



NATIONAL FIRE PROTECTION ASSOCIATION

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MINUTES

Technical Committee on Fire Pumps (FIM-AAA) NFPA 20 Second Draft Meeting (A2024)

October 25 – 26, 2023
10:00 a.m. – 6:56 p.m., (EDT)

Web/Teleconference

1. **Call to order.** Milosh Puchovsky, chair, called the meeting to order at 10:00 a.m. on October 25, 2023.
2. **Introductions.** Attendees introduced themselves and identified their affiliation. NFPA staff took attendance.
3. **Chair report.** Milosh Puchovsky welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Patrick Bakaj provided an overview of the standards development process and the revision cycle schedule.
5. **Previous meeting minutes.** The minutes from October 27-28, 2022, Orlando, FL were approved without revision.
6. **Representation.** Patrick Bakaj asked the committee if anyone was representing another interest category and there were no indications.
7. **NFPA 20 Second Draft.**
 - a. **Review of Public Comments and Committee Inputs.** The Technical Committee reviewed the Public Comments and Committee Inputs and developed Second Revisions as necessary. These will be available in the Second Draft Report at www.nfpa.org/20.
 - b. **Task group report(s).** The following task groups provided their reports and recommendations.
 - i. **Task Group 1 – Pumps (Chapters 4, 6, and 7).** Tony Spencer. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
 - ii. **Task Group 2 – Electrical Chapters (Chapters 9, 10, 12).** William Stelter. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
 - iii. **Task Group 3 – High Rise (Chapter 5).** David Fuller. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.

- iv. **Task Group 4 – Positive Displacement Pumps (Chapter 8).** Jennifer McGrath. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
- v. **Task Group 5 – Engines (Chapter 11).** Mike Dawson. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
- vi. **Task Group 6 – Steam (Chapter 13).** Marinus Both. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- vii. **Task Group 7 – Testing (Chapter 14)** . Kevin Hall. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
- viii. **Task Group 8 – Connectivity.** Doug Stephens. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- ix. **Task Group 9 – Coordination with NFPA 25.** Kerry Bell. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- x. **Task Group 10 – Battery Charging.** Richard Holub. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- xi. **Task Group 11 – Torsional Analysis.** Damon Pietraz. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- xii. **Task Group 12 – Flushing Rate Submittal to NFPA 24.** Marinus Both. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- xiii. **Task Group 13 – Energy Storage Systems.** Steven Baird. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- xiv. **Task Group 14 – Variable Speed vs. Adjustable Speed.** Richard Holub. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- xv. **Pressure Task Group..** Kevin Hall. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
- xvi. **Remote Testing Task Group.** William Stelter. The task group provided a report (attached), revisions were made. The task group has been discharged with thanks.
- xvii. **12.6 Task Group.** William Stelter. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- xviii. **Supplemental Fire Protection Task Group.** Terry Victor. The task group provided a verbal report, no revisions were made. The task group has been discharged with thanks.
- c. **New task groups.** The following task groups were appointed to work subsequent to the meeting:

- i. **Fire Pump Peak Driver Sizing Task Group.** TG Chair: Brian Buscher. Members: John Whitney, Steven Baird, Damon Pietraz, Keven Hall, Bill Stelter, David Fuller, Marvin Yoder, Mike Joanis, Tony Spencer, Don Goosman, Kerry Bell. Review data and provide recommendations for the next revision cycle on fire pump peak driver sizing related to Public Comments 29 and 30.
 - ii. **Annex D.** TG Chair: Rich Holub. Members: Bill Stelter. Update the Annex D table of cross references between NFPA 20 and NFPA 70 and recommend revisions for the next revision cycle..
8. **Future meetings.** This was the final meeting of this committee for the revision cycle. Public Inputs for the next edition are expected to close June 2025. A meeting notification will be posted at www.nfpa.org/20next when the next meeting is scheduled.
9. **Adjournment.** The meeting was adjourned at 6:56 p.m. on October 25, 2023.

Attendees

Committee Members:

X	Puchovsky, Milosh	Chair	Worcester Polytechnic Institute
	Aaron, Michael	Principal	Wiss, Janney, Elstner Associates, Inc.
X	Baird, Steven	Principal	Armstrong Fluid Technology
X	Beals, James	Principal	Jacobs Engineering
X	Buscher, Brian	Principal	AC Fire Pump Systems
	Campbell, John	Principal	Global Fire Protection Group, LLC
X	Cronin, Bradford	Principal	Rhode Island Association of Fire Marshals
	Dadgardoust, Mohammad	Principal	LRI Engineering Inc.
X	Dawson, Mike	Principal	Cummins Sales and Service
X	Denhardt, John	Principal	American Fire Sprinkler Association
	Ellis, Byron	Principal	Edison Electric Institute
	Francis, Christina	Principal	Tesla
X	Fuller, David	Principal	FM Global
	Gordon, Steve	Principal	Peerless Pump Company
X	Hulett, John	Principal	APi National Service Group
	Johnson, Aaron	Principal	Fire Lion Global LLC
	Kheir, Mohamed	Principal	Kheir Group
X	Leicht, R. T.	Principal	International Fire Marshals Association
X	Luinstra, Floyd	Principal	Oklahoma State University
X	McGrath, Jennifer	Principal	Pentair

	Petrus, Peter	Principal	Indonesian Fire & Rescue Foundation
X	Pietraz, Damon	Principal	Underwood Fire Equipment, Inc.
X	Popov, Alexander	Principal	JENSEN HUGHES
	Ramirez, Edward	Principal	ExxonMobil
X	Roberts, Jeffrey	Principal	Global Asset Protection Services, LLC
	Rodriguez, Vincent	Principal	Illinois Fire Prevention Association
	Rothmier, Michael	Principal	United Assn. of Journeymen & Apprentices
X	Sanford, Joseph	Principal	Liberty Mutual Property Risk Engineering
X	Spencer, Tony	Principal	Hydraulic Institute
X	Stelter, William	Principal	National Electrical Manufacturers
X	Torrissi, Alfio	Principal	Triad National Security, LLC.
X	Whitney, John	Principal	Clarke Fire Protection Products, Inc.
X	Yoder, Marvin	Principal	PREMIERflow
X	Bell, Kerry	Voting Alternate	UL Solutions
X	Dufault, Robert	Voting Alternate	Newport Fire Department
X	Holub, Richard	Voting Alternate	NFPA Industrial Fire Protection Section
X	Joanis, Michael	Voting Alternate	National Fire Sprinkler Association
	Charter, Virginia	Alternate	Oklahoma State University
X	Connolly, Michael	Alternate	Jacobs Engineering
	de Nooij, Tom	Alternate	Riskonet B.V.
X	Dembkowski, Mike	Alternate	Clarke Fire Protection
	Dobrzycki, Przemek	Alternate	Pentair
	Dorini, Alan	Alternate	Gulfstream Pump & Equipment, Inc.
	Engelke, Faye	Alternate	Tesla
	Frakes, Brandon	Alternate	Global Asset Protection Services, LLC
X	Franks, Joseph	Alternate	United Assn. of Journeymen & Apprentices
X	Goosman, Donald	Alternate	Wiss, Janney, Elstner Associates, Inc.
X	Hall, Kevin	Alternate	American Fire Sprinkler Association
	Helms, Doug	Alternate	National Electrical Manufacturers
	Holzkopf, Steven	Alternate	Illinois Fire Prevention Association
X	Isman, Kenneth	Alternate	University of Maryland
	Miller, Jeremy	Alternate	Liberty Mutual

	Moran, Michael	Alternate	International Fire Marshals Association
X	Rago, Anthony	Alternate	Jensen Hughes
X	Ryerson, Andrew	Alternate	FM Global
	Vesely, Craig	Alternate	Edison Electric Institute
X	Weir, Todd	Alternate	AC Fire Pump Systems
	Leedy, Edward	Member Emeritus	
	Duffy, Chad	Staff Liaison	National Fire Protection Association
X	Bakaj, Patrick	NFPA Staff	National Fire Protection Association

Guests:

Roger Montembault	The Montembault Group
Timothy Hennessey	Tesla
Joseph Saffer	American Automatic Sprinkler
Timothy Leuck	UL
Terry Victor	Risk Suppression Partners
Tom Harris	NFPA Staff

Total number in attendance: 41

Section	PC	PAGE	DISPOSITION
Global	28		Make a motion to reject but see.
Proposed Text (PC)	"Jockey Pump" is the accepted industry term for a pump used to maintain pressure on a system utilizing a fire pump. The attached document replaces all references to pressure maintenance pumps and make-up pumps to "jockey pumps" See attached Word Document TG-1_20_A2024_Global_PC-28.docx		
Committee Text (SR)			
Statement	The committee agrees with the submitter and will verify all locations to be changed. The standard currently uses multiple terms throughout and standardizing on one term will bring consistency.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG7
New 4.3.4	22 and 23		Make a motion to reject.
Proposed Text (PC)	<u>4.3.4* Startup or Service Personnel Qualifications.</u> <u>4.3.4.1</u> <u>Startup or Service personnel shall be factory trained and certified by the manufacture of the equipment to be started or serviced or be directly supervised by the manufacture during the startup or service event.</u> <u>4.3.4.2</u> <u>The factory training and certification shall be for the specific type and brand of equipment.</u> <u>A.4.3.4</u>		

	<u>Service personnel should be able to:</u> <u>1. Understand equipment-specific requirements, such as programming, application, and compatibility of the equipment being serviced.</u> <u>2. Understand the use of meters and test equipment required for the service to be performed.</u> <u>3. Understand basic job site safety rules and requirements of NFPA 70E.</u>
Committee Text (SR)	
Statement	Section 14.2.1 clearly states who the onsite personnel shall be.

