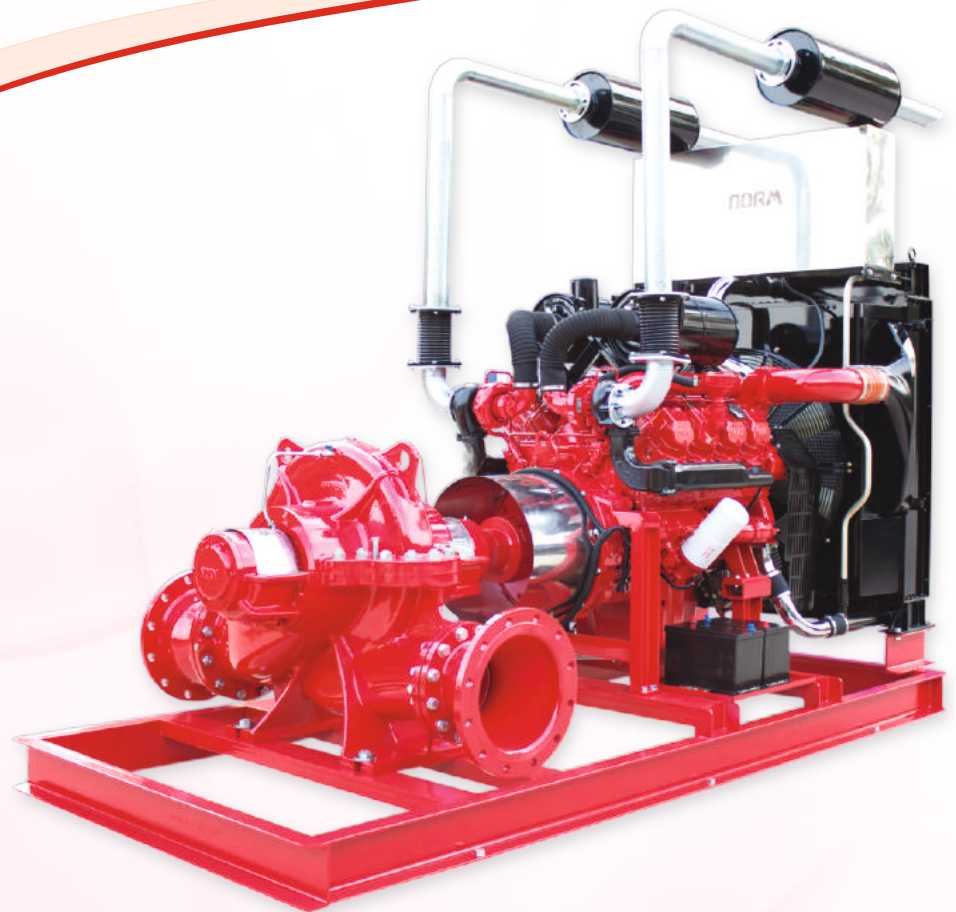


# NORM®

NFPA 20'ye uygun



**Fire Pumps**  
**Fire Pump Groups**  
**Fire Booster Sets**



**NORMA®**



## What is NFPA?

NFPA (National Fire Protection Association) is fire protection institution having worldwide accepted standards. This institution is the organization that is setting and the publishing the standards of issues effecting fire and fire safety which are applied worldwide. NORM Pompa is a member of NFPA and is constantly monitoring the studies and publications of NFPA. Norm Series Pumps are manufactured according to the standards of NFPA for two important reasons.

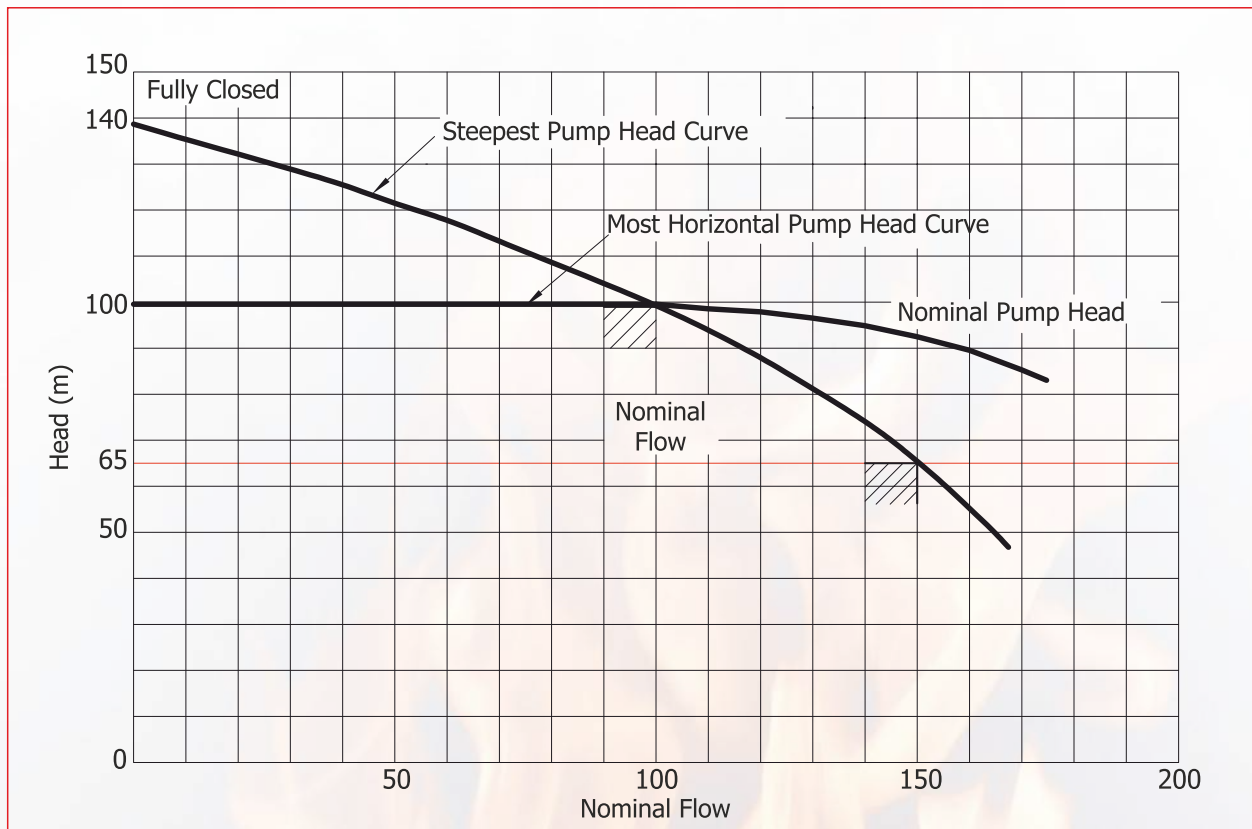
NFPA standards are the world's most widely used and which has the most severe conditions, especially in the pump systems.

- In our country, almost all technological systems, mainly watered fire extinguishing systems such as automatic sprinklers, indoor fire fighting and outdoor fire hydrant systems are designed according to NFPA standards. In terms of holistic approach as a general rule if a system is designed according to any standard, where the performance characteristics of the products to be used in that system must comply with the same standards. In the opposite case it's inevitable that a mismatch occurs between product and design. Since 3S Series Pumps are in accordance with NFPA, with aqueous fire fighting systems designed according to NFPA standards (automatic sprinklers, fire hose cabinet for indoor, outdoor hydrants, pressure spray and foam systems) can be used in full compliance.

In addition, insurance companies refuse to take risks and do not lower the fire insurance policy costs without detecting that the fire fighting systems are designed in accordance with NFPA standards and the fire pumps and selected groups are in accordance with NFPA 20.

## What is NFPA 20 Standard?

NFPA 20 (Standard for the Installation of Centrifugal Fire Pumps) is the fire pump standard of NFPA that is a standard for setting the performances and installation rules of fire pumps and pump assembly, motor control systems and the characteristics of the auxiliary parts that should be used.



## Features of Fire Pumps In Accordance with NFPA 20

### What are the Features of Fire Pumps In Accordance with NFPA 20?

NFPA has brought a standard; due to the special importance of fire pumps, as well as performance characteristics and the required material properties. The conformity of a fire pump to NFPA 20 requires the fulfillment of these conditions. When these are features are considered it is apparent that there are very serious differences between the general purpose pumps and fire pumps. Fire pumps are designed **in order to provide maximum reliability and additional outlet pressure value** throughout the entire operational life. The design criteria in general purpose pumps are the maximum efficiency and economic operating feature.

# FIRE PUMPS

## Features of NORM Pump and Fire Groups In Accordance with NFPA 20:

- There is a separate control panel for each pump.
- At zero flow, the pressure does not exceed 1.4 times of nominal value.
- At 1.5 x nominal flow, it does not drop to values of less than 0.65 of the nominal pressure.
- Speeds are less than 3 m/s in the suction pipe.
- Mounting in bearings should be carried out with bearings of least 5,000 hours of service life.
- Pump impeller: Bronze
- Pump shaft: AISI 316 or AISI 304
- Pump housing: GG-25 cast iron
- Sealing: With five turns of soft seal or mechanical seal.
- Service factor of electric motors (overload factor) should not exceed 1.15.
- Flanges are produced in conformance to EN 1092 - PN 16.

## Pump Equipment

- Automatic air relief valve (suction)
- Body cooling valve
- Convergent, divergent spacers in order to reduce the speed
- Pressure gauges in inlet and outlet
- Leaking valve against freezing
- Flexible coupling

(GPM)	(l/m)	(m <sup>3</sup> /h)
25	95	5,7
50	189	11,4
100	379	22,7
150	568	34,1
200	757	45,4
250	946	56,8
300	1136	68,1
400	1514	91
450	1703	102
500	1892	114
750	2893	170
1000	3785	227
1250	4731	284
1500	5677	341
2000	7570	454
2500	9462	568
3000	11355	681
3500	13247	795
4000	15140	908
5000	18925	1136

According to NFPA 20 the nominal flow of fire pumps can not be different from the values on the side.

