.32.4.1, orifice unions, orifice plates, flowmeters, and other devices that have restricting orifices shall have a means to perform an internal inspection or a means to disassemble the piping
		<i>New clause added;</i>
4.15.3		Restricting Orifice Identification. Check valves installed per 4.32.4.1, orifice unions, orifice plates, and other devices with a restricting orifice shall have a permanent tag or other means of identification indicating that a restricting orifice is present.
4.16	Info	Suction Pipe and Fittings
4.16.5	Info	Valves.



CLAUSE	VERDICT	COMMENT
		<i>New section added;</i>
4.16.5.2		Valve Closure Time
4.16.5.2.1		Listed indicating valves shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position.
4.16.5.2.2		Valves with an automatic means to operate the valve shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position.
		<i>New section added;</i>
4.16.5.3		Automated Valves
4.16.5.3.1		A listed indicating valve with automated controls shall be permitted. The automated water control valve assembly shall meet the following criteria:
4.16.5.3.2		(1) Include a reliable position indication (2) Include a valve supervisory switch and be connected to a remote supervisory station (3) Operate manually as well as automatically
4.20	Info	Relief Valves for Centrifugal Pumps
4.20.6	Info	Discharge Piping
		<i>New clause added;</i>
4.20.6.4		Relief valve discharge piping from a single fire pump returning water back to the supply source shall be permitted to be combined with fire pump test piping downstream of any control valve in a manner that complies with 4.20.6, 4.22.2, and 4.22.3.
		<i>New clause added;</i>
4.20.6.5		The discharge piping from multiple relief valves shall not be combined with fire pump test piping.
		<i>New clause added;</i>
4.20.6.6		Isolation of the test header piping from the pressure relief valve discharge shall be possible.
4.22	Info	Water Flow Test Devices
4.22.1	Info	General
		<i>New clause added;</i>
4.22.1.2		Where multiple pumps are installed, it shall be permitted to manifold the fire pump test discharge piping to a common flow measuring device and discharge.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
4.22.1.2.1		Where a single pump can supply the maximum fire protection system demand, the common piping, flow measuring device, and discharge shall be sized for the fire pump with the highest rated flow in accordance with 4.22.2 and 4.22.3.
		<i>New clause added;</i>
4.22.1.2.2		Where multiple pumps arranged in series are required to meet the maximum fire protection system demand, the common piping, flow measuring device, and discharge shall be sized for the fire pump with the highest rated flow in accordance with 4.22.2 and 4.22.3.
		<i>New clause added;</i>
4.22.1.2.3		Where multiple pumps arranged in parallel are required to operate simultaneously to meet the maximum fire protection system demand, the common piping, flow measuring device, and discharge shall be sized in accordance with 4.22.2 and 4.22.3 for the combined rated flow of all fire pumps required to operate simultaneously.
		<i>New clause added;</i>
4.22.1.2.4		The common flow measuring device shall be capable of providing accurate flow measurements when testing a single fire pump and when simultaneously testing all fire pumps required to operate simultaneously.
		<i>New clause added;</i>
4.22.1.2.5		A control valve shall be installed on each fire pump test connection upstream of the manifold.
4.22.3	Info	Hose Valves.
		Pipe Size. The pipe size shall be in accordance with one of the following methods:
4.22.3.4		(1) Where the pipe between the hose valve header and the connection to the pump discharge pipe is over 15 ft (4.5 m) in length, the next larger pipe size than that required by 4.22.3.1.3 shall be used. (2)* This pipe shall be permitted to be sized by hydraulic calculations that match the actual test configuration and that include the required pitot pressure and friction loss for the total length of pipe and fire hose plus equivalent lengths of fittings, control valve, and hose valves, plus elevation loss, from the pump discharge flange to the discharge outlets.
4.22.3.4.1		In accordance with 4.22.3.4(2), the installation shall be proven by a test flowing the lesser of 150 percent of rated flow or the maximum flow available at the lowest permissible suction pressure to achieve the required pitot pressure or higher.
4.29	Info	Backflow Preventers and Check Valves



CLAUSE	VERDICT	COMMENT
4.29.4	Info	Evaluation
4.29.4.1	Info	Backflow Prevention Device
		<i>New clause added;</i>
4.29.4.1.1		Where a backflow prevention device or assembly is installed in connection with the pump, special consideration shall be given to the increased pressure loss resulting from the installation.