Section	PC	PAGE	DISPOSITION
4.6.2.1.1, 4.6.2.1.2	6		
Proposed Text (PC)	~~4.6.2.1.1*~~ ~~Where mechanical seals are used as fire pump shaft seals, water supplied to the pump shall be from one of the following:~~ ~~1. Public service main~~ ~~2. Clean water stored in a closed top tank~~ ~~3. Other water supplies having a water quality that meets the pump manufacturer's specifications~~ ~~4.6.2.1.2~~ ~~Clean water flush for mechanical seals shall be of positive pressure.~~		
Committee Text (SR)			

Statement	The task group could not come to a consensus, therefor, we ask that this be reviewed by the committee as a whole.
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Section	PC	PAGE	DISPOSITION
4.7.6	29		Make a motion to reject but hold.
Proposed Text (PC)	4.7.6* The driver shall be selected in accordance with 9.5.2 ~~(for electric motors)~~ , 11.2.2 ~~(for diesel engines)~~ , or 13.1.2 ~~(for steam turbines)~~ to provide the required power to operate the pump at rated speed and maximum pump load ~~under any flow condition~~ <u>up to 200 percent rated flow</u> .		
Committee Text (SR)			
Statement	We recommend a task group be set up to review and collect data to present a recommendation during the next revision cycle.		

Section	PC	PAGE	DISPOSITION
4.11.3	30		Make a motion to reject.
Proposed Text (PC)	4.11.3 The nameplate shall indicate the maximum pump horsepower demand required to power the pump at any flow, including flows ~~beyond~~ <u>up to 175</u> percent of the rated capacity.		
Committee Text (SR)			
Statement	See statement from PC29.		

Section	PC	PAGE	DISPOSITION
New 4.14.3.3	26 and 27		Make a motion to reject and see Second Revision PC26 & 27.
Proposed Text (PC)	<u>4.14.3.3*</u> <u>Where the requirements of Section 14.3 rely on a source of power and the normal source of power is unreliable, an alternate source of power shall be provided for those electrically operated components.</u> <u>A.4.14.3.3</u> <u>A method of freeze protection that requires normal power is electrically operated unit heater(s) within the pump room. Unreliable sources of power should be determined based on the recommendations in A.9.3.2.</u>		
Committee Text (SR)	<u>4.14.3.1</u> An approved or listed source of heat shall be provided for maintaining the temperature of a pump room or pump house, where required, above 40°F (4°C) <u>at all times under any condition.</u>		
Statement	Reliable temperature control is critical for proper pump system operation under all conditions. The designer shall be responsible for selecting the method of a reliable heat source.		

Section	PC	PAGE	DISPOSITION
New 6.1.1.5	7		
Proposed Text (PC)	<u>6.1.1.5 Sealing</u> <u>The sealing type acceptable for centrifugal pumps shall be packing.</u>		

Committee Text (SR)	
Statement	The task group could not come to a consensus, therefore, we ask that this be reviewed by the committee as a whole.

Section	PC	PAGE	DISPOSITION
New 6.3	12		Make a motion to reject
Proposed Text (PC)	<u>6.3 Water Mist Centrifugal Pumps.</u> <u>6.3.1 Water mist centrifugal pumping units shall be dedicated to and listed as a unit for fire protection service.</u> <u>6.3.2 Where provided with a variable speed control, failure of the variable speed control feature shall cause the controller to bypass and isolate the variable speed control system.</u> <u>6.3.3 Pumps for water mist systems shall have adequate capacities to meet the maximum system demand for their intended service.</u> <u>6.3.4 NPSH shall exceed the pump manufacturer's required NPSH plus 5 ft (1.52 m) of liquid.</u> <u>6.3.5 The inlet pressure to the pump shall not exceed the pump manufacturer's recommended maximum inlet pressure.</u>		
Committee Text (SR)			
Statement	This is new material and should be submitted as a Public Input during the next revision cycle.		

Section	PC	PAGE	DISPOSITION
New 7.3.1.3	8		
Proposed Text (PC)	<u>7.3.1.3 Sealing</u>		

	<u>The sealing type acceptable for vertical shaft turbine-type pumps shall be packing.</u>
Committee Text (SR)	
Statement	The task group could not come to a consensus, therefore, we ask that this be reviewed by the committee as a whole.

Section	PC	PAGE	DISPOSITION
14.2.1	22		Make a motion to make a second revision.
Proposed Text (PC)			
Committee Text (SR)	Under section 14.2.1, delete reference to (4.4)		
Statement	This language is no longer valid or needed. During the first draft, this material was deleted for qualification personnel.		

Section	PC	PAGE	DISPOSITION
			Make a motion to make a second revision.
Proposed Text (PC)	4.14.1.3 <u>Sprinkler Systems.</u> 4.14.1.3.1 <u>Sprinklers shall be installed in accordance with NFPA 13.</u> 4.14.1.3.2 <u>~~Pump rooms~~ Rooms</u> enclosing diesel engine pump drivers <u>and-or</u> fuel tanks shall be <u>classified</u> as Extra Hazard (Group 2)<u>occupancies</u>. 4.14.1.3.3		

	<u>Pump</u> rooms enclosing electric fire pump drivers shall be <u>classified</u> as Ordinary Hazard (Group 1) <u>occupancies</u> .
Committee Text (SR)	Under section 4.14.1.3.2, remove “Pump” and change “and” to “or”.
Statement	This change clarifies the inclusion for a diesel driver or a tank in a room to be sprinkled as EH2.

Section	PC	PAGE	DISPOSITION
Proposed Text (PC)			
Committee Text (SR)			
Statement			

3.3.52.15* ~~Pressure Maintenance (Jockey or Make-Up) Pump.~~

A pump designed to maintain the pressure on the fire protection system(s) between preset limits when the system is not flowing water.

A.3.3.52.15

A jockey pump can also be referred to as a pressure maintenance pump or make-up pump.

4.2.3.2

Plans shall indicate, at a minimum, the items from the following list that pertain to the design of the system:

- (1) Name(s) of owner(s)
- (2) Location, including street address
- (3) Point of compass
- (4) Name and address of installing contractor
- (5) Pump make and model number
- (6) Pump rating including flow, pressure, and speed
- (7) Suction main size, length, location, type and class/schedule of material, and point of connection to water supply, as well as depth to top of pipe below grade
- (8) Water storage tank, if applicable
- (9) Size and type of valves, regulators, meters, and valve pits, if applicable
- (10) Water supply information, including the following flow test information, if applicable:
 - (a) Location and elevation of static and residual test gauge with relation to the elevation reference point
 - (b) Flow location
 - (c) Static pressure, psi (bar)
 - (d) Residual pressure, psi (bar)
 - (e) Flow rate, gpm (L/min)
 - (f) Date
 - (g) Time
 - (h) Name of person who conducted the test or supplied the information
 - (i) Other sources of water supply, with pressure or elevation
- (11) Pump driver details, including manufacturer and horsepower
- (12) Voltage for electric-motor-driven pumps
- (13) Fuel system details for diesel-driven pumps
- (14) Controller manufacturer, type, and rating
- (15) Suction and discharge pipe, fitting, and valve types
- (16) Test connection piping and valves
- (17) Flowmeter details, if applicable
- (18) ~~Pressure maintenance~~Jockey pump and controller arrangement, including sensing line details, if applicable

4.27* ~~Pressure Maintenance (Jockey or Make-Up) Pumps.~~

A.4.27

~~Pressure maintenance (jockey or make-up)~~ pumps should be used where it is desirable to maintain a uniform or relatively high pressure on the fire protection system.

A domestic water pump in a dual-purpose water supply system can function as a means of maintaining pressure.

4.27.1

For pressure-actuated fire pumps, a means to maintain the pressure in the fire protection system shall be provided in accordance with one of the following:

- (1) A ~~pressure maintenance (jockey)~~ pump
- (2) A water mist positive displacement pumping unit in accordance with 8.5.7.2
- (3) Another approved means that is not the main fire pump

4.27.2

~~Pressure maintenance jockey~~ pumps shall not be required to be listed. ~~Pressure maintenance pumps shall be approved.~~

4.27.2.1*

The ~~pressure maintenance jockey~~ pump shall be sized to replenish the fire protection system pressure due to allowable leakage and normal drops in pressure.

A.4.27.2.1

The sizing of the ~~pressure maintenance jockey~~ pump requires a thorough analysis of the type and size of system the ~~pressure maintenance jockey~~ pump will serve. ~~Pressure maintenance jockey~~ pumps on fire protection systems that serve large underground mains need to be larger than ~~pressure maintenance jockey~~ pumps that serve small aboveground fire protection systems. Underground mains are permitted by NFPA 24 to have some leakage (see 10.10.2.2.6 of NFPA 24), while aboveground piping systems are required to be tight when new and should not have significant leakage.

For situations where the ~~pressure maintenance jockey~~ pump serves only aboveground piping for fire sprinkler and standpipe systems, the ~~pressure maintenance jockey~~ pump should be sized to provide a flow less than a single fire sprinkler. The main fire pump should start and run (providing a pump running signal) for any waterflow situation where a sprinkler has opened, which will not happen if the ~~pressure maintenance jockey~~ pump is too large. One guideline that has been successfully used to size ~~pressure maintenance jockey~~ pumps is to select a pump that will make up the allowable leakage rate in 10 minutes or 1 gpm (3.8 L/min), whichever is larger.

4.27.2.2 Jockey pumps shall be approved.

4.27.3

~~Pressure maintenance jockey~~ pumps shall have rated capacities not less than any normal leakage rate.