Pump head of the fire pumps are not specified in NFPA 20. Provision of different pressures depending on the design of the firefighting system may be desirable.

Recommended **nominal pressures are** 30- 40 - 50 - 60 - 70 - 80 - 90 - 100 - 110 - 120 - 130 - 140 (m).

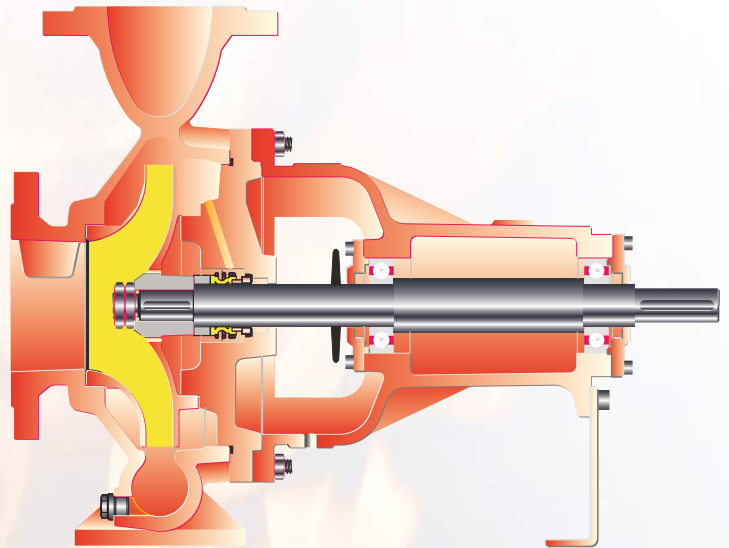
Fire pumps and groups that are manufactured by 3S POMPA manufacturing in accordance with NFPA 20 but they are not listed.

### "REGULATION WITH REGARD TO THE PROTECTION OF BUILDINGS AGAINST FIRE"

**Dated 09.09.2009 - No. 27344**

- Fire pumps provided that the desired pressure value is met, 130% of the nominal flow can be utilized for capacity demands of the system.
- If a pump is used in the system there must be a backup pump with the same capacity.
- If there are more than one pump, sufficient number of spare pumps will be used where at least 50% of the total capacity is backed up.

## END SUCTION FIRE PUMPS



### NOMINAL FLOW

### NOMINAL PRESSURES (m)

### MOTORS

50 gpm/11.4 m <sup>3</sup> /h	1000 gpm/227 m <sup>3</sup> /h
100 gpm/22.7 m <sup>3</sup> /h	1250 gpm/284 m <sup>3</sup> /h
150 gpm/34.1 m <sup>3</sup> /h	1500 gpm/341 m <sup>3</sup> /h
200 gpm/45.4 m <sup>3</sup> /h	2000 gpm/454 m <sup>3</sup> /h
250 gpm/56.8 m <sup>3</sup> /h	2500 gpm/568 m <sup>3</sup> /h
300 gpm/68.1 m <sup>3</sup> /h	3000 gpm/681 m <sup>3</sup> /h
400 gpm/91 m <sup>3</sup> /h	3500 gpm/795 m <sup>3</sup> /h
450 gpm/102 m <sup>3</sup> /h	4000 gpm/908 m <sup>3</sup> /h
500 gpm/114 m <sup>3</sup> /h	4500 gpm/1022 m <sup>3</sup> /h
750 gpm/170 m <sup>3</sup> /h	

30
40
50
60
70
80
90
100
110
120
130

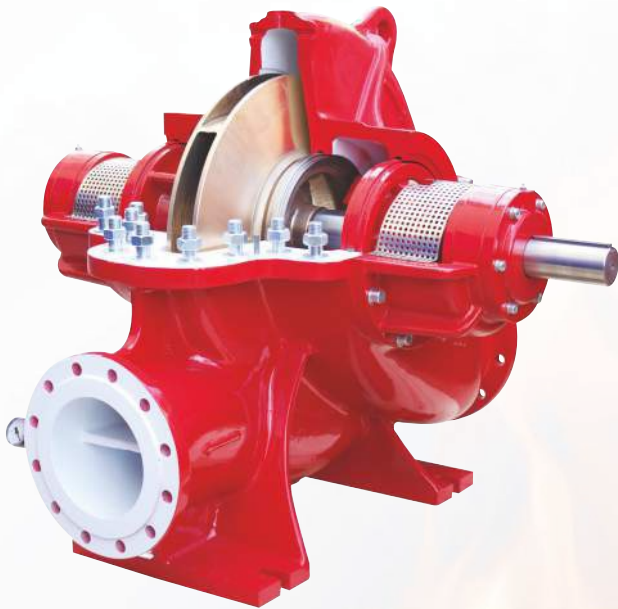
- Electrical motors
- Electrical motors in accordance with NFPA
- Diesel motors
- Diesel motors in accordance with NFPA

## END SUCTION FIRE PUMPS

### FSNSP Type End Suction Fire Pump Selection Table

FLOW		PUMP HEAD												
gpm	l/m	m <sup>3</sup> /h	30	40	50	60	70	80	90	100	110	120	130	
25	95	5,7	32/160 3 kW-2900 d/d	32/160 4 kW-2900 d/d	32/200 5,5 kW-2900 d/d	32/200 7,5 kW-2900 d/d	32/250 11 kW-2900 d/d	32/250 11 kW-2900 d/d	32/250 11 kW-2900 d/d	32/300 18,5 kW-2900 d/d	32/300 18,5 kW-2900 d/d	32/300 18,5 kW-2900 d/d		
50	189	11,4	32/160 3 kW-2900 d/d	32/160 4 kW-2900 d/d	32/200 7,5 kW-2900 d/d	32/200 11 kW-2900 d/d	40/250 15 kW-2900 d/d	40/250 15 kW-2900 d/d	40/250 15 kW-2900 d/d	40/250 18,5 kW-2900 d/d	32/300 18,5 kW-2900 d/d	32/300 18,5 kW-2900 d/d		
100	379	22,7	40/125 4 kW-2900 d/d	32/160 5,5 kW-2900 d/d	32/200 7,5 kW-2900 d/d	40/200 11 kW-2900 d/d	40/250 11 kW-2900 d/d	40/250 11 kW-2900 d/d	40/250 11 kW-2900 d/d	40/250 C 30 kW-2900 d/d	50/300 30 kW-2900 d/d	50/315 37 kW-2900 d/d		
150	568	34,1	50/160 7,5 kW-2900 d/d	50/160 11 kW-2900 d/d	50/200 11 kW-2900 d/d	50/200 15 kW-2900 d/d	40/250 C 18,5 kW-2900 d/d	40/250 C 18,5 kW-2900 d/d	40/250 C 18,5 kW-2900 d/d	40/250 C 22 kW-2900 d/d	50/300 30 kW-2900 d/d	50/315 37 kW-2900 d/d		
200	757	45,4	65/160 11 kW-2900 d/d	50/160 11 kW-2900 d/d	50/200 15 kW-2900 d/d	50/200 15 kW-2900 d/d	50/250 22 kW-2900 d/d	50/250 22 kW-2900 d/d	50/250 22 kW-2900 d/d	50/300 30 kW-2900 d/d	50/300 30 kW-2900 d/d	50/315 37 kW-2900 d/d		
250	946	56,8	65/160 11 kW-2900 d/d	65/160 15 kW-2900 d/d	65/200 18,5 kW-2900 d/d	50/200 18,5 kW-2900 d/d	50/250 22 kW-2900 d/d	50/250 22 kW-2900 d/d	50/250 22 kW-2900 d/d	50/300 37 kW-2900 d/d	50/300 45 kW-2900 d/d	50/315 45 kW-2900 d/d		
300	1136	68,1	65/160 11 kW-2900 d/d	65/160 15 kW-2900 d/d	65/200 18,5 kW-2900 d/d	65/200 22 kW-2900 d/d	50/250 30 kW-2900 d/d	50/250 30 kW-2900 d/d	50/250 30 kW-2900 d/d	65/300 45 kW-2900 d/d	65/300 55 kW-2900 d/d	65/315 55 kW-2900 d/d		
400	1514	91	80/160 15 kW-2900 d/d	80/160 18,5 kW-2900 d/d	65/200 22 kW-2900 d/d	65/200 30 kW-2900 d/d	65/250 37 kW-2900 d/d	65/250 37 kW-2900 d/d	65/250 37 kW-2900 d/d	65/300 55 kW-2900 d/d	65/300 55 kW-2900 d/d	65/315 55 kW-2900 d/d		
450	1703	102	80/160 15 kW-2900 d/d	80/160 18,5 kW-2900 d/d	65/200 30 kW-2900 d/d	65/200 30 kW-2900 d/d	80/250 37 kW-2900 d/d	80/250 37 kW-2900 d/d	80/250 37 kW-2900 d/d	80/250 55 kW-2900 d/d	80/300 75 kW-2900 d/d	80/315 75 kW-2900 d/d		
500	1892	114	80/315 15 kW-1450 d/d	80/160 22 kW-2900 d/d	80/200 30 kW-2900 d/d	65/200 37 kW-2900 d/d	80/250 45 kW-2900 d/d	80/250 45 kW-2900 d/d	80/250 45 kW-2900 d/d	80/250 55 kW-2900 d/d	80/300 75 kW-2900 d/d	80/315 90 kW-2900 d/d		
750	2893	170	125/315 30 kW-1450 d/d	100/200 30 kW-2900 d/d	100/200 37 kW-2900 d/d	80/200 55 kW-2900 d/d	100/250 75 kW-2900 d/d	100/250 75 kW-2900 d/d	100/250 75 kW-2900 d/d	100/250 90 kW-2900 d/d	80/300 90 kW-2900 d/d	80/315 90 kW-2900 d/d		
1000	3785	227	150/315 30 kW-1450 d/d	100/160 45 kW-2900 d/d	100/200 45 kW-2900 d/d	150/400 75 kW-1450 d/d	100/250 90 kW-2900 d/d	100/250 90 kW-2900 d/d	100/250 110 kW-2900 d/d	80/300 90 kW-2900 d/d	80/300 90 kW-2900 d/d	80/315 90 kW-2900 d/d		
1250	4731	284	150/315 37 kW-2900 d/d	150/400 55 kW-1450 d/d	125/200 75 kW-2900 d/d	150/400 75 kW-1450 d/d	150/500 110 kW-1450 d/d	150/500 110 kW-1450 d/d	150/500 132 kW-1450 d/d	100/300 132 kW-2900 d/d	100/300 132 kW-2900 d/d	100/315 160 kW-2900 d/d		
1500	5677	341	200/315 55 kW-1450 d/d	200/400 75 kW-1450 d/d	150/400 75 kW-1450 d/d	150/400 90 kW-1450 d/d	150/500 132 kW-1450 d/d	150/500 132 kW-1450 d/d	150/500 160 kW-1450 d/d					
2000	7570	454	200/315 75 kW-1450 d/d	200/400 90 kW-1450 d/d	200/400 110 kW-1450 d/d		200/500 200 kW-1450 d/d	200/500 200 kW-1450 d/d	200/500 200 kW-1450 d/d					
2500	9462	568	200/315 90 kW-1450 d/d	250/400 110 kW-1450 d/d	250/400 160 kW-1450 d/d	250/500 200 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 315 kW-1450 d/d					
3000	11355	681		250/400 132 kW-1450 d/d	250/400 160 kW-1450 d/d	250/500 200 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 315 kW-1450 d/d					
3500	13247	795		250/400 132 kW-1450 d/d	250/500 200 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 315 kW-1450 d/d	250/500 355 kW-1450 d/d					
4000	15140	908			250/500 200 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 250 kW-1450 d/d	250/500 315 kW-1450 d/d	250/500 400 kW-1450 d/d					
4500	17032	1022				250/500 315 kW-1450 d/d	250/500 315 kW-1450 d/d	250/500 355 kW-1450 d/d	250/500 400 kW-1450 d/d					