		<i>New clause added;</i>
4.29.4.1.3		The discharge flow rate shall meet or exceed the fire protection system design flow.
		<i>New clause added;</i>
4.29.4.1.4		The discharge flow rate shall meet or exceed 100 percent of the fire pump rated flow rate.
4.29.4.1.7		Retroactive installation of a backflow prevention device shall not result in a discharge pressure that does not meet the maximum system demand <u>and 100 percent of the rated flow rate for the fire pump.</u>
		<i>New section added;</i>
4.35		Automated Inspection, Testing, and Distance Monitoring of Devices, Meters, and Equipment
4.35.1		Devices, meters, and equipment utilized to perform automated inspection and testing procedures that are subjected to system pressure, where provided, shall be listed.
4.35.2		Devices, meters, and equipment utilized to perform distance monitoring of system or component status that are subjected to system pressure, where provided, shall be listed.
5	Info	Fire Pumps for High-Rise Buildings
5.6	Info	Very Tall Buildings
5.6.1	Info	Water Supply Tanks for Very Tall Buildings
5.6.1.1		Where the primary supply source is a tank, two or more water tanks shall be provided <u>for a vertical fire protection zone is stored water within the building, each zone shall be supplied by a minimum of two tanks.</u>
		<i>New clause added;</i>
5.6.1.5		The refill rate shall be sustainable for the required water supply duration.
5.6.1.6		The automatic and manual fill valve combination for each tank or tank compartment shall have its own connection to one of the following:



CLAUSE	VERDICT	COMMENT
		<p>(1) A standpipe riser <u>for a zone that is not supplied from the tank served by the refill valve and is provided with a backup fire pump</u></p> <p>(2) A gravity feed express or standpipe riser for a zone that is not supplied from the tank served by the refill valve</p> <p>(3) A dedicated riser from a fire pump located below the refill valve</p> <p>(4) A reliable domestic riser sized to meet the requirements of 5.6.1.4</p>
5.6.1.6.2		<p><i>New clause added;</i></p> <p>The refill connections shall be interconnected.</p>
5.6.1.6.2.1		<p><i>New clause added;</i></p> <p>When the refill valves are connected to different zones, check valves shall be installed in each standpipe connection to prevent cross flow between the different zones.</p>
5.6.1.6.2.2		<p><i>New clause added;</i></p> <p>Isolation valves shall be provided on both sides of each check valve required by 5.6.1.6.2.1.</p>
5.6.1.6.3		<p><i>New clause added;</i></p> <p>Isolation valves shall be provided between each interconnection.</p>
5.6.1.6.4		<p><i>New clause added;</i></p> <p>When at least one of the tank valves is fed from below, the primary fill shall be from below.</p>
5.6.1.6.4.1		<p><i>New clause added;</i></p> <p>When the fill valves are connected to different zones, the isolation valve shall be permitted to be normally closed to assure that the primary refill is the first refill to operate.</p>
5.6.1.6.5		<p><i>New clause added;</i></p> <p>Each tank shall be provided with an overflow sized for the maximum refill rate with a single automatic refill valve operating fully open.</p>
5.6.1.6.6		<p><i>New clause added;</i></p> <p>The overflow shall be piped to a safe discharge location.</p>
6	Info	Centrifugal Pumps
6.2	Info	Factory and Field Performance



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
6.2.2.2		When operating below the rated speed in a self-regulating mode, a self-regulating variable speed fire pump unit shall maintain the discharge pressure within 5 percent of the set pressure.
		<i>New clause added;</i>
6.2.2.3		When operating below the rated speed with a variable speed pump in suction control mode, a variable speed fire pump shall maintain the suction pressure at or above the lowest permissible suction pressure with an accuracy of -0/+3 psi (-0/+0.2 bar).
6.5	Info	Coupling Type
6.5.2		Pumps and drivers on separately coupled-type pumps shall be aligned in accordance with the coupling and pump manufacturers' specifications and the Hydraulic Institute Standards for Centrifugal, Rotary and Reciprocating Pumps <u>ANSI/HI 1.4, Rotodynamic Centrifugal Pumps for Manuals Describing Installation, Operation and Maintenance.</u>
7	Info	General
7.5	Info	Driver
7.5.1	Info	Method of Drive
7.5.1.1		The driver provided shall be so constructed that the total thrust of the pump, which includes the weight of the shaft, impellers, and hydraulic thrust, can be carried on a thrust bearing of ample capacity so that it will have an average life rating of 5 years of continuous operation <u>15,000 hours.</u>
7.5.1.6	Info	Mass Elastic System
		<i>New clause added;</i>
7.5.1.6.1		For vertical turbine pumps using right-angle gear drives driven by a diesel engine, a listed torsional coupling shall be used and mounted on the engine side of the driveshaft.