4.27.4

~~Pressure maintenance jockey~~ pumps shall have discharge pressure sufficient to maintain the desired fire protection system pressure.

4.27.5* Excess Pressure.

A.4.27.5

A centrifugal-type ~~pressure maintenance jockey~~ pump is preferable.

The following notes apply to a centrifugal-type ~~pressure maintenance jockey~~ pump:

- (1) A jockey pump is usually required with automatically controlled pumps.
- (2) Jockey pump suction can come from the tank filling supply line. This situation would allow high pressure to be maintained on the fire protection system even when the supply tank is empty for repairs.
- (3) Pressure sensing lines also need to be installed in accordance with 10.5.2.1. [See and Figure A.4.32(a) and Figure A.4.32(b).]

4.27.5.1

Where a centrifugal-type ~~pressure maintenance jockey~~ pump has a total discharge pressure with the pump operating at shutoff exceeding the working pressure rating of the fire protection equipment, or where a turbine vane (peripheral) type of pump is used, a relief valve sized to prevent overpressuring of the system shall be installed on the pump discharge to prevent damage to the fire protection system.

4.27.5.2

Running period timers shall not be used where jockey pumps are utilized that have the capability of exceeding the working pressure of the fire protection systems.

4.27.6 Piping and Components for ~~Pressure Maintenance Jockey~~ Pumps.

4.27.6.1

Steel pipe shall be used for suction and discharge piping on ~~pressure maintenance jockey~~ pumps, which includes packaged prefabricated systems.

4.27.6.2

Valves and components for the ~~pressure maintenance jockey~~ pump shall not be required to be listed.

4.27.6.3

An isolation valve shall be installed on the suction side of the pressure maintenancejockey pump to isolate the pump for repair.

4.27.6.4

A check valve and isolation valve shall be installed in the discharge pipe.

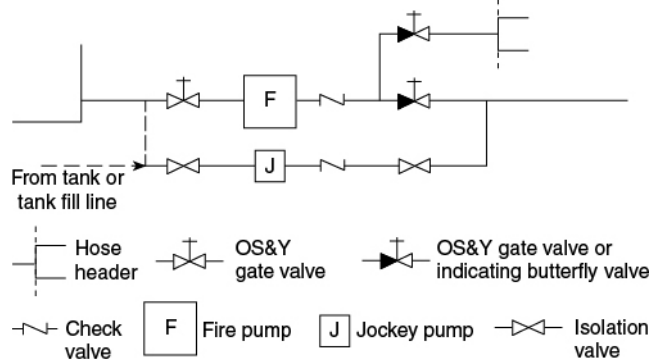
4.27.6.5*

Indicating valves shall be installed in such places as needed to make the pump, check valve, and miscellaneous fittings accessible for repair.

A.4.27.6.5

See Figure A.4.27.6.5.

Figure A.4.27.6.5 Jockey Pump Installation with Fire Pump.



4.27.6.6

The pressure sensing line for the pressure maintenancejockey pump shall be in accordance with Section 4.32.

4.27.6.7

The isolation valves serving the pressure maintenancejockey pump shall not be required to be supervised.

4.27.7

Except as permitted in Chapter 8, the primary or standby fire pump shall not be used as a pressure maintenancejockey pump.

4.27.8

The controller for a pressure maintenancejockey pump shall be listed but shall not be required to be listed for fire pump service.

4.27.9

The pressure maintenancejockey pump shall not be required to have alternate or standby power.

4.32.1.1.1

The pressure maintenancejockey pump controller for each discharge port shall have its own individual pressure sensing line.

8.5.7 Pressure Maintenance.

8.5.7.1

Except as permitted in 8.5.7.2, the primary or standby fire pump shall not be used as a pressure maintenancejockey pump.

8.5.7.2

Water mist positive displacement pumping units shall be permitted to maintain system pressure under one of the following conditions:

- (1) Pumping unit is designed and listed to alternate pressure maintenance duty between two or more pumps with variable speed pressure-limiting control, and provide a supervisory signal wherever pressure maintenance is required more than two times in one hour.
- (2) Pumping unit is designed and listed to have a redundant pump when one primary pump is used for pressure maintenance duty with variable speed pressure-limiting control, and provide a supervisory signal wherever pressure maintenance is required more than two times in one hour.
- (3) Pumping unit is designed to use dedicated pressure maintenancejockey pump that is not required for primary fire pump service and provides a supervisory signal whenever pressure maintenance is required more than two times in one hour.

9.7 Junction Boxes.

Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met:

- (1) The junction box shall be securely mounted.
- (2) *Mounting and installation of a junction box shall not violate the enclosure type rating of the fire pump controller(s).
- (3) Mounting and installation of a junction box shall not violate the integrity of the fire pump controller(s).
- (4) *Mounting and installation of a junction box shall not affect the short circuit rating of the controller(s).
- (5) As a minimum, a Type 2, dripproof enclosure (junction box) shall be used.
- (6) The enclosure shall be listed to match the fire pump controller enclosure type rating.
- (7) Terminals, junction blocks, and splices, where used, shall be listed.
- (8) Neither a fire pump controller nor a fire pump power transfer switch, where provided, shall be used as a junction box to supply other equipment, including a ~~pressure maintenance (jockey)~~ pump(s). (See 10.3.4.5.1 and 10.3.4.6.)
- (9) Neither a fire pump controller nor a fire pump power transfer switch shall be used as a junction box for wire splices.

10.3.4.6

Electrical supply conductors for ~~pressure maintenance (jockey-or make-up)~~ pump(s) shall not be connected to the fire pump controller.

12.3.5.3.3

Electrical supply conductors for ~~pressure maintenance (jockey-or make-up)~~ pump(s) shall not be connected to the diesel engine fire pump controller.

10.4.2.4 Instruction and Warning Labels.

10.4.2.4.1

An instruction label shall be provided that directs the order of operation of the isolating switch and circuit breaker.

10.4.2.4.2

The instruction label shall be permitted to be part of the label required by 10.3.7.3.

10.4.2.4.3

Unless the isolating switch complies with 10.4.2.1.2 or the isolating switch and the circuit breaker are interlocked in accordance with 10.4.2.5.1, the following warning shall appear on or immediately adjacent to the isolating switch:

WARNING

**DO NOT OPEN OR CLOSE THIS SWITCH WHILE THE CIRCUIT BREAKER
(DISCONNECTING MEANS) IS IN CLOSED POSITION.**

10.4.2.5 Operating Handle.

10.4.2.5.1

The isolating switch and the circuit breaker shall be permitted to be interlocked so that the isolating switch can neither be opened nor closed while the circuit breaker is closed.

10.4.2.5.2

Where the isolating switch is not interlocked in accordance with 10.4.2.5.1, the operating handle shall be provided with a spring latch that shall be so arranged that it requires the use of the other hand to hold the latch released in order to permit opening or closing of the switch.

Section	PC	PAGE	DISPOSITION – Also reviewed by TG1
New 4.14.3.3	26 and 27		The electrical task group moves to reject PC 26 and 27 with the following statement.
Proposed Text (PC)	<u>4.14.3.3*</u> <u>Where the requirements of Section 14.3 rely on a source of power and the normal source of power is unreliable, an alternate source of power shall be provided for those electrically operated components.</u> <u>A.4.14.3.3</u> <u>A method of freeze protection that requires normal power is electrically operated unit heater(s) within the pump room. Unreliable sources of power should be determined based on the recommendations in A.9.3.2.</u>		
Committee Text (SR)			
Statement	There are other sources of heat besides electrical and paragraph 4.14.3.1 states: 4.14.3.1 An approved or listed source of heat shall be provided for maintaining the temperature of a pump room or pump house, where required, above 40°F (4°C). Each site needs to solve this problem based on available heating sources.		