## HORIZONTAL SHAFT / DOUBLE ENTRY SPLIT CASE FIRE PUMPS



### NOMINAL FLOW

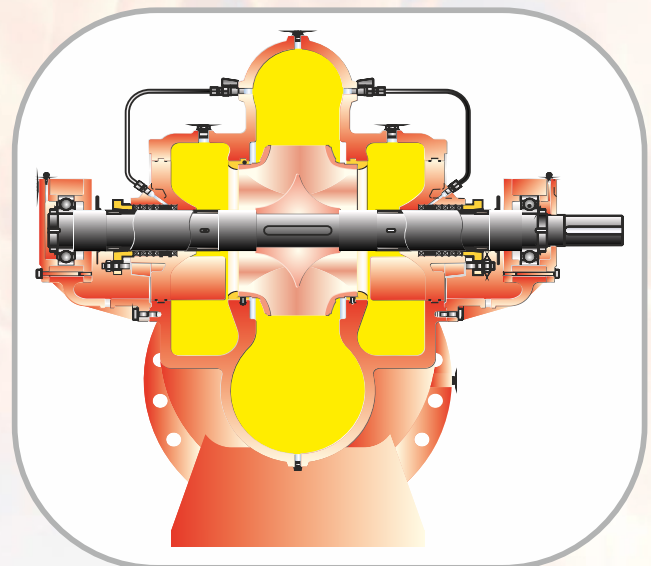
400 gpm/91 m<sup>3</sup>/h  
 500 gpm/114 m<sup>3</sup>/h  
 750 gpm/170 m<sup>3</sup>/h  
 1000 gpm/227 m<sup>3</sup>/h  
 1250 gpm/284 m<sup>3</sup>/h  
 1500 gpm/341 m<sup>3</sup>/h  
 2000 gpm/454 m<sup>3</sup>/h  
 3000 gpm/681 m<sup>3</sup>/h  
 3500 gpm/795 m<sup>3</sup>/h

### NOMINAL PRESSURES (m)

50  
 60  
 70  
 80  
 90  
 100  
 110  
 120  
 140

### MOTORS

- Electric motors
- Electric motors in accordance with NFPA 20
- Diesel motors
- Diesel motors in accordance with NFPA 20



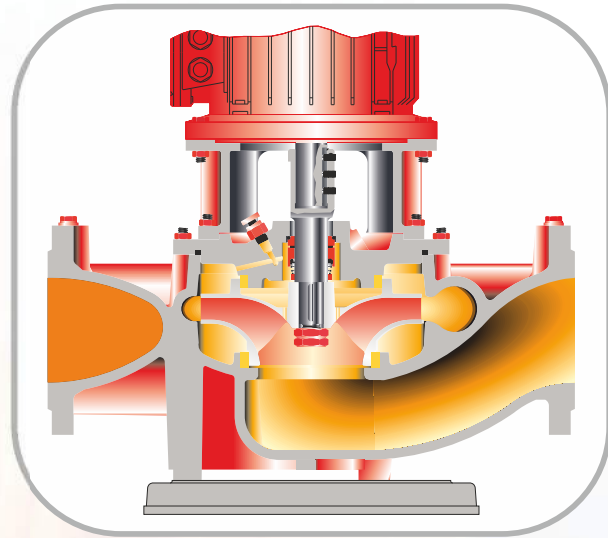


## HORIZONTAL SHAFT / DOUBLE SUCTION SPLIT CASE FIRE PUMPS

**SNDS Type Horizontal Shaft / Double Suction / Split Body Fire Pump Selection Table**

FLOW		PUMP HEAD												
gpm	l/m	30	40	50	60	70	80	90	100	110	120	140		
400	1514	91			65/250 37 kW-2900 d/d	65/250 37 kW-2900 d/d	65/250 45 kW-2900 d/d	65/250 45 kW-2900 d/d	65/250 55 kW-2900 d/d	65/250 75 kW-2900 d/d	65/250 75 kW-2900 d/d			
450	1703	102			65/250 37 kW-2900 d/d	65/250 45 kW-2900 d/d	65/250 45 kW-2900 d/d	65/250 55 kW-2900 d/d	65/250 75 kW-2900 d/d	65/250 75 kW-2900 d/d				
500	1892	114			65/250 37 kW-2900 d/d	65/250 45 kW-2900 d/d	65/250 55 kW-2900 d/d	65/250 55 kW-2900 d/d	65/250 75 kW-2900 d/d	65/250 75 kW-2900 d/d	80/315 90 kW-2900 d/d	80/315 110 kW-2900 d/d		
750	2893	170			80/250 55 kW-2900 d/d	80/250 55 kW-2900 d/d	80/250 75 kW-2900 d/d	80/250 75 kW-2900 d/d	80/250 90 kW-2900 d/d	80/250 90 kW-2900 d/d	80/315 110 kW-2900 d/d	80/315 132 kW-2900 d/d		
1000	3785	227			100/250 75 kW-2900 d/d	100/250 75 kW-2900 d/d	100/250 90 kW-2900 d/d	100/250 110 kW-2900 d/d	100/250 110 kW-2900 d/d	100/250 132 kW-2900 d/d	80/315 132 kW-2900 d/d	80/315 160 kW-2900 d/d		
1250	4731	284			100/250 75 kW-2900 d/d	100/250 90 kW-2900 d/d	100/250 110 kW-2900 d/d	100/250 132 kW-2900 d/d	100/250 132 kW-2900 d/d	100/250 160 kW-2900 d/d	100/250 160 kW-2900 d/d	125/315 250 kW-2900 d/d		
1500	5677	341			150/450 110 kW-1450 d/d	125/315 110 kW-2900 d/d	100/250 132 kW-2900 d/d	100/250 132 kW-2900 d/d	100/250 160 kW-2900 d/d	100/250 185 kW-2900 d/d	125/315 200 kW-2900 d/d	125/315 250 kW-2900 d/d		
2000	7570	454			150/450 132 kW-1450 d/d	150/450 160 kW-1450 d/d	150/450 185 kW-1450 d/d	125/315 200 kW-2900 d/d	125/315 200 kW-2900 d/d	125/315 250 kW-2900 d/d	125/315 250 kW-2900 d/d	125/315 315 kW-2900 d/d		
2500	9462	568			200/500 160 kW-1450 d/d	200/500 185 kW-1450 d/d	200/500 200 kW-1450 d/d	200/500 250 kW-1450 d/d	200/500 315 kW-1450 d/d	200/500 315 kW-1450 d/d				
3000	11355	681			200/500 185 kW-1450 d/d	200/500 200 kW-1450 d/d	200/500 250 kW-1450 d/d	200/500 315 kW-1450 d/d	200/500 315 kW-1450 d/d	200/500 355 kW-1450 d/d				
3500	13247	795			200/500 250 kW-1450 d/d	200/500 250 kW-1450 d/d	200/500 315 kW-1450 d/d	200/500 315 kW-1450 d/d	200/500 355 kW-1450 d/d	200/500 400 kW-1450 d/d				

## VERTICAL SHAFT LINE TYPE (IN-LINE) COAXIAL FIRE PUMPS



### NOMINAL FLOW

25	gpm/5,7	m <sup>3</sup> /h
50	gpm/11,4	m <sup>3</sup> /h
100	gpm/22,7	m <sup>3</sup> /h
150	gpm/34,1	m <sup>3</sup> /h
200	gpm/45,4	m <sup>3</sup> /h
250	gpm/56,8	m <sup>3</sup> /h
300	gpm/68,1	m <sup>3</sup> /h
400	gpm/91	m <sup>3</sup> /h
450	gpm/102	m <sup>3</sup> /h
500	gpm/114	m <sup>3</sup> /h
750	gpm/170	m <sup>3</sup> /h
1000	gpm/227	m <sup>3</sup> /h
1250	gpm/284	m <sup>3</sup> /h