		<i>New clause added;</i>
7.5.1.6.1.1		For drive systems that include a diesel engine, torsional coupling, right-angle gear drive, and vertical shaft pump, the pump manufacturer shall provide, at a minimum, a 3-mass torsional frequency calculation, indicating that the first two natural frequencies of the system and the critical speeds associated with engine firing frequency are found to be no less than 25 percent above or below when the pump is operating at rated speed.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
7.5.1.6.1.2		The torsional frequency calculation specified in 7.5.1.6.1.1 shall include the mass elastic characteristics for a wetted pump with the specific impeller(s) trim, torsional coupling, right-angle gear, gear ratio, flexible connecting shaft, and the engine.
		<i>New clause added;</i>
7.5.1.6.1.3		Where the calculations required in 7.5.1.6.1.1 indicate that critical speeds are found to fall less than 25 percent above or below pump rated speed, a further detailed set of forced response calculations shall be required for the vertical and horizontal components indicating there are no damaging vibratory stresses or torques.
		<i>New clause added;</i>
7.5.1.6.1.4		The torsional analysis specified in 7.5.1.6.1.3 shall include the mass elastic characteristics required in 7.5.1.6.1.2 plus the following: (1) The excitation characteristics of the specific engine and rating (2) A fully flexible lumped parameter model having multiple elements along the length of the engine crankshaft, the horizontal shafting, and vertical shafting to all pump stages (3) The effect of engine misfire
		<i>New clause added;</i>
7.5.1.6.1.5		For a system defined in 7.5.1.6.1 that uses a variable speed diesel driver, the operating speed for the analytical speeds shall be defined as not less than 25 percent above the pump rated speed and not less than 25 percent below the lowest possible speed of the variable speed driver.
		<i>New clause added;</i>
7.5.1.6.1.6		The torsional coupling required in 7.5.1.6.1 shall be permitted to be omitted when a complete mass elastic system torsional analysis is provided and accepted by the authority having jurisdiction and indicates that the system meets the requirements of 7.5.1.6.1.3 without a torsional coupling being included in the system.
		<i>New clause added;</i>
7.5.1.6.1.7		In addition to the requirements of 7.5.1.6.1.3, results shall include engine critical response, crankshaft stress, and crankshaft damper heat dissipation.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
7.5.1.6.2		For variable speed vertical hollow shaft electric motors, the pump manufacturer shall provide a complete mass elastic system torsional analysis to ensure there are no damaging stresses or critical speeds less than 25 percent above or below the operating speed of the pump and driver.
		<i>New clause added;</i>
7.5.1.6.4		For vertical turbine pumps using angle gear drives driven by a diesel engine, a torsional coupling shall be used and mounted on the engine side of the driver shaft.
		<i>New clause added;</i>
7.5.1.6.4.1		The torsional coupling shall be permitted to be omitted when a mass elastic system torsional analysis is provided and accepted by the authority having jurisdiction.
7.5.1.7	Info	Gear Drives
7.5.1.7.4		All gear drives shall be listed and rated by the manufacturer at a load equal to the maximum horsepower and thrust of the pump for <u>a minimum of 15,000 hours of operation, as well as being capable of transferring the minimum and maximum conditions, as defined by the pump manufacturer, for which the gear drive is intended.</u>
7.6.1.5		The operation shall be observed for vibration while running, with vibration limits according to the Hydraulic Institute Standards for Centrifugal, Rotary and Reciprocating Pumps <u>ANSI/HI 1.4, Rotodynamic Centrifugal Pumps for Manuals Describing Installation, Operation and Maintenance.</u>
7.6.2	Info	Maintenance
		<i>New clause added;</i>
7.6.2.3		When spare or replacement parts are ordered for the gearbox, the gearbox serial number stamped on the nameplate fastened to the gear case shall be included in order to make sure the proper parts are provided.
9	Info	Electric Drive for Pumps
9.3	Info	Alternate Power
9.3.6	Info	Two or More Alternate Sources
		<i>New clause added;</i>
9.3.6.1		Where the alternate source consists of two or more sources of power and one of the sources is a dedicated feeder derived from a utility service separate from that used by the normal source, the disconnecting means, overcurrent protective device, and conductors shall not be required to meet the requirements of Section 9.2 and shall be permitted to be installed in accordance with NFPA 70.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
9.3.6.2		Protective devices shall not be installed in the load side of the power transfer switch.
9.4	Info	Voltage Drop
		<i>New clause added;</i>
9.4.2.1		The requirements of 9.4.1 shall apply to the emergency-run mechanical control of the self-regulating variable speed fire pump unit.