Section	PC	PAGE	DISPOSITION also reviewed by TG1
4.7.6	29		The electrical task group moves to reject PC 29 with the following statement.
Proposed Text (PC)	4.7.6* The driver shall be selected in accordance with 9.5.2 (~~for~~ electric motors), 11.2.2 (~~for~~ diesel engines), or 13.1.2 (~~for~~ steam turbines) to provide the required power to operate the pump at rated speed and maximum pump load ~~under any flow condition~~ <u>up to 200 percent rated flow</u>.		
Committee Text (SR)			
Statement	The fire pump controller circuit breaker must hold 300% of the motor full load current for three minutes in accordance with 10.4.4.3(1)(b) without tripping. 4.7.6 as written in the 2022 edition of NFPA 20 sizes the driver for the maximum power for any flow condition. This prevents an overload from occurring. Limiting the flow condition at which the driver power is selected leads to an undersized motor that can then run into an overload condition. The electric motors, conductors, and electric controllers are sized for the service factor amps. Power required beyond this, continually increases the current draw beyond its ratings. Substantial currents beyond its ratings will overheat the motor windings and electric controller conductors causing them to melt in minutes. Once the insulation melts, a short circuit or ground fault will ultimately occur and trip the circuit breaker. At this point the controller is out of service and will likely be damaged beyond repair. It is important to note that overloads can occur if the actual fire demand is greater than the fire system design, if a pipe breaks, if the bypass loop is opened too far, during initial flow testing, or during hydrant flushing. Destroying the fire pump controller and motor during a fire takes options away from first responders while fighting the fire; and if it's not a fire, replacing the controller and motor can leave the building without a fire protection for a substantial period of time.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG4
8.4.6.1	4		The electrical task group moves to reject PC 4 with the following statement.
Proposed Text (PC)	8.4.6.1 Where a redundant motor and pump are provided to satisfy the requirement in 8.4.6(2), the following shall apply: <u>1.</u> Load isolation in accordance with 10.10.4 shall not be required for the variable speed pump. <u>1.2.</u> <u>The line isolation requirements of 10.10.4 shall not be required on the variable speed pump when the VFD meets the surge protection requirements as per EN/IEC 61000-4-5 and the pump controller, including the VFD, has surge protection according to 10.4.1.</u> <u>2.3.</u> Circuit protection in accordance with 10.10.5.1 shall be provided between the line side of the variable speed drive and the load side of the isolating switch. <u>3.4.</u> If the isolating switch required by 10.4.2 has self-protecting instantaneous short-circuit overcurrent protection, the circuit protection required by 10.10.5.2 shall be coordinated such that the isolating switch does not trip due to a fault condition in the variable speed drive.		
Committee Text (SR)			
Statement	A drive may be compliant with this IEC standard but the surge protection might not be effective in all power configurations. A corner grounded Delta power supply or a high resistance grounded power supply may invalidate the surge protection in the VFD, even though the drive was "compliant" with this EMC surge protection standard. Twenty years of NFPA 20 history with VFD isolation has been extremely successful at preventing VFD damage due to spikes and surges in all power configurations.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG4
8.4.6.1	33		The electrical task group moves to reject PC 33 with the following statement.
Proposed Text (PC)	~~8.4.6.1~~ ~~Where a redundant motor and pump are provided to satisfy the requirement in 8.4.6(2), the following shall apply:~~ ~~1. Load isolation in accordance with 10.10.4 shall not be required for the variable speed pump.~~ ~~2. Circuit protection in accordance with 10.10.5.1 shall be provided between the line side of the variable speed drive and the load side of the isolating switch.~~ ~~3. If the isolating switch required by 10.4.2 has self-protecting instantaneous short-circuit overcurrent protection, the circuit protection required by 10.10.5.2 shall be coordinated such that the isolating switch does not trip due to a fault condition in the variable speed drive.~~		
Committee Text (SR)			
Statement	The requirements specific to WMPDPU should be contained in Chapter 8 even if they are electrically related to clarify that the requirements only apply to WMPDPU.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG4
New 8.4.14	3		The electrical task group moves to reject PC 3 with the following statement.
Proposed Text (PC)	<u>8.4.14</u> <u>For WMPDPU's that are having redundancy to start a motor and pump manually in case of any single failure, the requirements in chapter 10.5.3.2.1 shall not apply and following requirements shall apply:</u> <u>8.4.14.1</u> <u>The controller shall be equipped with an emergency-run switches, one per motor, that allows maximum amount of motors and pumps to start.</u> <u>8.4.14.1.1</u> <u>Maximum allowed motor amount to start, shall be marker or labeled next to emergency run switches.</u> <u>8.4.14.2</u> <u>The operating handles shall be marked or labeled as to function and operation.</u>		
Committee Text (SR)	10.5.3.2.1 requires Emergency-Run Mechanical Control for the motor. It provides additional reliable means during fire fighting to start and run the WMPDPU pumps when all electrical means fail. It is required for all types of electric fire pumps.		
Statement			

Section	PC	PAGE	DISPOSITION – Also reviewed by TG4
New 8.4.15	2		The electrical task group moves to reject PC 2 with the following statement.
Proposed Text (PC)	<u>8.4.15</u> <u>Locked Rotor Overcurrent Protection requirements in 10.4.4. shall not be applicable to water mist positive displacement pumping unit that is equipped with a redundant motor and pump.</u> <u>8.4.15.1 The overcurrent protective device shall be required and permitted between the isolating switch and the fire pump motor.</u> <u>8.4.15.2 The overcurrent device shall be located within the fire pump controller.</u> <u>8.4.15.3 For a squirrel-cage or wound-rotor induction motor, the device shall be of the time-delay type having tripping times between 8 seconds and 12 seconds at locked rotor current</u> <u>8.4.15.4 It shall be possible to reset the device for operation immediately after tripping, with the tripping characteristics thereafter remaining unchanged.</u> <u>8.4.15.5 Tripping shall comply with both of the following:</u> <u>(a) Tripping shall be accomplished by opening the circuit breaker.</u> <u>(b) The circuit breaker shall be of the external manual reset type.</u> <u>8.4.15.6 In case a motor is isolated by the tripped overcurrent protective device, the redundant motor be started to compensate the lost capacity, according to the performance requirements as stated in 8.4.4</u>		
Committee Text (SR)			
Statement	There is no substantial operational difference between the WMPDPU and a centrifugal fire pump with regards to the single-phase running condition to have an exception for the 300% requirement. These		

	pumps will still provide some fire protection value if already running and running at light loads when a single-phase condition occurs. The 300% requirement is to allow for single phase running once the motor is started. A single-phase condition can affect all of the motors and controls at one time if the single phase condition is in the power supply feeding the WMPDPU.
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Section	PC	PAGE	DISPOSITION
10.3.3.3	17		The electrical task group moves to reject but see second revision of PC 17
Proposed Text (PC)	10.3.3.3 Where <u>the equipment is located outside, or where other</u> special environments exist, rated enclosures suitable for the environments shall be used.		
Committee Text (SR)	10.3.3.3 Where <u>the equipment is located outside, or where other</u> special environments exist, rated enclosures suitable for the environments shall be used. <u>A.10.3.3.3</u> <u>For outdoor locations, NEMA 3R (IP-34) or NEMA 4 (IP-66) would typically be used.</u> <u>For other special environments. See NEMA Standards Publication – A Brief Comparison of NEMA 250 and IEC 60529 - 2024</u>		
Statement	Committee recognizes that NEMA 2 indoor enclosure are being used outdoors, so the committee is adding the proposed text and Annex language to explain the typical NEMA enclosure for outdoor locations. It also references the NEMA document to explain the IP equivalents.		

Section	PC	PAGE	DISPOSITION
New 10.4.2.1.3.1	32		The electrical task group moves to reject PC 32 with the following statement
Proposed Text (PC)	<u>10.4.2.1.3.1</u> <u>Where a redundant variable speed pump is provided with self-protecting instantaneous short-circuit overcurrent protection, the isolating switch shall not trip due to a fault condition in the variable speed drive.</u>		
Committee Text (SR)			
Statement	The requirements specific to WMPDPU should be contained in Chapter 8 even if they are electrically related to clarify that the requirements only apply to WMPDPU.		

Section	PC	PAGE	DISPOSITION
10.4.2.4, 10.4.2.5	21		The electrical task group moves to reject but see second revision of PC 21
Proposed Text (PC)	See word document, Chapter_10_10_4_2_4_PC-21.docx		
Committee Text (SR)	10.4.2.4 <u>Instruction and Warning Labels.</u> 10.4.2.4.1 ~~Unless the requirements of~~ <u>An instruction label shall be provided that directs the order of operation of the isolating switch and circuit breaker.</u> <u>10.4.2.4.2</u> <u>The instruction label shall be permitted to be part of the label required by 10.3.7.3.</u> <u>10.4.2.4.3</u>		

Unless the isolating switch complies with 10.4.2.1.2 or the isolating switch and the circuit breaker are interlocked in accordance with 10.4.2.5.1 or 10.4.2.4.2 are met, the following warning shall appear on or immediately adjacent to the isolating switch:

WARNING

DO NOT OPEN OR CLOSE THIS SWITCH WHILE THE CIRCUIT BREAKER (DISCONNECTING MEANS) IS IN CLOSED POSITION.

~~10.4.2.5.4.2~~ Instruction Label Operating Handle.

~~The requirements of 10.4.2.4.1 shall not apply where the requirements of 10.4.2.4.2.1 and 10.4.2.4.2.2 are met.~~

~~10.4.2.4.2.5.1~~

~~Where the isolating switch and the circuit breaker are so~~ shall be permitted to be interlocked so that the isolating switch can ~~be~~ neither be opened nor closed while the circuit breaker is closed, ~~the warning label shall be permitted to be replaced with an instruction label that directs the order of operation.~~

~~10.4.2.4.2.5.2~~

~~This label shall be permitted to be part of the label required by 10.3.7.3.~~

~~10.4.2.5~~ Operating Handle.

~~10.4.2.5.1~~

~~Unless the requirements of~~ Where the isolating switch is not interlocked in accordance with 10.4.2.5.2 are met, the ~~isolating switch~~ operating handle shall be provided with a spring latch that shall be so arranged that it requires the use of the other hand to hold the latch released in order to permit opening or closing of the switch.

[See clean version in file "PC21 TG2 second revision.docx"]

Also, the electrical task group recommends a second revision correcting the definition of 3.3.70.1. The rewording should be:

3.3.70 Switch.

	3.3.70.1 Isolating Switch. A switch intended for isolating an electric circuit from its source of power. ~~It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.~~
Statement	The current wording of 10.4.2.4 is confusing. It is proposed to be rewritten for clarity and to make the correct reference to 10.4.2.1.2 for not requiring the warning label in 10.4.2.4.1.2. Additionally, the order of 10.4.2.4.3 was change for better readability. Further the definition is recommended to be changed in the second draft accordingly.