### NOMINAL PRESSURES (m)

30
40
50
60
70
80
90

### MOTORS

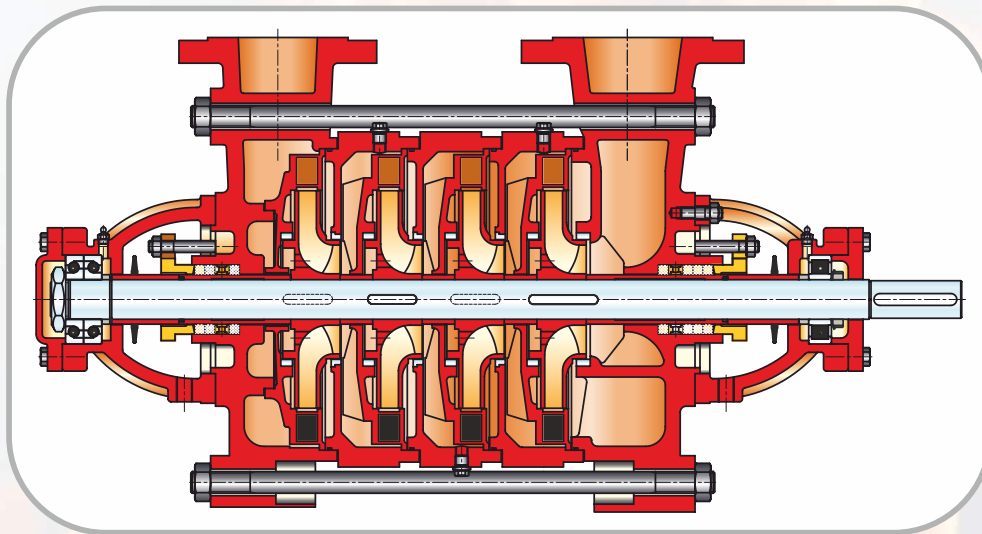
- Electric motors
- Electric motors in accordance with NFPA 20

## VERTICAL SHAFT LINE TYPE (IN-LINE) COAXIAL FIRE PUMPS

FSNLL Type Vertical Shaft Line Type (In-Line) Coaxial Fire Pumps Selection Table

FLOW		PUMP HEAD												
gpm	l/m	30	40	50	60	70	80	90	100	110	120	130		
25	95	40/160 3 kW-2900 d/d	40/160 4 kW-2900 d/d											
50	189	40/160 2,2 kW-2900 d/d	40/160 4 kW-2900 d/d	40/200 5,5 kW-2900 d/d	40/200 5,5 kW-2900 d/d									
100	379	60/125 4 kW-2900 d/d	50/160 5,5 kW-2900 d/d	50/160 7,5 kW-2900 d/d	40/200 11 kW-2900 d/d	50/250 15 kW-2900 d/d	50/250 15 kW-2900 d/d	50/250 15 kW-2900 d/d						
150	568	65/125 5,5 kW-2900 d/d	65/160 7,5 kW-2900 d/d	65/200 11 kW-2900 d/d	50/200 11 kW-2900 d/d	50/250 15 kW-2900 d/d	50/250 18,5 kW-2900 d/d	50/250 18,5 kW-2900 d/d	50/250 15 kW-2900 d/d					
200	757	80/125 7,5 kW-2900 d/d	80/160 11 kW-2900 d/d	65/200 15 kW-2900 d/d	65/200 15 kW-2900 d/d	65/250 22 kW-2900 d/d	65/250 22 kW-2900 d/d	65/250 22 kW-2900 d/d	65/250 22 kW-2900 d/d					
250	946	80/125 11 kW-2900 d/d	80/160 11 kW-2900 d/d	65/200 15 kW-2900 d/d	65/200 18,5 kW-2900 d/d	80/250 22 kW-2900 d/d	65/250 30 kW-2900 d/d	65/250 30 kW-2900 d/d	65/250 30 kW-2900 d/d					
300	1136	100/160 15 kW-2900 d/d	80/160 15 kW-2900 d/d	80/200 18,5 kW-2900 d/d	80/200 22 kW-2900 d/d	80/250 22 kW-2900 d/d	65/250 37 kW-2900 d/d	65/250 37 kW-2900 d/d	65/250 37 kW-2900 d/d					
400	1514	100/160 15 kW-2900 d/d	100/160 18,5 kW-2900 d/d	80/200 22 kW-2900 d/d	80/200 22 kW-2900 d/d	100/250 30 kW-2900 d/d	80/250 37 kW-2900 d/d	80/250 37 kW-2900 d/d	80/250 37 kW-2900 d/d					
450	1703	100/160 15 kW-2900 d/d	100/160 18,5 kW-2900 d/d	100/200 30 kW-2900 d/d	100/200 30 kW-2900 d/d	100/250 30 kW-2900 d/d	80/250 45 kW-2900 d/d	80/250 45 kW-2900 d/d	80/250 45 kW-2900 d/d					
500	1892	125/315 15 kW-1450 d/d	100/160 22 kW-2900 d/d	100/200 30 kW-2900 d/d	100/250 30 kW-2900 d/d	100/250 37 kW-2900 d/d	100/250 37 kW-2900 d/d	100/250 37 kW-2900 d/d						
750	2893	125/315 30 kW-1450 d/d	150/400 37 kW-1450 d/d	150/400 45 kW-1450 d/d	125/250 45 kW-1450 d/d	125/250 55 kW-1450 d/d								
1000	3785	200/315 37 kW-1450 d/d												
1250	4731	200/315 37 kW-1450 d/d												

## HORIZONTAL MULTISTAGE FIRE PUMPS



NOMINAL FLOW		NOMINAL PRESSURES (m)	
25 gpm/5,7 m <sup>3</sup> /h	400 gpm/91 m <sup>3</sup> /h	30	90
50 gpm/11,4 m <sup>3</sup> /h	450 gpm/102 m <sup>3</sup> /h	40	100
100 gpm/22,7 m <sup>3</sup> /h	500 gpm/114 m <sup>3</sup> /h	50	110
150 gpm/34,1 m <sup>3</sup> /h	750 gpm/170 m <sup>3</sup> /h	60	120
200 gpm/45,4 m <sup>3</sup> /h	1000 gpm/227 m <sup>3</sup> /h	70	130
250 gpm/56,8 m <sup>3</sup> /h	1250 gpm/284 m <sup>3</sup> /h	80	140
300 gpm/68,1 m <sup>3</sup> /h	1500 gpm/341 m <sup>3</sup> /h		
	2000 gpm/454 m <sup>3</sup> /h		

## HORIZONTAL MULTISTAGE FIRE PUMPS

FSCM Type Horizontal Multistage Fire Pumps Selection Table

FLOW		PUMP HEAD													
gpm	l/m	30	40	50	60	70	80	90	100	110	120	130	140		
25	95	32/2 2,2 kW-2900 d/d	32/2 2,2 kW-2900 d/d	32/2 3 kW-2900 d/d	32/3 3 kW-2900 d/d	32/3 4 kW-2900 d/d	32/4 4 kW-2900 d/d	32/4 5,5 kW-2900 d/d	32/4 5,5 kW-2900 d/d	32/4 5,5 kW-2900 d/d	32/5 7,5 kW-2900 d/d	32/6 7,5 kW-2900 d/d	32/6 7,5 kW-2900 d/d		
50	189	32/2 3 kW-2900 d/d	32/2 3 kW-2900 d/d	32/3 4 kW-2900 d/d	32/3 5,5 kW-2900 d/d	32/4 5,5 kW-2900 d/d	32/4 7,5 kW-2900 d/d	32/4 7,5 kW-2900 d/d	32/5 7,5 kW-2900 d/d	32/5 11 kW-2900 d/d	32/6 11 kW-2900 d/d	32/6 11 kW-2900 d/d	32/7 11 kW-2900 d/d		
100	379				40/3 11 kW-2900 d/d	40/3 11 kW-2900 d/d	40/3 11 kW-2900 d/d	40/3 15 kW-2900 d/d	40/4 15 kW-2900 d/d	40/4 15 kW-2900 d/d	40/4 15 kW-2900 d/d	40/5 18,5 kW-2900 d/d	40/5 18,5 kW-2900 d/d		
150	568				50/2 15 kW-2900 d/d	50/2 15 kW-2900 d/d	50/2 18,5 kW-2900 d/d	50/3 18,5 kW-2900 d/d	50/3 18,5 kW-2900 d/d	50/3 22 kW-2900 d/d	50/3 22 kW-2900 d/d	50/4 22 kW-2900 d/d	50/4 30 kW-2900 d/d		
200	757							65/2 30 kW-2900 d/d	65/2 30 kW-2900 d/d	65/3 30 kW-2900 d/d	65/3 30 kW-2900 d/d	65/3 37 kW-2900 d/d	65/3 37 kW-2900 d/d		
250	946							65/2 30 kW-2900 d/d	65/2 37 kW-2900 d/d	65/3 37 kW-2900 d/d	65/3 37 kW-2900 d/d	65/3 45 kW-2900 d/d	65/3 55 kW-2900 d/d		
300	1136								65/3 30 kW-2900 d/d	65/2 45 kW-2900 d/d	65/2 55 kW-2900 d/d	65/3 55 kW-2900 d/d	65/3 55 kW-2900 d/d		
400	1514								80/2 55 kW-2900 d/d	80/2 55 kW-2900 d/d	80/2 75 kW-2900 d/d	100/6 75 kW-2900 d/d	80/3 75 kW-2900 d/d		
450	1703								100/6 55 kW-1450 d/d	100/6 55 kW-1450 d/d	100/6 75 kW-1450 d/d	100/6 75 kW-1450 d/d	100/7 75 kW-1450 d/d		
500	1892								100/6 55 kW-1450 d/d	100/6 55 kW-1450 d/d	100/6 75 kW-1450 d/d	100/7 75 kW-1450 d/d	100/7 75 kW-1450 d/d		
750	2893								125/3 75 kW-1450 d/d	125/4 90 kW-1450 d/d	125/4 90 kW-1450 d/d	125/4 110 kW-1450 d/d	125/5 110 kW-1450 d/d		
1000	3785								150/3 110 kW-1450 d/d	150/3 132 kW-1450 d/d	150/3 132 kW-1450 d/d	150/3 160 kW-1450 d/d	150/3 160 kW-1450 d/d		
1250	4000								150/3 132 kW-1450 d/d	150/3 160 kW-1450 d/d	150/3 160 kW-1450 d/d	150/3 185 kW-1450 d/d	150/4 185 kW-1450 d/d		
1500	5684								200/3 185 kW-1450 d/d	200/3 200 kW-1450 d/d	200/3 200 kW-1450 d/d	200/3 250 kW-1450 d/d	200/3 250 kW-1450 d/d		
2000	7570										200/2 315 kW-1450 d/d	200/3 315 kW-1450 d/d	200/3 355 kW-1450 d/d		