9.5	Info	Motors
9.5.1	Info	General
		<i>New clause added;</i>
9.5.1.1.2		International Electrotechnical Commission (IEC) motors, where used, shall be listed for fire service.
9.5.2	Info	Current Limits
		The following shall apply to the service factor:
9.5.2.2		(1) The maximum service factor at which a motor shall be used is 1.15. (2) Where the motor is used with a variable speed pressure limiting controller, the service factor shall not be used <u>used shall be as marked on the motor, but in no case exceed 1.15.</u>
10	Info	Electric-Drive Controllers and Accessories
10.3	Info	Construction
10.3.4	Info	Connections and Wiring
		<i>New clause added;</i>
10.3.4.3.1		Where a self-regulating variable speed fire pump unit is applied to the output of the controller, the accuracy of the fire pump controller meters shall not be required to be maintained, and the meters on the self-regulating variable speed fire pump unit shall be used.
10.4	Info	Components
10.4.5	Info	Motor Starting Circuitry
10.4.5.6	Info	Operating Coils
		<i>New clause added;</i>
10.4.5.6.1		For controllers of 500 V or less, the operating coil(s) for any motor contactor(s) and any bypass contactor(s), if provided, shall be supplied directly from the main power voltage and not through a transformer.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
10.4.5.6.2		For controllers rated above 500 V but not more than 600 V, a transformer shall be permitted to supply the operating coils referred to in 10.4.5.6.1.
10.4.7	Info	Fire Pump Alarm and Signal Devices Remote from Controller
10.4.7.1		Where the pump room is not constantly attended, audible or visible signals powered by a <u>separate reliable supervised</u> source not exceeding 125 V shall be provided at a point of constant attendance.
10.4.7.2.3		Phase Reversal. The fire pump alarm circuit shall be energized by a <u>separate reliable supervised power source or from the pump motor power, reduced to not more than 125 V shall actuate whenever the three-phase power at the line terminals of the motor contactor is reversed.</u>
		<i>New clause added;</i>
10.4.7.2.5		Alternate Source Isolating Switch or Circuit Breaker Open. Where two sources of power are supplied to meet the requirements of 9.3.2, a signal shall be provided to indicate that the alternate source isolating switch or circuit breaker is open or tripped.
		<i>New clause added;</i>
10.4.7.2.6		Controller or System Trouble. A controller or system trouble alarm shall actuate whenever a ground-fault signal, when provided (see 10.4.5.9), a pressure-sensing device signal (see 10.5.2.1.3.1 and 10.5.2.1.3.2), a variable speed trouble signal, or a fail-to-start signal (see 10.5.2.7.5) occurs.
10.5	Info	Starting and Control
10.5.2	Info	Automatic Controller
10.5.2.1	Info	Water Pressure Control
10.5.2.1.1	Info	Pressure-Sensing Device
		<i>New clause added;</i>
10.5.2.1.1.2		Water piping shall not be extended into the controller.
10.5.2.4	Info	Manual Electric Control at Remote Station
		<i>New clause added;</i>
10.5.2.4.1		Where additional control stations for causing nonautomatic continuous operation of the pumping unit, independent of the pressure-actuated switch, are provided at locations remote from the controller, such stations shall not be operable to stop the motor, except as permitted by 10.5.2.4.2.



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		<i>New clause added;</i>
10.5.2.4.2		A remote momentary station shall be permitted to include a remote stop as long as the remote station is installed within sight of the fire pump controller.
10.10	Info	Controllers with Variable Speed Pressure Limiting Control or Variable Speed Suction Limiting Control
10.10.1	Info	Control Equipment
		<i>New clause added;</i>
10.10.1.3.1		The current rating of the variable frequency drive (VFD) shall not be exceeded when operating in the motor service factor.
10.10.3.5		When the manual selection means required in 10.10.7.3 is used to initiate a switchover from variable speed to bypass mode, if the pump is running in the variable speed mode and none of the conditions in 10.10.3 that require the controller to initiate the bypass operation exist, the controller shall be arranged to provide a restart delay to allow the motor to be de-energized before it is re-energized in the bypass mode.