Section	PC	PAGE	DISPOSITION
10.5.2.1.3.1	5		The electrical task group moves to reject PC 5 with the following statement.
Proposed Text (PC)	10.5.2.1.3.1* <u>The controller shall activate a visual and audible alarm that can be silenced in one of the following conditions:</u> (1) Where the electronic pressure sensor reading exceeds the higher of 10 psi (0.68 bar) or 3.33 percent of the maximum controller rated pressure during any automatic pump start that was initiated by the solenoid drain valve, as required by 10.5.2.7.3, ~~the controller shall activate a visual and audible signal that can be silenced.~~ (2) <u>Where the difference between the values from the electronic pressure sensors is more than 5% of the pressure maintenance level for 10 minutes in the systems that are equipped with two electronic pressure sensors and from where the lower value of the two is used for automatic pump start. Additionally the system shall be equipped with a pressure switch to initiate automatic activation in case the both pressure sensors has been drifted up simultaneously.</u> ~~(1)~~(3) <u>Where the pump unit has a pressure gauge and a pressure sensor, a settable alarm limit shall be used to activate the alarm when the electronic pressure sensor reading do not decrease below the set alarm pressure limit during any automatic pump start that was initiated by the solenoid drain</u>		

	<u>valve, as required by 10.5.2.7.3. The alarm limit shall be set and verified during commissioning and annual services.</u>
Committee Text (SR)	
Statement	WMPDPUs can operate up to 3000 psi, but with the first draft language that was changed to add "...or 3.33 percent of maximum controller rated pressure", the alarm pressure would be greater than 100 psi for this pressure rating. This is achievable with today's technology but may need a smaller orifice in the sense line. The smaller orifice would then be an exception for the WMPDPUs in chapter 8. TG2 recommends that TG4 should evaluate the smaller orifice and consider an exception to 8.4 based on a hydraulic solution. Comparing the transducer pressure to atmospheric pressure through an open solenoid valve is still the most reliable way to check for a drifting transducer.

Section	PC	PAGE	DISPOSITION
10.5.2.1.8.8	34		The electrical task group moves to Accept
Proposed Text (PC)	~~10.5.2.1.8.8—~~ ~~A shutoff valve in the pressure-sensing line shall not be permitted.~~		
Committee Text (SR)			
Statement			

Section	PC	PAGE	DISPOSITION
10.5.2.7.4	13		The electrical task group moves to reject but see second revision of PC 13
Proposed Text (PC)	10.5.2.7.4 The motor shall shut down from motor overload when the motor current exceeds 120 percent of full load amperes for ~~40~~ <u>12</u> seconds. <u>10.5.2.7.4.1</u> <u>Audible and visual alarms with trouble remote contacts shall be provided to indicate motor overload shutdown during testing.</u>		
Committee Text (SR)	See TG2 and Remote TG Second Draft revisions in files: TG-2_10.5.2.7 Remote TG PC13 for electrics-final.docx TG-2_12.7.2.7 Remote TG PC13 for diesels-final.docx		
Statement	The requested changes from PC13 have been incorporated in the second draft revision and addition safety shutdowns have been added to prevent equipment damage during automatic testing. The equivalent section 12.7.2.7 for diesel controllers has been revised as well. Further changes have been added to help facilitate remote testing.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG7
10.5.2.8	14		The electrical task group moves to reject but see second revision of PC 14
Proposed Text (PC)	See word document Chapter_10_10_5_2_8_PC-14.docx		
Committee Text (SR)	See TG2 and Remote TG Second Draft revisions in files: TG-2_10.5.2.7 Remote TG PC14 for electrics-final.docx TG-2_12.7.2.7 Remote TG PC14 for diesels-final.docx		
Statement	The safety shutdowns requested from PC14 have been incorporated into the second draft revision of paragraph 10.5.2.7 in PC13 since it applies to both automatic and automatic remote testing. The		

	cybersecurity wording is in accordance with NEC 110.3(A)(8) and was enhanced with additional wording taken from the NEC 240.6(D). Personnel required within site of the equipment was not accepted since 4.3.1 presently states that “Means shall be provided for qualified personnel to determine that the fire pump is operating in a satisfactory manner during pump operation.” This does not require personnel within site of the equipment and since additional shutdowns have been added, including leak detection, the pump room and equipment have been protected in a satisfactory manor during the automatic test. The equivalent section 12.7.2.8 for diesel controllers has been revised as well.
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Section	PC	PAGE	DISPOSITION
10.10.4	31		The electrical task group moves to reject PC 31 with the following statement.
Proposed Text (PC)	10.10.4 Isolation. 10.10.4.1 The variable speed drive shall be line and load isolated when not in operation. 10.10.4.2 The variable speed drive load isolation contactor and the bypass contactor shall be mechanically and electrically interlocked to prevent simultaneous closure. <u>10.10.4.3</u> <u>Where a redundant motor and pump are provides to satisfy the requirements fo 8.4.6(2), load isolation shall not be required for variable speed pumps</u>		
Committee Text (SR)			
Statement	The requirements specific to WMPDPU should be contained in Chapter 8 even if they are electrically related to clarify that the requirements only apply to WMPDPU.		

Section	PC	PAGE	DISPOSITION
12.3.3.1.2	19		The electrical task group moves to reject but see second revision of PC 19
Proposed Text (PC)	12.3.3.1.2 Where <u>the equipment is located outside, or where other</u> special environments exist, rated enclosures suitable for the environments shall be used.		
Committee Text (SR)	12.3.3.1.2 Where <u>the equipment is located outside, or where other</u> special environments exist, rated enclosures suitable for the environments shall be used. <u>A.12.3.3.1.2</u> <u>For outdoor locations, NEMA 3R (IP-34) or NEMA 4 (IP-66) would typically be used.</u> <u>For other special environments. See NEMA Standards Publication – A Brief Comparison of NEMA 250 and IEC 60529 - 2024</u>		
Statement	Committee recognizes that NEMA 2 indoor enclosure are being used outdoors, so the committee is adding the proposed text and Annex language to explain the typical NEMA enclosure for outdoor locations. It also references the NEMA document to explain the IP equivalents.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG7
14.2.6.7.1.1	15		The electrical task group moves to reject but see second revision of PC 15
Proposed Text (PC)	14.2.6.7.1.1 ~~Where service factor amperes are not provided, the product of the motor full-load amperes from Table 430.248 or 430.250 of NFPA 70 times the allowable service factor shall not be exceeded.~~		
Committee Text (SR)	<u>14.2.6.7.1.1</u> ~~Where service factor amperes are not provided~~ (or documented), the ampere demand on each phase shall not exceed the product of the full-load ampere rating times the allowable service factor as stamped on the motor nameplate.		
Statement	The NFPA tables are approximately 5% higher than the motor's full-load ampere rating so when you add 5% to the additional 15% for the service factor calculation, the motor could be 20% over its full-load ampere rating. This is beyond motor manufacture's ratings so these tables should not be used. The committee text adds back the original wording for older motors that don't have the SFA on the nameplate and where documentation is not provided.		

Section	PC	PAGE	DISPOSITION
14.2.6.7.2.1	20		The electrical task group moves to reject but see second revision of PC 20
Proposed Text (PC)	~~14.2.6.7.2.1~~ ~~Where service factor amperes are not provided, the product of the rated voltage and motor full load amperes from Table 430.248 or 430.250 of NFPA 70 times the allowable service factor shall not be exceeded.~~		
Committee Text (SR)	<u>14.2.6.7.2.1</u> <u>Where the service factor amperes are not provided (or documented), the product of the actual voltage and current demand on each phase shall not exceed the product of the rated voltage and rated full-load current times the allowable service factor.</u>		
Statement	The NFPA 70 tables are approximately 5% higher than the motor's full-load ampere rating so when you add 5% to the additional 15% for the service factor calculation, the motor could be 20% over its full-load ampere rating. This is beyond motor manufacture's ratings so these tables should not be used. The committee text adds back the original wording for older motors that don't have the SFA on the nameplate and where documentation is not provided.		

Section	PC	PAGE	DISPOSITION
Proposed Text (PC)			
Committee Text (SR)			
Statement			

PC #13 Second Revision

10.5.2.7 Automatic Testing.

10.5.2.7.1

The controller equipment shall be arranged to automatically start, run, and shutdown the motor at the minimum ~~no-flow~~ test frequency and duration required by NFPA 25.

10.5.2.7.2

Performance of the automatic testing shall be recorded as a pressure drop indication on the pressure recorder.

10.5.2.7.3

A solenoid valve drain on the pressure control line shall be the initiating means.

10.5.2.7.4

~~The motor shall shutdown from motor overload when the motor current exceeds 120 percent of full load amperes for 10 seconds.~~

As a minimum, the motor shall shutdown automatically on the following if no other starting or running cause exists:

- 1) Overload
- 2) Reversed phase rotation
- 3) Single phasing
- 4) Overpressure
- 5) Leak detection
- 6) Low reservoir level (not required for no-flow testing)
- 7) Lowest permissible suction pressure (not required for no-flow testing)

10.5.2.7.5

~~If a starting cause occurs after shutdown, the controller shall override the motor overload shutdown, restart, and run in accordance with 10.4.4.~~

If after shutdown a starting cause occurs, the controller shall restart the motor regardless of the shutdowns listed in 10.5.2.7.4 and run in accordance with 10.5.4.2.

A.10.5.2.7.5

A starting cause is any signal from the fire protection system that causes the controller to start. This could be a pressure drop, deluge valve contact opening, remote start signal, or manual pushbutton start.

10.5.2.7.6

In a non-pressure-actuated controller, the automatic testing shall be permitted to be initiated by a means other than a solenoid valve.

10.5.2.7.7

~~A visible indicator and audible alarm shall be provided when the controller fails to start from the automatic mode.~~[moved to 10.5.2.7.12]

Where a starting cause occurs during automatic testing, other than those initiated by the automatic testing sequence, the testing shall be terminated, the controller shall return to its automatic operation, and a visual and audible signal that can be silenced shall actuate.

10.5.2.7.8

A visual and audible signal that can be silenced shall actuate when the controller shuts down in accordance with 10.5.2.7.4.