# FIRE FIGHTING BOOSTER SETS

WITH ELECTRIC MOTOR



# FIRE FIGHTING BOOSTER SETS

Recommended Electric Motor Fire Pump Selection Table

Rated Flow (GPM)	Rated Pressure (m)	Rotation Number of (R/min)	Motor Strength (kW)	Pump Code
25 gpm (5.7 m³/h)	30	2900	2,2	FSCM 32/2
	40		2,2	FSCM 32/2
	50		3	FSCM 32/2
	60		3	FSCM 32/3
	70		4	FSCM 32/3
	80		4	FSCM 32/4
	90		5,5	FSCM 32/4
	100		5,5	FSCM 32/4
	110		5,5	FSCM 32/5
	120		7,5	FSCM 32/5
	130		7,5	FSCM 32/6
140	7,5	FSCM 32/6		
50 gpm (11.4 m³/h)	30	2900	3	FSNSP 32-160
	40		3	FSCM 32/2
	50		4	FSCM 32/3
	60		5,5	FSCM 32/3
	70		5,5	FSCM 32/4
	80		7,5	FSCM 32/4
	90		7,5	FSCM 32/4
	100		7,5	FSCM 32/5
	110		11	FSCM 32/5
	120		11	FSCM 32/6
	130		11	FSCM 32/6
140	11	FSCM 32/7		
100 gpm (22.7 m³/h)	30	2900	4	FSNSP 40-125
	40		5,5	FSNSP 32-160
	50		7,5	FSNSP 32-200
	60		11	FSNSP 40-200
	70		15	FSNSP 40-250
	80		11	FSCM 40/3
	80		18,5	FSNSP 40-250
	90		15	FSCM 40/3
	90		18,5	FSNSP 40-250
	100		15	FSCM 40/4
	110		15	FSCM 40/4
120	15	FSCM 40/4		
130	18,5	FSCM 40/5		
140	18,5	FSCM 40/5		
150 gpm (34.1 m³/h)	30	2900	7,5	FSNSP 50-160
	40		11	FSNSP 50-160
	50		11	FSNSP 50-200
	60		15	FSNSP 40-200
	70		18,5	FSNSP 40-250
	80		18,5	FSCM 50-2
	90		18,5	FSCM 50/3
	100		18,5	FSCM 50/3
	110		22	FSCM 50/3
	120		22	FSCM 50/3
	130		22	FSCM 50/4
140	30	FSCM 50/4		
200 gpm (45.4 m³/h)	30	2900	11	FSNSP 65-160
	40		11	FSNSP 50-160
	50		15	FSNSP 50-200
	60		15	FSNSP 50-200
	70		22	FSNSP50-250
	80		30	FSNSP 50-250
	90		30	FSCM 65-2
	100		30	FSCM 65/2
	110		30	FSCM 65/3
	120		30	FSCM 65/3
	130		37	FSCM 65/3
140	37	FSCM 65/3		
250 gpm (56.8 m³/h)	30	2900	11	FSNSP 65-160
	40		15	FSNSP 65-160
	50		15	FSNSP 50-200
	60		18,5	FSNSP 50-200
	70		22	FSNSP 50-250
	80		30	FSNSP 50-250
	90		30	FSCM 65-2
	100		37	FSCM 65/2
	110		37	FSCM 65/3
	120		37	FSCM 65/3
	130		45	FSCM 65/3
140	55	FSCM 65/3		

# FIRE FIGHTING BOOSTER SETS

Recommended Electric Motor Fire Pump Selection Table

Rated Flow (GPM)	Rated Pressure (m)	Rotation Number of (R/min)	Motor Strength (kW)	Pump Code	
300 gpm (68.1 m <sup>3</sup> /h)	30	2900	11	FSNSP 65-160	
	40		15	FSNSP 65-160	
	50		18,5	FSNSP 65-200	
	60		22	FSNSP 65-250	
	70		30	FSNSP 50-250	
	80		30	FSNSP 50-250	
	90		37	FSNSP 65/250	
	100		45	FSCM 65/2	
	110		55	FSCM 65/3	
	120		55	FSCM 65/3	
	130		55	FSCM 65/3	
140	55	FSCM 65/3			
400 gpm (91 m <sup>3</sup> /h)	30	2900	15	FSNSP 80-160	
	40		18,5	FSNSP 80-160	
	50		22	FSNSP 65-200	
	60		30	FSNSP 65-200	
	70		37	FSNSP 65-250	
	80		37	FSNSP 65-250	
	90		45	FSNSP 65-250	
	100		55	FSNDS 65/250	
	110		55	FSCM 80/2	
	120		75	FSCM 80/2	
	130		1450	75	FSCM 100/6
140	2900	75	FSCM 80/3		
450 gpm (102 m <sup>3</sup> /h)	40	2900	18,5	FSNSP 80-160	
	50		30	FSNSP 65-200	
	60		30	FSNSP 65-200	
	70		37	FSNSP 80-250	
	80		45	FSNSP 65-250	
	90		45	FSNSP 65-250	
	100		55	FSNDS 65/250	
	110		75	FSNDS 65/250	
	120		75	FSCM 100/6	
	130		1450	75	FSCM 100/6
	140		75	FSCM 100/7	
500 gpm (114 m <sup>3</sup> /h)	40	2900	22	FSNSP 80/160	
	50		30	FSNSP 80-200	
	60		37	FSNSP 80/200	
	70		45	FSNSP 80-250	
	80		45	FSNSP 80-250	
	90		55	FSNSP 80-250	
	100		55	FSNDS 65/250	
	110		75	FSNDS 65/250	
	120		75	FSCM 100/6	
	130		75	FSCM 100/7	
	140		75	FSCM 100/7	
750 gpm (170 m <sup>3</sup> /h)	40	2900	30	FSNSP 100-200	
	50		37	FSNSP 100-200	
	60		55	FSNSP 80-200	
	70		55	FSNSP 100-250	
	80		75	FSNSP 100-250	
	90		75	FSNSP 100-250	
	100		90	FSNDS 65/250	
	110		90	FSNDS 65/250	
	120		90	FSNDS 65/250	
	130		1450	110	SCM 125/4
	140		110	SCM 125/5	
1000 gpm (227 m <sup>3</sup> /h)	70	2900	75	FSNDS 100-250	
	80		90	FSNDS 100-250	
	90		110	FSNDS 65/250	
	100		110	FSNDS 150/250	
	110		132	FSNDS 100/250	
	120		160	FSNDS 100/250	
	120		132	FSCM 150/3	
	130		1450	160	FSCM 150/3
	140		160	FSCM 150/3	



# FIRE FIGHTING BOOSTER SETS

Recommended Electric Motor Fire Pump Selection Table

Rated Flow (GPM)	Rated Pressure (m)	Rotation Number of (R/min)	Motor Strength (kW)	Pump Code	
1250 gpm (284 m <sup>3</sup> /h)	30	1450	37	FSNSP 150-315	
	40		55	FSNSP 150-400	
	50		75	FSNSP 150-400	
	60		75	FSNSP 150-400	
	70	2900	90	FSNSP 100-250	
	80		110	FSNSP 100-250	
	90		110	FSNSP 100-300	
	100		132	FSNDS 150/350	
	110		160	FSNDS 100/250	
	120	1450	160	FSCM 150/3	
	130		185	FSCM 150/3	
140	185		FSCM 150/4		
1500 gpm (341 m <sup>3</sup> /h)	30	1450	55	FSNSP 200-315	
	40		75	FSNSP 200-400	
	50		75	FSNSP 150-400	
	60		90	FSNSP 150-400	
	70		110	FSNDS 125-315	
	80	2900	132	FSNDS 100-250	
	90		132	FSNDS 100-250	
	100		160	FSNDS 100-250	
	110		185	FSNDS 100-250	
	120		200	FSCM 200/3	
	130	1450	250	FSCM 200/3	
	140		250	FSCM 200/3	
2000 gpm (454 m <sup>3</sup> /h)	30	1450	75	FSNSP 200-315	
	40		90	FSNSP 200-400	
	50		110	FSNDS 150-450	
	60		132	FSNDS 150-450	
	70		160	FSNDS 150-450	
	80		200	FSNSP 200-500	
	90		200	FSNSP 200-500	
	100	2900	200	FSNDS 125-315	
	110		250	FSNDS 125-315	
	120		315	FSCM 200/2	
	130	1450	315	FSCM 200/3	
	140		355	FSCM 200/3	
	2500 gpm (568 m <sup>3</sup> /h)	30	1450	90	FSNSP 200-315
		40		110	FSNSP 250-400
50		132		FSNDS 200-400	
60		160		FSNDS 200-400	
70		185		FSNDS 200-500	
80		200		FSNDS 200-500	
90		250		FSNDS 200-500	
100		315		FSNDS 200-500	
110		315		FSNDS 200-500	
3000 gpm (681 m <sup>3</sup> /h)	40	1450	132	FSNSP 250-400	
	50		160	FSNSP 250-400	
	60		185	FSNDS 200-500	
	70		200	FSNDS 200-500	
	80		250	FSNDS 200-500	
	90		315	FSNDS 200-500	
	100		315	FSNDS 200-500	
	110		355	FSNDS 200-500	
3500 gpm (795 m <sup>3</sup> /h)	40	1450	132	FSNSP 250-400	
	50		200	FSNSP 250-400	
	60		250	FSNDS 250-450	
	70		250	FSNDS 250-450	
	80		315	FSNDS 200-500	
	90		315	FSNDS 200-500	
	100		355	FSNDS 200-500	
	110		400	FSNDS 200-500	
4000 gpm (908 m <sup>3</sup> /h)	50	1450	200	FSNSP 250-500	
	60		250	FSNDS 250-450	
	70		315	FSNDS 250-450	
	80		355	FSNDS 250-450	
	90		400	FSNDS 250-600	
4500 gpm (1022 m <sup>3</sup> /h)	70	1450	315	FSNDS 250-450	
	80		355	FSNSP 250-500	
	90		400	FSNSP 250-500	