		<u>When the variable speed pressure limiting control is bypassed, automatic shutdown of the controller shall be as permitted by 10.5.4.2.</u>
11	Info	Diesel Engine Drive
11.2	Info	Engines
11.2.4	Info	Engine Speed Controls
11.2.4.1	Info	Speed Control Governor
		<i>New clause added;</i>
11.2.4.1.3		Mechanical fuel injection engines with a mechanical governor speed control device shall be allowed to employ an electric-actuated speed control override system to achieve speed control of less than 10 percent, provided the requirements of 11.2.4.1.1 are still met in the event that any component of the electric actuator speed control system fails.
11.2.6	Info	Wiring Elements
11.2.6.1	Info	Automatic Controller Wiring in Factory
		<i>New clause added;</i>
11.2.6.1.3		Provisions shall be made on the engine for connecting two remote sensing leads from each of the battery chargers for the purpose of accurately measuring the voltage across each of the battery terminals under all load conditions.
11.2.7	Info	Starting Methods
11.2.7.2	Info	Electric Starting



CLAUSE	VERDICT	COMMENT
11.2.7.2.5		<i>New section added;</i> Battery Recharging
11.2.7.2.5.1		Two means for recharging storage batteries shall be provided.
11.2.7.2.5.2		One method shall be the generator or alternator furnished with the engine.
11.2.7.2.5.3		The other method shall be an automatically controlled battery charger, in accordance with Section 12.6, taking power from an ac power source.
11.2.7.3	Info	Hydraulic Starting <i>New clause added;</i>
11.2.7.3.2		The piping between the engine and the hydraulic accumulator system shall be installed in accordance with the manufacturer's maximum allowed pressure drop recommendations. <i>New clause added;</i>
11.2.7.3.5		The hydraulic cranking system shall be a self-contained system that will provide the required cranking forces and engine starting revolutions per minute (rpm) as recommended by the engine manufacturer. <i>New clause added;</i>
11.2.7.3.6		Electrically operated means or air operated means shall automatically recharge and maintain the stored hydraulic pressure to the predetermined pressure requirements. <i>New clause added;</i>
11.2.7.3.7		The means of automatically maintaining the hydraulic system within the predetermined pressure requirements shall be energized from the main bus and the final emergency bus if one is provided. <i>New clause added;</i>
11.2.7.3.8		Engine driven means shall be provided to recharge the hydraulic system when the engine is running. <i>New clause added;</i>
11.2.7.3.9		Means shall be provided to manually recharge, bleed, and purge the hydraulic accumulator system. <i>New clause added;</i>
11.2.7.3.10		When the engine is equipped with multiple cranking systems (of different types), one system shall be defined as a primary cranking system and the other as a secondary cranking system.



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
11.2.7.3.11		When used as the only or primary cranking system, the capacity of the hydraulic cranking system shall provide not fewer than twelve cranking cycles of not less than 15 seconds each (capacity for 180 seconds of total crank time).
		<i>New clause added;</i>
11.2.7.3.11.1		The total capacity shall be provided from two separate, equally sized accumulator systems.
		<i>New clause added;</i>
11.2.7.3.11.2		The first six attempts shall be automatic from the signaling source, alternating between accumulator systems.
		<i>New clause added;</i>
11.2.7.3.11.3		The second six attempts shall be manually activated from either engine or controller, with each button-push initiating a complete 15-second crank attempt.
		<i>New clause added;</i>
11.2.7.3.12		When used as a secondary cranking system, the capacity of the hydraulic cranking system shall be capable of providing not fewer than six cranking cycles of not less than 15 seconds each (capacity for 90 seconds of total crank time).
		<i>New clause added;</i>
11.2.7.3.12.1		The first three attempts shall be automatic from the signaling source.
		<i>New clause added;</i>
11.2.7.3.12.2		The second three attempts are to be manually activated from ether engine or controller, which each button-push initiating a complete 15-second crank attempt.
		For primary and secondary cranking systems, each cranking cycle shall provide the necessary number of revolutions at the required rpm to permit the diesel engine to meet the requirements of carrying its full rated load within 20 seconds after cranking is initiated with intake air, room ambient temperature, and hydraulic cranking system at 32°F (0°C).
11.2.7.3.13		All controls for engine shutdown in the event of overspeed shall be 12 V dc or 24 V dc source to accommodate controls supplied on the engine, and the following also shall apply:
		<i>New clause added;</i>
11.2.7.3.14		(a) In the event of such failure, the hydraulic cranking system shall provide an interlock to prevent the engine from rekranking. (b) The interlock shall be manually reset for automatic starting when engine failure is corrected.