10.5.2.7.9

During a no-flow test, the Pump Run remote contacts shall be permitted to be automatically disabled immediately prior to the test and enabled immediately after the test.

10.5.2.7.10

Local means in the controller shall be provided to cancel all automatic testing and to return to standby mode.

10.5.2.7.11

In addition to the requirements in 10.3.4.5.2, sensors or devices used for testing and monitoring shall be permitted to be field installed provided they do not affect the operation of the existing fire pump controller, subject to AHJ approval.

10.5.2.7.11.1

Sensors or devices shall not be connected between the fire pump controller and motor such that failure or removal of such device compromises the starting and running of the fire pump.

10.5.2.7.12

A visible indicator and audible alarm shall be provided when the controller fails to start from the automatic mode.

Also create the following associated Second Revisions:

10.3.4.5.3

Except as provided in 4.21.2.2(1), [10.5.2.8.4](#) and 10.9.4, lockout, remote shutdown, or interlock to prevent normal operation shall not be permitted unless approved by the authority having jurisdiction.

Substantiation:

10.5.2.8.4 is added to 10.3.4.5.3 to allow remote stop during the 30 minute remote testing period.

10.4.6.3 Pump or Motor Running.

A visual indicator shall actuate whenever the controller is operating in a motor-running condition.

Substantiation:

A visual indication of Pump Running is added so local personnel who may be onsite can quickly identify which pump is running when multiple pumps are in the same pump room and are being remotely tested.

10.4.6.4 Motor Overload.

The visual and audible signal that can be silenced shall actuate whenever the motor current exceeds 120 percent of full load amperes in any phase for 12 seconds.

Substantiation:

A visual indication of Motor Overload is added so local personnel who may be onsite can quickly identify a problem that can damage the equipment while the pump is running.

10.4.7.2.6 Controller or System Trouble.

As a minimum, a controller or system trouble shall actuate whenever any of the following signals occur:

- 1) Ground-fault, when provided (*see 10.4.5.9*)
- 2) Pressure-sensing device fault (*see 10.5.2.1.3.1 and 10.5.2.1.3.2*),
- 3) Variable speed trouble (*see 10.10.8.1, 10.10.8.2, and 10.10.8.3*),
- 4) Fail-to-start (*see 10.5.2.7.5*),
- 5) Motor Overload (*see 10.4.6.4*),
- 6) Single Phase (*see 10.4.5.7*),
- 7) Leaks over 1/4 inch (6.4 mm) in depth in the pump room; and

- 8) Pressures exceeding those for rated components
- 9) Low reservoir level (not required for no-flow testing – see 10.5.2.7.4)
- 10) Lowest permissible suction pressure (not required for no-flow testing – see 10.5.2.7.4)

Substantiation:

The additional conditions monitored for automatic testing are added to the visual signal list and to the common remote indication circuit for additional remote monitoring.

PC #14 Second Revision

10.5.2.8 ~~Remote Automatic Testing~~Automatic Remote Testing.

10.5.2.8.1

~~Automatic remote testing shall be permitted through a secure connection from authorized users.~~

10.5.2.8.2

~~Additional safety shutdowns shall be allowed if the controller overrides the shutdown and restarts in the event of a starting cause.~~

10.5.2.8.3

~~Remote stop shall be allowed if the controller overrides the stop signal and restarts in the event of a starting cause.~~

10.5.2.8.4

~~Upon starting a remote test, a watchdog timer shall be set to stop all remote testing operation and return the system to standby if it is not reset remotely and locally once every minute.~~

10.5.2.8.5

~~After 30 minutes, the controller shall stop all remote testing activities, even if still occurring, and return to standby mode.~~

10.5.2.8.1

Where automatic remote testing is conducted through a network, it shall be through a cybersecure network connection from authorized users.

10.5.2.8.1.1*

The equipment shall be evaluated for cybersecurity.

A.10.5.2.8.1.1

Examples of how the cybersecurity can be evaluated are:

- (1) The ISA Security Compliance Institute (ISCI) conformity assessment program
- (2) Certification of compliance by a nationally recognized test laboratory
- (3) Manufacturer certification for the specific type and brand of system provided

10.5.2.8.1.2

Documentation of compliance of the evaluation shall be made available upon request to the AHJ and those authorized to inspect, operate, and maintain the system.

10.5.2.8.2

Where automatic remote testing is conducted through a non-network, locally wired system, a cybersecurity evaluation shall not be required.

A.10.5.2.8.2

This allows for initiation of the remote testing from a contact closure or voltage signal.

10.5.2.8.3

Remote operation shall initiate the automatic testing in accordance with Section 10.5.2.7.

10.5.2.8.4

Remote stop shall be permitted only during the automatic testing sequence.

10.5.2.8.5*

Where a remote gateway is used for the network connection to the controller, the controller shall stop all remote testing operations and return the system to standby upon loss of connectivity.

A.10.5.2.8.5

Due to the importance of monitoring during a remote test, the minimum run timer (see 10.5.4.2.2) should be overridden, the pump stopped, valves reset, and all testing equipment should be reset back to the standby condition.

10.5.2.8.6

After 30 minutes, the controller shall automatically stop all remote testing activities, even if still occurring, and return to standby mode.

PC13 Second Revision for diesels

12.7.2.7 Automatic Testing.

12.7.2.7.1

The controller equipment shall be arranged to automatically start, run, and shutdown the engine at the minimum ~~no flow~~ test frequency and duration required by NFPA 25.

12.7.2.7.2

Performance of the automatic testing shall be recorded as a pressure drop indication on the pressure recorder. ~~(See 12.4.4)~~

12.7.2.7.3

A solenoid valve drain on the pressure control line shall be the initiating means.

12.7.2.7.4

~~The engine shall shutdown automatically on high engine temperature, low oil pressure, or high cooling water temperature if no other starting or running cause exists.~~

As a minimum, the engine shall shutdown automatically on the following if no other starting or running cause exists:

- 1) High engine temperature
- 2) Low oil pressure
- 3) High cooling water temperature
- 4) Overpressure
- 5) Leak detection
- 6) Low reservoir level (not required for no-flow testing)
- 7) Lowest permissible suction pressure (not required for no-flow testing)

12.7.2.7.5*

~~If after shutdown a starting cause occurs, the controller shall restart the engine and override the high engine temperature, low oil pressure, or high cooling water temperature shutdowns and run in accordance with 12.7.5.2.~~

If after shutdown a starting cause occurs, the controller shall restart the engine regardless of the shutdowns listed in 12.7.2.7.4 and run in accordance with 12.7.5.2.

A.12.7.2.7.5

A starting cause is any signal from the fire protection system that causes the controller to start. This could be a pressure drop, deluge valve contact opening, remote start signal, or manual pushbutton start.

12.7.2.7.6

In a non-pressure-actuated controller, the weekly test shall be permitted to be initiated by means other than a solenoid valve.

12.7.2.7.7

~~The controller shall use the opposite battery bank (every other bank) for cranking on subsequent weeks.~~[moved to 12.7.2.7.12]

Where a starting cause occurs during automatic testing, other than those initiated by the automatic testing sequence, the testing shall be terminated, the controller shall return to its automatic operation, and a visual and audible signal that can be silenced shall actuate.

12.7.2.7.8

A visual and audible signal that can be silenced shall actuate when the controller shuts down in accordance with 12.7.2.7.4.

12.7.2.7.9

During a no-flow test, the Pump Run remote contacts shall be permitted to be automatically disabled immediately prior to the test and enabled immediately after the test.

12.7.2.7.10

Local means in the controller shall be provided to cancel all automatic testing and to return to standby mode.

12.7.2.7.11

In addition to the requirements in 12.3.5.3.2, sensors or devices used for testing and monitoring shall be permitted to be field installed provided they do not affect the operation of the existing fire pump controller, subject to AHJ approval.

12.7.2.7.11.1

Sensors or devices shall not be connected between the fire pump controller and engine such that failure or removal of such device compromises the starting and running of the fire pump.

12.7.2.7.12

The controller shall use the opposite battery bank (every other bank) for cranking on subsequent weeks.

Also create the following associated Second Revisions:

12.3.5.3.3.1

Except as provided in 4.21.2.2 (1) or 12.7.2.8.4, remote shutdown or interlock to prevent normal operation shall not be permitted unless approved by the authority having jurisdiction.

Substantiation:

12.7.2.8.4 is added to 12.3.5.3.3.1 to allow remote stop during the 30 minute remote testing period.

12.4.1.2*

~~Visible indication shall be provided that the controller is in the automatic position. If the visible indicator is a pilot lamp, it shall be accessible for replacement.~~

Visible indication shall be provided for the following conditions:

- (1) The controller is in the automatic position
- (2) The engine is running

12.4.1.2.1

If the visual indicator is a pilot lamp, it shall be accessible for replacement.

Substantiation:

A visual indication of Engine Running is added so local personnel who may be onsite can quickly identify which pump is running when multiple pumps are in the same pump room and are being remotely tested.

12.4.1.4

(13) Leaks over 1/4 inch (6.4 mm) in depth in the pump room

(14) Pressures exceeding those for rated components

(15) Low reservoir level (not required for no-flow testing – see 12.7.2.7.4)

(16) Lowest permissible suction pressure (not required for no-flow testing – see 12.7.2.7.4)

Substantiation:

The additional trouble conditions monitored for automatic testing are added to the common trouble alarm for additional remote monitoring.

PC14 Second Revision for diesels

12.7.2.8 Automatic Remote Testing.

12.7.2.8.1

Where automatic remote testing is conducted through a network, it shall be through a cybersecure network connection from authorized users.

12.7.2.8.1.1*

The equipment shall be evaluated for cybersecurity.