# FIRE FIGHTING BOOSTER SETS

WITH DIESEL ENGINE

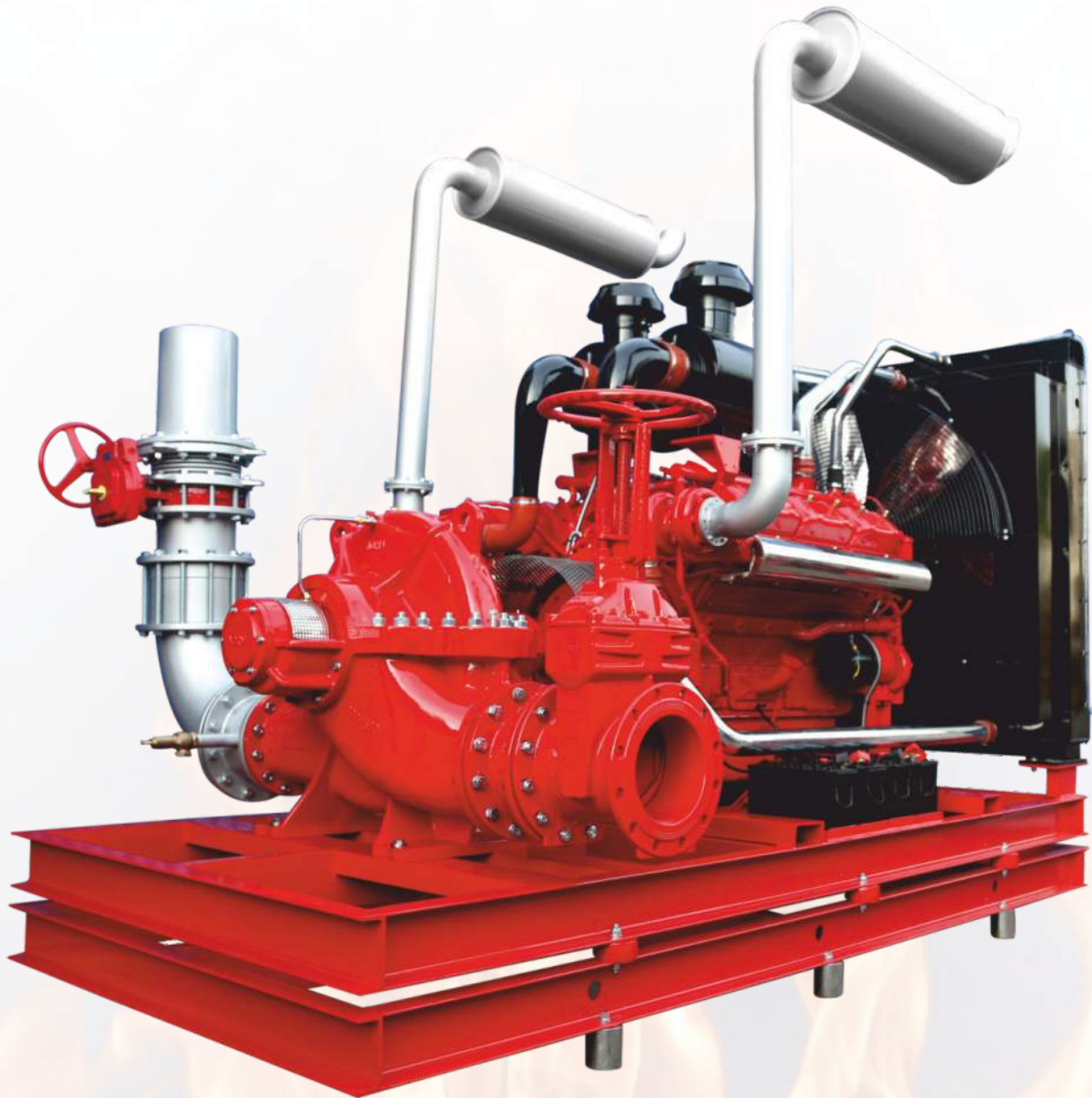


## Diesel Engine Fire Fighting Booster Sets

100% backing up of the fire pumps many times are made with fire motor pumps operating with a diesel engine. In this case what motor pumps must supply is defined in NFPA 20. According to this standard, especially 1.21 times of the zero flow pump head in electrically-driven pump adjusted so as to open a safety valve is required to be mounted on the discharge side. Spring-loaded safety valves are used in 3S Fire Fighting Systems.

# FIRE FIGHTING BOOSTER SETS

WITH DIESEL ENGINE



# FIRE FIGHTING BOOSTER SETS

## DIESEL ENGINE

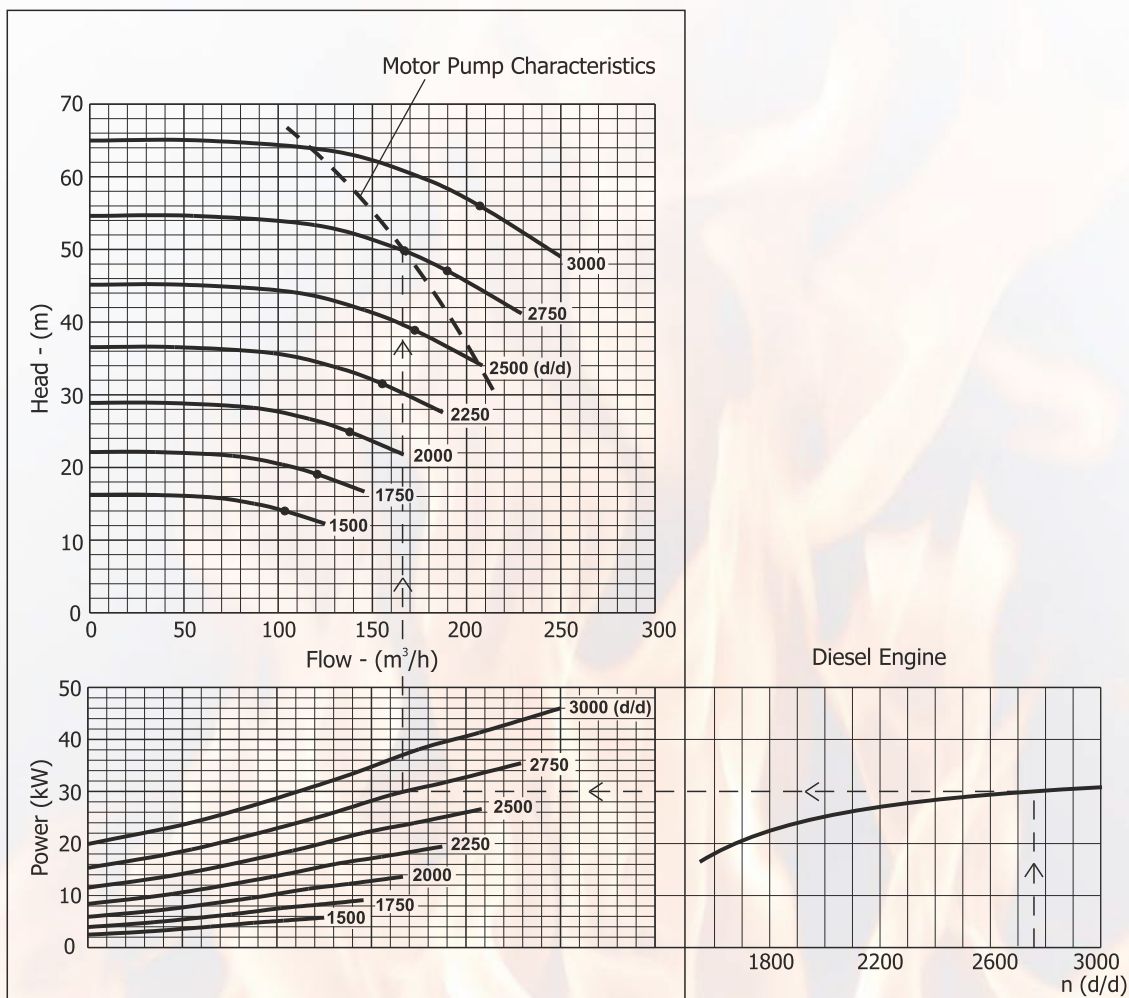
Recommended Diesel Motor Fire Pump Selection Table