11.2.7.4	Info	Air Starting



CLAUSE	VERDICT	COMMENT
11.2.7.4.4	Info	Air Starting Supply <i>New clause added;</i>
11.2.7.4.4.1		Where the engine is equipped with multiple cranking systems of different types, one system shall be defined as a primary cranking system and the other as a secondary cranking system. <i>New clause added;</i>
11.2.7.4.4.2		Where used as the only or primary cranking system, the air supply container shall be sized for 180 seconds of continuous cranking without recharging. <i>New clause added;</i>
11.2.7.4.4.3		Where used as the only or primary cranking system, the total capacity shall be provided from two separate, equally sized air supply containers A and B. <i>New clause added;</i>
11.2.7.4.4.4		Where used as the only or primary cranking system, the first start attempt shall be automatic from the signaling source, pulling from air supply container A with 90 seconds of crank duration. <i>New clause added;</i>
11.2.7.4.4.5		Where used as the only or primary cranking system, the second start attempt shall be manually activated from either engine or controller, pulling from air supply container B and only cranking while the button is held in. <i>New clause added;</i>
11.2.7.4.4.6		Where used as a secondary cranking system, the air supply container shall be sized for 90 seconds of continuous cranking without recharging. <i>New clause added;</i>
11.2.7.4.4.7		Where used as a secondary cranking system, the first start attempt shall be automatic from the signaling source with 45 seconds of crank duration. <i>New clause added;</i>
11.2.7.4.4.8		Where used as a secondary cranking system, the second start attempt shall be manually activated from either engine or controller, only cranking while the button is held in.
11.6	Info	Diesel Engine Driver System Operation
11.6.5	Info	Temperature Maintenance



CLAUSE	VERDICT	COMMENT
		<i>New clause added;</i>
11.6.5.2		In locations where electrical power is not reliable and where there is a risk of pump room freezing, an alternate power source shall be provided to maintain space heating, battery charging, engine block heating, and lighting.
12	Info	Engine Drive Controllers
		Battery Chargers. The requirements for battery chargers shall be as follows:
12.6		<u>(8) Means shall be provided on the exterior of the controller to read the voltage and charging current of each battery within an accuracy of ±2 percent.</u> <u>(13) The alternator shall be the primary means of charging when the engine is running.</u>
12.7	Info	Starting and Control
12.7.2	Info	Automatic Operation of Controller
12.7.2.1	Info	Water Pressure Control
12.7.2.1.1	Info	Pressure-Actuated Switch
		<i>New clause added;</i>
12.7.2.1.1.2		pipng shall not be extended into the controller.
14	Info	Acceptance Testing, Performance, and Maintenance
14.2	Info	Field Acceptance Tests
14.2.4	Info	Certified Pump Curve
		<i>New clause added;</i>
14.2.4.1.3		For self-regulating variable speed fire pump units, a copy of the manufacturer's test curves for self-regulating variable speed constant boost mode, self-regulating variable speed constant discharge mode, and bypass constant speed mode shall be available.
		<i>New clause added;</i>
14.2.4.2.3		For self-regulating variable speed fire pump units, the unit as installed shall equal the performance as indicated on the fire pump unit manufacturer's certified self-regulating variable speed mode shop test data within the accuracy limits of the test equipment.
14.2.6	Info	Field Acceptance Test Procedures
14.2.6.1	Info	Test Equipment
14.2.6.1.2.3		Fire pump controller voltage and current readings on controllers that are factory calibrated and adjusted to ± 3 2 percent shall be permitted to be used in lieu of calibrated volt/amp meters for the acceptance test.



CLAUSE	VERDICT	COMMENT
14.2.6.2		<i>New section added;</i> Automated Inspection and Testing Devices and Equipment
14.2.6.2.1		Automated inspection and testing devices and equipment installed on the fire pump system shall be tested to ensure the accuracy of the automated inspection and testing devices and equipment.
14.2.6.2.1.1		Automated inspection devices and equipment shall be proven to be as effective as a visual examination.
14.2.6.2.1.2		Automated testing devices and equipment shall produce the same action required by this standard to test a device.
14.2.6.2.2		The testing shall discharge water where required by this standard and NFPA 25.
14.2.6.2.3		Failure of a component or system to pass an automated inspection or test shall result in an audible trouble signal in accordance with NFPA 72.
CUSTOMERS PLEASE NOTE: This Table and column “Verdict” can be used in determining how your current or future production is or will be in compliance with new/revised requirements.		