A.12.7.2.8.1.1

Examples of how the cybersecurity can be evaluated are:

- (1) The ISA Security Compliance Institute (ISCI) conformity assessment program
- (2) Certification of compliance by a nationally recognized test laboratory
- (3) Manufacturer certification for the specific type and brand of system provided

12.7.2.8.1.2

Documentation of compliance of the evaluation shall be made available upon request to the AHJ and those authorized to inspect, operate, and maintain the system.

12.7.2.8.2

Where automatic remote testing is conducted through a non-network, locally wired system, a cybersecurity evaluation shall not be required.

A.12.7.2.8.2

This allows for initiation of the remote testing from a contact closure or voltage signal.

12.7.2.8.3

Remote operation shall initiate the automatic testing in accordance with Section 12.7.2.7.

12.7.2.8.4

Remote stop shall be permitted only during the automatic testing sequence.

12.7.2.8.5*

Where a remote gateway is used for the network connection to the controller, the controller shall stop all remote testing operations and return the system to standby upon loss of connectivity.

A.12.7.2.8.5

Due to the importance of monitoring during a remote test, the minimum run timer (see 12.7.5.2.2) should be overridden, the pump stopped, valves reset, and all testing equipment should be reset back to the standby condition.

10.5.2.8.6

After 30 minutes, the controller shall automatically stop all remote testing activities, even if still occurring, and return to standby mode.

Section	PC	PAGE	DISPOSITION – Also reviewed by TG2
8.4.6.1	4		<u>Task Group 4 moves to Reject with following statement</u>
Proposed Text (PC)	8.4.6.1 Where a redundant motor and pump are provided to satisfy the requirement in 8.4.6(2), the following shall apply: <u>1.</u> Load isolation in accordance with 10.10.4 shall not be required for the variable speed pump. <u>4.2.</u> <u>The line isolation requirements of 10.10.4 shall not be required on the variable speed pump when the VFD meets the surge protection requirements as per EN/IEC 61000-4-5 and the pump controller, including the VFD, has surge protection according to 10.4.1.</u> <u>2.3.</u> Circuit protection in accordance with 10.10.5.1 shall be provided between the line side of the variable speed drive and the load side of the isolating switch. <u>3.4.</u> If the isolating switch required by 10.4.2 has self-protecting instantaneous short-circuit overcurrent protection, the circuit protection required by 10.10.5.2 shall be coordinated such that the isolating switch does not trip due to a fault condition in the variable speed drive.		
Committee Text (SR)			
Statement	<u>A drive may be compliant with this IEC standard but not compliant with it in all power configurations. A corner grounded Delta power supply or a high resistance grounded power supply may invalidate the surge protection feature in the ASD, even though the drive was "compliant" with this EMC surge protection standard. Twenty years of NFPA 20 history with VFD isolation has been extremely successful at preventing VFD damage due to spikes and surges.</u>		

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Section	PC	PAGE	DISPOSITION – Also reviewed by TG2
8.4.6.1	33		<u>Task Group 4 moves to Reject with following statement</u>
Proposed Text (PC)	~~8.4.6.1~~ ~~Where a redundant motor and pump are provided to satisfy the requirement in 8.4.6(2), the following shall apply:~~ ~~1. Load isolation in accordance with 10.10.4 shall not be required for the variable speed pump.~~ ~~2. Circuit protection in accordance with 10.10.5.1 shall be provided between the line side of the variable speed drive and the load side of the isolating switch.~~ ~~3. If the isolating switch required by 10.4.2 has self-protecting instantaneous short circuit overcurrent protection, the circuit protection required by 10.10.5.2 shall be coordinated such that the isolating switch does not trip due to a fault condition in the variable speed drive.~~		
Committee Text (SR)			
Statement	<u>The requirements specific to WMPDPU should be contained in Chapter 8 even if they are electrical related to clarify that the requirements only apply to WMPDPU.</u>		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG2
New 8.4.14	3		<u>Task Group 4 moves to Reject with following statement</u>
Proposed Text (PC)	<u>8.4.14</u> <u>For WMPDPU's that are having redundancy to start a motor and pump manually in case of any single failure, the requirements in chapter 10.5.3.2.1 shall not apply and following requirements shall apply:</u>		

Commented [BP1]: Review language and grammar. If you agree with this section, recommend renumbering to 8.4.13

Commented [BP2]: Two shall statements

	8.4.14.1 The controller shall be equipped with an emergency-run switches, one per motor, that allows maximum amount of motors and pumps to start. 8.4.14.1.1 Maximum allowed motor amount to start, shall be marker or labeled next to emergency run switches. 8.4.14.2 The operating handles shall be marked or labeled as to function and operation.
Committee Text (SR)	Manual mechanical operation provides additional reliable opportunities during fire fighting to run the WMPDPU when all electrical means fails.
Statement	

Section	PC	PAGE	DISPOSITION – Also reviewed by TG2
New 8.4.15	2		Task Group 4 moves to Reject with following statement
Proposed Text (PC)	8.4.15 Locked Rotor Overcurrent Protection requirements in 10.4.4. shall not be applicable to water mist positive displacement pumping unit that is equipped with a redundant motor and pump. 8.4.15.1 The overcurrent protective device shall be required and permitted between the isolating switch and the fire pump motor. 8.4.15.2 The overcurrent device shall be located within the fire pump controller. 8.4.15.3 For a squirrel-cage or wound-rotor induction motor, the device shall be of the time-delay type having tripping times between 8		

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	<u>seconds and 12 seconds at locked rotor current</u> <u>8.4.15.4 It shall be possible to reset the device for operation immediately after tripping, with the tripping characteristics thereafter remaining unchanged.</u> <u>8.4.15.5 Tripping shall comply with both of the following:</u> <u>(a) Tripping shall be accomplished by opening the circuit breaker.</u> <u>(b) The circuit breaker shall be of the external manual reset type.</u> <u>8.4.15.6 In case a motor is isolated by the tripped overcurrent protective device, the redundant motor be started to compensate the lost capacity, according to the performance requirements as stated in 8.4.4</u>
Committee Text (SR)	
Statement	<u>There is no substantial operational difference between the WMPDPU and a centrifugal fire pump with regards to single phase running to have an exception for the 300% requirement. These pumps will still provide some fire protection value if already running and running at light loads. The 300% requirement accounts for single phase running. A single phase condition is likely to affect all of the motors and controls at one time.</u>

Section	PC	PAGE	DISPOSITION – Also reviewed by TG7
14.2.6.6.11.1	25		<u>Accept - Create a 2nd revision using PC 25</u>
Proposed Text (PC)	14.2.6.6.11.1 For water mist positive displacement pumping units, the automatic activation test shall be carried out by using a test connection that simulates the smallest system nozzle, in the hydraulically most remote area, discharged from maintenance pressure/standby pressure or <u>equal-sized</u> test orifice in the pump <u>unit</u> test <u>line</u> header that is		

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	<u>designed to simulate the system pressure decay associated with the smallest nozzle at the most hydraulically remote area.</u>
Committee Text (SR)	<u>14.2.6.6.11.1</u> <u>For water mist positive displacement pumping units, the automatic activation test shall be carried out by using a test connection that simulates the smallest system nozzle, in the hydraulically most remote area, discharged from maintenance pressure/standby pressure or a test orifice in the pump test header that is designed to simulate the system pressure decay associated with the smallest nozzle at the most hydraulically remote area.</u>
Statement	<u>PC 25 proposed language provides a more exact and clearer definition of the equal sized test orifice language used in the current standard.</u>

Section	PC	PAGE	DISPOSITION
<u>8.4.2</u>			<u>2nd revision</u>
Proposed Text (PC)			
Committee Text (SR)	8.4.2 Expect as provided in 8.4.3 through 8.4. ~~44~~ <u>12</u> , all the requirements of this standard shall apply		
Statement	<u>Correcting reference paragraphs that were not updated in the first revision report</u>		

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Section	PC	PAGE	DISPOSITION
<u>8.4.13</u>	<u>5</u>		<u>Reject</u>
Proposed Text (PC)	<u>1. New section after 8.4.12.</u>		

	<u>A smaller orifice than 3/32" (2.4mm) shall be allowed for WMPDPU when the pressure sensing line has a reverse check valve with the drilling.</u> <u>2. New section after 8.4.12.</u> <u>The drilling size requirement to have a 3/32" (2.4mm) hole in chapters 4.32.4.1 and 4.32.4.2 shall not apply to WMPDPU when the pressure sensing line has a reverse check valve with the drilling.</u>
Committee Text (SR)	
Statement	<u>Committee is aware of the potential concern that the 3/32" hole size creates for high pressure systems, however the requirement cannot be eliminated without including a revised minimum diameter.</u>

Section	PC	PAGE	DISPOSITION
Proposed Text (PC)			
Committee Text (SR)			
Statement			

Section	PC	PAGE	DISPOSITION
Proposed Text (PC)			
Committee Text (SR)			
Statement			

Section	PC	PAGE	DISPOSITION
11.2.4.2.3.4(B)	18		Move to create a second revision based on PC #18 with the following changes to the text.
Proposed Text (PC)	(B) Where <u>the equipment is located outside, or where other</u> special environments exist, rated enclosures suitable for the environments shall be used.		
Committee Text (SR)	Where special environments exist <u>as defined by NEMA 250</u> , rated enclosures suitable for the environments shall be used.		
Statement	Task group felt that the text as it was written as well as was proposed still left room for local interpretation. Adding a reference to NEMA 250 (Enclosures for Electrical Equipment – 1000V Maximum) would provide specific examples and their corresponding required enclosure rating. We feel that this also addresses the concern raised in the PC.		