Rated Flow (GPM)	Rated Pressure (m)	Rotation Number of (R/min)	Motor Strength (kW)	Pump Code
50 gpm (11.4 m <sup>3</sup> /h)	30	2900	3	FSNSP 32-160
	30		4	FSNSP 40-125
100 gpm (22.7 m <sup>3</sup> /h)	40	2900	5.5	FSNSP 32-160
	50		7.5	FSNSP 32-200
	60		11	FSNSP 40-200
	70		15	FSNSP 40-250
	80		18.5	FSNSP 40-250
	90		18.5	FSNSP 40-250
	30		2900	7.5
40	11	FSNSP 50-160		
50	11	FSNSP 50-200		
60	15	FSNSP 40-200		
70	18.5	FSNSP 40-250		
80	22	FSNSP 40-250		
90	22	FSNSP 40-250		
100	30	FSNSP 40-250		
200 gpm (45.4 m <sup>3</sup> /h)	30	2900	11	FSNSP 65-160
	40		11	FSNSP 50-160
	50		15	FSNSP 50-200
	60		15	FSNSP 50-200
	70		22	FSNSP 40-250
	80		30	FSNSP 50-250
	90		30	FSNSP 40-250
250 gpm (56.8 m <sup>3</sup> /h)	30	2900	11	FSNSP 65-160
	40		15	FSNSP 65-160
	50		15	FSNSP 50-200
	60		18.5	FSNSP 50-200
	70		22	FSNSP 50-250
	80		30	FSNSP 50-250
	90		37	FSNSP 50-250
300 gpm (68.1 m <sup>3</sup> /h)	30	2900	11	FSNSP 65-160
	40		15	FSNSP 65-160
	50		18.5	FSNSP 65-200
	60		22	FSNSP 65-250
	70		30	FSNSP 50-250
	80		30	FSNSP 50-250
400 gpm (91 m <sup>3</sup> /h)	30	2900	15	FSNSP 80-160
	40		18.5	FSNSP 80-160
	50		22	FSNSP 65-200
	60		30	FSNSP 65-200
	70		37	FSNSP 65-250
	80		37	FSNSP 65-250
	90		45	FSNSP 65-250
	100		55	FSNDS 65/250
450 gpm (102 m <sup>3</sup> /h)	40	2900	18.5	FSNSP 80/160
	50		30	FSNSP 65-200
	60		30	FSNSP 65-200
	70		37	FSNSP 80-250
	80		45	FSNSP 65-250
	90		55	FSNSP 80/250
	100		75	FSNDS 65/250
500 gpm (114 m <sup>3</sup> /h)	110	2900	75	FSNDS 65/250
	40		22	FSNSP 80-160
	50		30	FSNSP 80-200
	60		37	FSNSP 65-200
	70		45	FSNSP 80-250
	80		55	FSNSP 80-250
	90		55	FSNSP 80-250
	100		75	FSNDS 65/250
110	75	FSNDS 65/250		

# FIRE FIGHTING BOOSTER SETS

## Finding the Characteristics of Fire Pump Motors

Graphic analysis is the most appropriate method in order to find the characteristics of fire pump motors. First of all, at the different number of revolutions of the pump, pump head - flow curves and the shaft power - flow curves are drawn, then by reading out the power that it can give for a number of period over the shaft power - the number of rotations curve of the motor to be selected at the same number of rotations of the pump the flow that it can pass through is read from the power curve, operating point of diesel motor pump is found by switching to pump head at the same number of rotations from there. Motor pump characteristic is obtained by repeating the similar operation in required number.



## JOCKEY PUMPS

It should be chosen so as to get into operation in a period as much as 10 minutes and bring the pressure to the desired level upon detecting a leakage that may be evident in the fire-fighting system.

It is selected at 1% of the nominal flow of the flow (min. 1 GPM) and at a pressure of more than 10% of the nominal pressure.



# FIRE PUMPS

## Fire Pump Groups

- Each pump should be able to be removed from the system for maintenance without removing the complete system.
- The leakage pump is used in order to meet for the small water leaks that will occur in the fire extinguishing system without the intervention of the main pump.
- In case of power failure in the facility in the absence of the automatically activated generators electrically-driven pumps will be backed up using diesel motor pumps.
- It is mandatory to use pressure switches that back up one another.
- Rising shaft valves are used in suction piping.
- Pressure is read on the vacuum meter in suction pipes and on the manometer in discharge pipes.
- There are cooling valves in pumps ensuring the cooling of the pump in case of a closed valve.
- They consist of several pumps for 100% backup purposes.
- Fire-fighting system must be resistant against horizontal seismic loads up to 0.5 x its weight.



## Fire Operation Schema

### Automatic

In fire-fighting system upon the on the signal from the pressure switch by the dropping of the pressure below a defined value, first of all the leakage pumps are engaged, deactivates if the leakage can be stopped in a period as much as ten minutes but if the pressure continues to fall first of all the main pump is activated and it is checked whether the system pressure is established or not, the backup pump will be activated if it can not be maintained.

Pumps are stopped manually by pressing the button on the control panel.

After the pumps run automatically, if they are desired to stop automatically, upon the restoring of the pressure to normal after working for a period of at least ten minutes, they can be stopped upon the signal from the minimum minimum operation timer.

Stopping of leakage of pump is performed automatically with the help of the pressure switch.

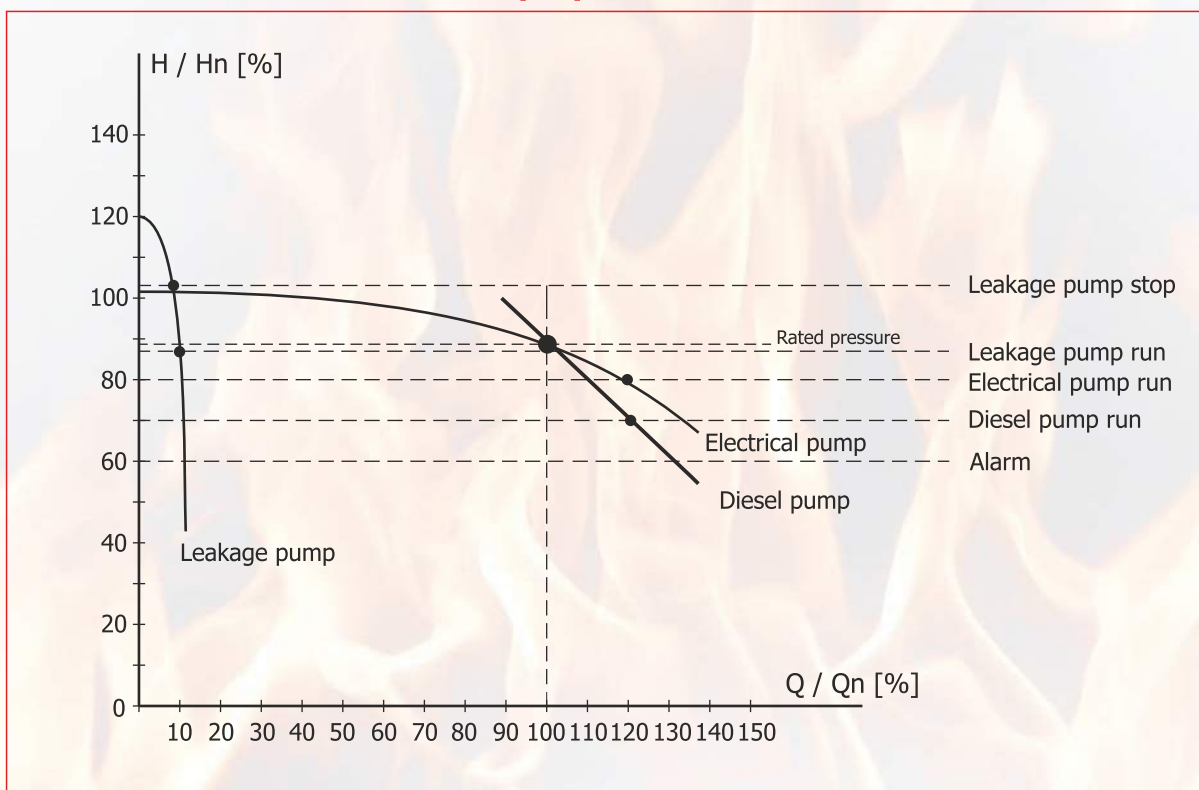
### Manual / Electric

Each of the pumps of the fire group can be started electrically by pressing the button on the control panel manually.

### Manual / Mechanical

Main and the backup pump can be started mechanically manually by pressing the lever located on the control board.

### Fire Group Operation Scheme





## Fire Group Control System

- It is possible to manually operate the pumps from the board.
- Continuous grounding is carried out.
- Separate individual panels are used for electrical pump, diesel pump motor and leak pump.
- There are locking mechanisms available in the panels.
- In case of jamming of the electric pump it automatically drops off the main power switch with the help of LRP system.
- There is no thermal protection in panels (except for leakage pump).
- Protection class of the pumps is IP 55.
- The warning signals in the electric pump-panels (excluding illegal pump):
  1. Phase sequence faulty
  2. Pump fault
  3. Insufficient phase
  4. Pump running
  5. Minimum water level (if desired)
  6. Lamp test button (if desired)
  7. Silencing possible audible and non-inactivating visual alarm
- Battery charging system.
- Two 12 V batteries for diesel engine.
- Additional warning signals for diesel pump motor:
  1. 1<sup>st</sup> Battery insufficient
  2. 2<sup>nd</sup> Battery insufficient
  3. Diesel running
  4. Diesel failure
  5. Faulty battery charger
  6. Control is not in automatic mode
  7. Excessive speed
  8. Engine temperature high
  9. Minimum fuel
  10. Low oil pressure

3S Fire Fighting Groups have the ability to communicate with the building automation systems. However, it is not correct to run and stop the system from the building control room.

Pressure switches are very important because they produce operation command. While it should be provided at least one for each pump, the system should have at least two and it should always be backed up.

It can be locked after factory pressure setting is adjusted. They must be plugged into the panel, without getting affected by the vibrations, the upper and lower adjustment values should be adjusted independently of one another.

Whereas the automatic fire pumps may operate depending on the pressure switch, manually using a button on the panel they should be able to run manually electrically and mechanically.