Section	PC	PAGE	DISPOSITION
Proposed Text (PC)			
Committee Text (SR)			
Statement			

Section	PC	PAGE	DISPOSITION – Also reviewed by TG1
New 4.3.4	22 and 23		Move to Reject PC 22 and PC 23. (Defer to TG 1)
Proposed Text (PC)	<u>4.3.4* Startup or Service Personnel Qualifications.</u> <u>4.3.4.1</u> <u>Startup or Service personnel shall be factory trained and certified by the manufacture of the equipment to be started or serviced or be directly supervised by the manufacture during the startup or service event.</u> <u>4.3.4.2</u> <u>The factory training and certification shall be for the specific type and brand of equipment.</u> <u>A.4.3.4</u> <u>Service personnel should be able to:</u> <u>1. Understand equipment-specific requirements, such as programming, application, and compatibility of the equipment being serviced.</u> <u>2. Understand the use of meters and test equipment required for the service to be performed.</u> <u>3. Understand basic job site safety rules and requirements of NFPA 70E.</u>		
Committee Text (SR)			
Statement	The qualifications for startup and service personnel are adequately addressed in Chapter 14 and it is not necessary to reinsert this language that was removed during first draft.		

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Section	PC	PAGE	DISPOSITION
14.2.1	N/A		Move to Create a SR
Proposed Text (PC)			
Committee Text (SR)	14.2.1* The pump manufacturer, the engine manufacturer (when supplied), the controller manufacturer, and the transfer switch manufacturer (when supplied) or their factory-authorized representatives shall be present for the field acceptance test. (See Section 4.4.)		
Statement	The reference to section 4.4 was deleted as that section was removed during the first draft stage.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG2
10.5.2.8	14		Move to Create a SR based on PC 14 (Reject but see)
Proposed Text (PC)	See word document Chapter_10_10_5_2_8_PC-14.docx		
Committee Text (SR)	See word document Chapter_10_10_5_2_8_PC-14_TG 7.docx		
Statement	The section on remote automatic testing was revised for clarity and to reference cybersecurity requirements in accordance with NFPA 70. Additionally examples specific events requiring additional safety shutdowns were provided in the annex.		

Section	PC	PAGE	DISPOSITION – Also reviewed by TG4
14.2.6.6.11.1	25		Move to Reject but Hold
Proposed Text (PC)	14.2.6.6.11.1		

	For water mist positive displacement pumping units, the automatic activation test shall be carried out by using a test connection that simulates the smallest system nozzle, in the hydraulically most remote area, discharged from maintenance pressure/standby pressure or a test orifice in the pump test header that is designed to simulate the system pressure decay associated with the smallest nozzle at the most hydraulically remote area.
Committee Text (SR)	
Statement	A related action from the first draft stage was not identified and this proposal should be considered during the next revision cycle.

Section	PC	PAGE	DISPOSITION – Also reviewed by TG2
14.2.6.7.1.1	15		Move to create a SR based on PC 15 (Reject but See)
Proposed Text (PC)	14.2.6.7.1.1		~~Where service factor amperes are not provided, the product of the motor full load amperes from Table 430.248 or 430.250 of NFPA 70 times the allowable service factor shall not be exceeded.~~
Committee Text (SR)	14.2.6.7.1.1		~~Where service factor amperes are not provided, the product of the motor full load amperes from Table 430.248 or 430.250 of NFPA 70 times the allowable service factor shall not be exceeded.~~
Statement			The motor full-load ampere tables from the NEC are for branch circuit protection and not representative of actual Service Factor amps.

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Commented [BP3]: Recommend also deleting the section number.

Section	PC	PAGE	DISPOSITION
14.2.6.7.2.1	20		Move to Accept PC 20
Proposed Text (PC)	~~14.2.6.7.2.1—~~ ~~Where service factor amperes are not provided, the product of the rated voltage and motor full-load amperes from Table 430.248 or 430.250 of NFPA 70 times the allowable service factor shall not be exceeded.~~		
Committee Text (SR)			
Statement	The motor full-load ampere tables from the NEC are for branch circuit protection and not representative of actual Service Factor amps.		

Section	PC	PAGE	DISPOSITION
A.14.2.6	24		Move to Reject PC 24
Proposed Text (PC)	See word document Annex_A_A_14_2_6_PC-24.docx Only revision is A.14.2.6(4)(f)(v) – ‘stop’ to ‘reset’		
Committee Text (SR)			
Statement	The reference to “fire pump stop” is appropriate given the context of the annex note for fire pump settings for cut in and cut out pressures.		

10.5.2.8 Remote Automatic Testing.
10.5.2.8.1*

~~Remote A~~automatic ~~remote~~-testing shall be permitted through a secure connection from authorized users.

~~A.10.5.2.8.1~~
~~For cybersecurity requirements for life safety equipment, see NFPA 70, 110.3(A)(8).~~

10.5.2.8.2 *

Additional safety shutdowns shall be allowed if the controller overrides the shutdown and restarts in the event of a starting cause.

~~A.10.5.2.8.2.1~~Additional safety shutdowns should be considered if any of the following events occur:.

- ~~(1) (1) Overload of 120 percent of full load amperes exceeded for 12 seconds;~~
- ~~(2) (2) Reversed phase rotation;~~
- ~~(3) (3) Overpressure~~
- ~~(4) (4) Single phasing~~

10.5.2.8.3

Remote stop shall only be allowed only if the controller overrides the ~~remote~~ stop signal and restarts in the event of a starting cause.

10.5.2.8.4

Upon starting a remote test, a ~~watchdog~~-timer shall be set to stop all remote testing operations and return the system to standby if it is not reset remotely and locally once every minute.

10.5.2.8.5

After 30 minutes, the controller shall automatically stop all remote testing activities, even if still occurring, and return to standby mode.

~~10.5.2.8.6~~
~~Personnel trained to immediately disable the remote automatic test sequence, if necessary, shall be present within sight of both the controller and the fire pump.~~
~~10.5.2.8.7~~
~~Local means shall be provided to cancel all testing and to return to standby mode.~~

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Section	PC	PAGE	DISPOSITION
3.3.49.4	N/A	N/A	Move to create a Second Revision
Proposed Text (PC)			
Committee Text (SR)	3.3.49.4 Rated Pressure. <u>For fire pumps, the</u> net pressure (differential pressure) at rated flow and rated speed as marked on the manufacturer's nameplate.		
Statement	The definition was clarified as "rated pressure" is a term used for multiple devices and this definition is specific to fire pumps. When "rated pressure" is referenced for devices other than fire pumps, the term should be applied using its ordinarily accepted meaning within the context in which it is used.		

Section	PC	PAGE	DISPOSITION
Global	N/A	N/A	Move to create a Global Second Revision
Proposed Text (PI)			
Committee Text (SR)	Revise all sections referencing the rated pressure of controllers to state "the controller's maximum rated pressure" See attachment "TG-Pressure_Fire Pump Controller Rating Global SR.docx"		
Statement	The phrasing for the controller's rated pressure was modified to distinguish the difference between the definition of "rated pressure" for fire pumps and the intended application of the maximum rated pressure for controller controllers and other devices.		

10.1.2.5.1

All controllers shall be marked “Electric Fire Pump Controller” and show plainly the name of the manufacturer, identifying designation, controller’s maximum rated pressure, enclosure type designation, and complete electrical rating.

10.5.2.1.3.1*

Where the electronic pressure sensor reading exceeds the higher of 10 psi (0.68 bar) or 3.33 percent of the ~~maximum~~-controller’s maximum rated pressure during any automatic pump start that was initiated by the solenoid drain valve, as required by 10.5.2.7.3, the controller shall activate a visual and audible signal that can be silenced.

10.5.2.1.6

The pressure-sensing device shall be capable of withstanding a momentary surge pressure of 400 psi (27.6 bar) or 133 percent of fire pump controller’s maximum ~~controller~~-rated pressure, whichever is higher, without losing its accuracy.

10.5.2.1.8.5

The pressure-sensing element of the recorder shall be capable of withstanding a momentary surge pressure of at least 400 psi (27.6 bar) or 133 percent of ~~the fire pump~~-controller’s maximum rated ~~operating~~ pressure, whichever is greater, without losing its accuracy.

10.7.2.1

In lieu of 10.1.2.5.1, each controller shall be marked “Limited Service Controller” and show plainly the name of the manufacturer, the identifying designation, the controller’s maximum rated pressure, the enclosure type designation, and the complete electrical rating.

12.1.3.3.1

All controllers shall be marked “Diesel Engine Fire Pump Controller” and show plainly the name of the manufacturer, identifying designation, controller’s maximum rated pressure, enclosure type designation, and complete electrical rating.

12.4.4.3

The pressure-sensing element of the recorder shall be capable of withstanding a momentary surge pressure of at least 400 psi (27.6 bar) or 133 percent of ~~the fire pump~~-controller’s maximum rated ~~operating~~ pressure, whichever is greater, without losing its accuracy.

12.7.2.1.3.1*

Where the electronic pressure sensor reading exceeds the higher of 10 psi (0.68 bar) or 3.33 percent of the ~~maximum~~-controller’s maximum rated pressure during any automatic pump start that was initiated by the solenoid drain valve, as required by 12.7.2.7.3, the controller shall activate a visual and audible signal that can be silenced.

12.7.2.1.6

The pressure-sensing element of the recorder shall be capable of withstanding a momentary surge pressure of at least 400 psi (27.6 bar) or 133 percent of ~~the fire pump~~-controller’s maximum rated ~~operating~~ pressure, whichever is greater, without losing its accuracy.