## Technical Specifications for Electric Motor Fire Group (Given as an Example)

### 1. Subject:

Fire group should be comprised of;

- One leakage compensation pump.
- One fire pump with electric motor.
- One spare fire pump with electric motor.
- There shall be a separate control panel for each pump.

### 2. Technical Specifications:

- 2.1. Nominal flow of the fire group shall be.....gpm ..... m<sup>3</sup>/h  
rated pressure is .....psi .....m  
the number of rotations .....rpm.....rpm
- 2.2. Pumps shall be single-stage, horizontally splittable cased, centrifugal type.
- 2.3. The entire fire group shall be in accordance with NFPA 20.

### 3 .General Requirements:

- 3.1. All of the elements required by NFPA 20 shall be found in the fire group.
- 3.2. All elements of the fire groups shall be mounted on a single chassis, and shall be delivered to the address indicated by the recipient as tested.

### 4. Special Conditions:

- 4.1. Standard elements of the fire group shall be indicated in the proposal, additional elements shall be determined during ontract if desired.
- 4.2. Electric motors shall have ODP (locked rotor current protection).
- 4.3. There shall be aeration valve, group vent valve, case cooling valve.
- 4.4. Test certificates, use and maintenance manual of the fire group shall be supplied along with the pump.
- 4.5. Two year warranty shall be provided for the pumps.
- 4.6. Control panels of the main pump and spare pump shall be micro-processor controlled it shall have a weekly tested programmable unit, and shall have three operating modes, including automatic, manually-electrical, manually-mechanical, (energy on, low pressure, etc. required) shall give out audible and visual warning signals shall have a minimum operating time timer.

### Tests Shall Be Conducted During The Operation

#### Weekly

In a particular time of the week, that the time clock is set on the fire pump control panel, it turns on the solenoid valve in the circuit of pressure switch, the pressure drops due to the water thrown out, after the motor operates solenoid valve automatically closes. And the pump runs up and stops as much as the programmed time.

During this test a fire office should be present in the test area. (It is not possible to detect mechanical failures in the tests that are to be performed automatically by the system.)

Electric pump should run for at least 10 minutes during the weekly test while the diesel motor pump should run for at least 30 minutes.

In case of diesel engine control unit failing to start, if after cranking the engine 6 times with a duration of 15 seconds in succession upon waiting for 15 seconds, the starter must locked and alarm should be given out.

#### Manually-Weekly Test Algorithm

After completion of automatic test first electrically-driven pump and then the diesel motor pump is tested first all of the electrical one manually (by pressing the run button on the panel) and then the mechanical-manually (by pressing the mechanical mechanism in the pump) in order to check whether they operate for a short time whether the pumps activate or not.

# FIRE PUMPS

## Electrical Motor and Diesel Engine Fire Group Specifications (Given as an Example)

### 1. Subject:

Fire group;

- Shall consist of a leakage compensation pump.
- A separate control panel for each pump.
- One spare fire pump with diesel engine.
- One fire pump with electric motor.

### 2. Technical Specifications:

- 2.1. Nominal flow of the fire group shall be.....gpm ..... m<sup>3</sup>/h  
 rated pressure is .....psi .....m  
 the number of rotations shall be .....rpm.....rpm
- 2.2. Pumps shall be single-stage , horizontally splittable cased, centrifugal type.
- 2.3. The entire fire group shall be in accordance with NFPA 20.

### 3 .General Requirements:

- 3.1. All of the elements required by NFPA 20 shall be found in the fire group.
- 3.2. Diesel pump panel shall have a battery and charging system as defined in NFPA 20.
- 3.3. All elements of the fire groups shall be mounted on a single chassis, and shall be delivered to the address indicated by the recipient as tested.





### 4. Special Conditions:

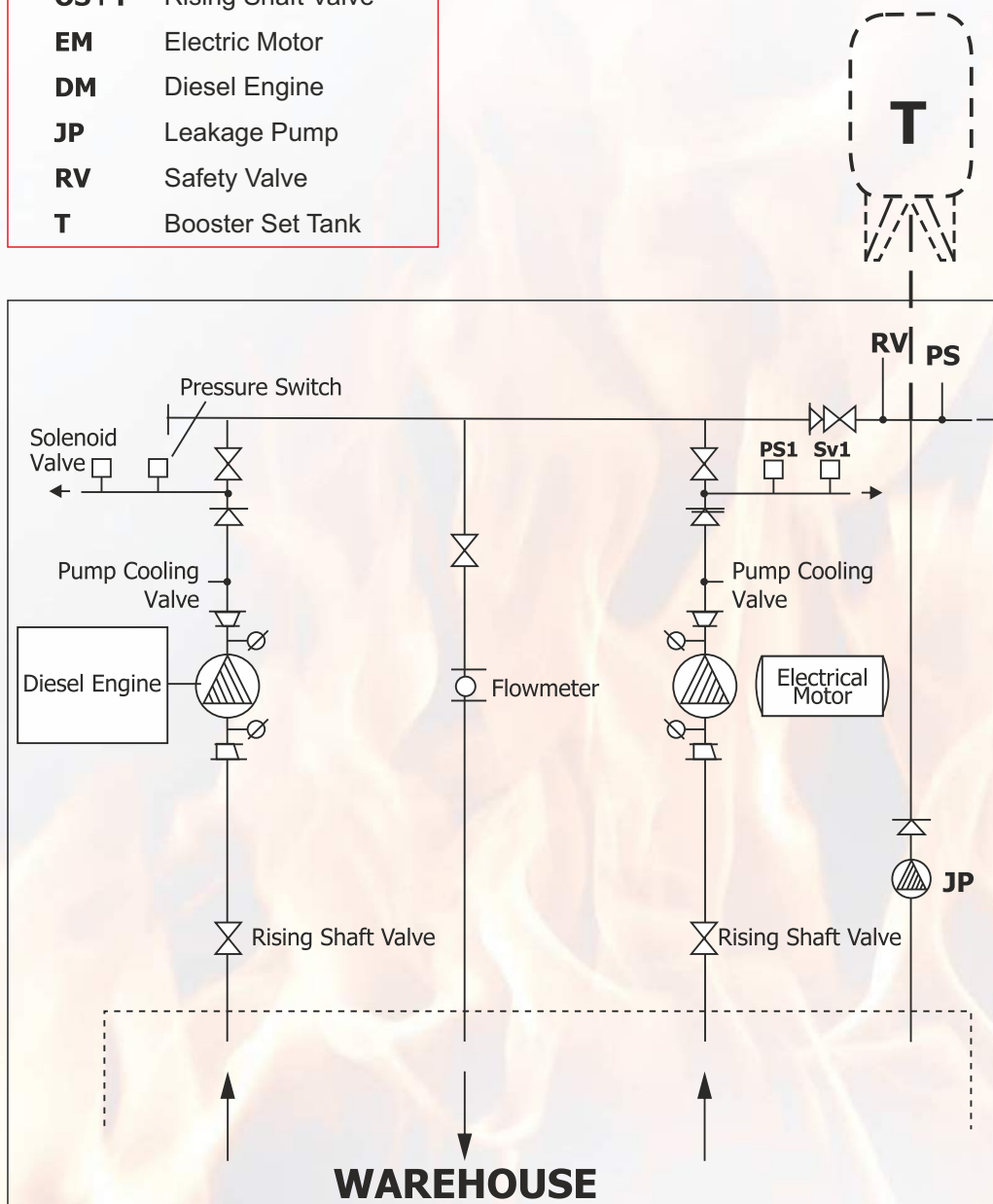
- 4.1. Test certificates, use and maintenance manual of the fire group shall be supplied along with the pump.
- 4.2. Two years warranty shall be provided for the pump.
- 4.3. There shall be aeration valve, group vent valve, case cooling valve.
- 4.4. Electric motors shall have ODP (locked rotor current protection).
- 4.5. Control panels of the main pump and spare pump shall be micro-processor controlled it shall have a weekly tested programmable unit, and shall have three operating modes, including automatic, manually-electrical, manually-mechanical (energy on, low pressure, etc. required) shall give out audible and visual warning signals shall have a minimum operating time timer.
- 4.6. Standard elements of the fire group shall be indicated in the proposal, additional elements shall be determined during contract if desired.

### Minimum Diameter of Fire Pump Installation

RATED FLOW		PUMP SUCTION PIPE	PUMP DISCHARGE PIPE	SAFETY VALVE	SAFETY VALVE OUTPUT	FLOW METER
(gpm)	(m <sup>3</sup> h)	(inch)	(inch)	(inch)	(inch)	(inch)
25	5,7	1	1	3/4	1	1 1/4
50	11,4	1 1/2	1 1/4	1 1/4	1 1/2	2
100	22,7	2	2	1 1/2	2	2 1/2
150	34,1	2 1/2	2 1/2	2	2 1/2	3
200	45,4	3	3	2	2 1/2	3
250	56,8	3 1/2	3	2	2 1/2	3 1/2
300	68,1	4	4	2 1/2	3 1/2	3 1/2
400	91	4	4	3	5	4
450	102	5	5	3	5	4
500	114	5	5	3	5	5
750	170	6	6	4	6	5
1000	227	8	6	4	8	6
1250	284	8	8	6	8	6
1500	341	8	8	6	8	8
2000	454	10	10	6	10	8
2500	568	10	10	6	10	8
3000	681	12	12	8	12	8
3500	795	12	12	8	12	10
4000	908	14	12	8	14	10
4500	1022	16	14	8	14	10

## In Accordance with NFPA 20

	Pump
	Valve
	Valve
	Manometre
<b>PS</b>	Pressure Switch
<b>FE</b>	Flowmeter
<b>SV</b>	Solenoid Valve
<b>CRV</b>	Pump Cooling Valve
<b>OS+Y</b>	Rising Shaft Valve
<b>EM</b>	Electric Motor
<b>DM</b>	Diesel Engine
<b>JP</b>	Leakage Pump
<b>RV</b>	Safety Valve
<b>T</b>	Booster Set Tank



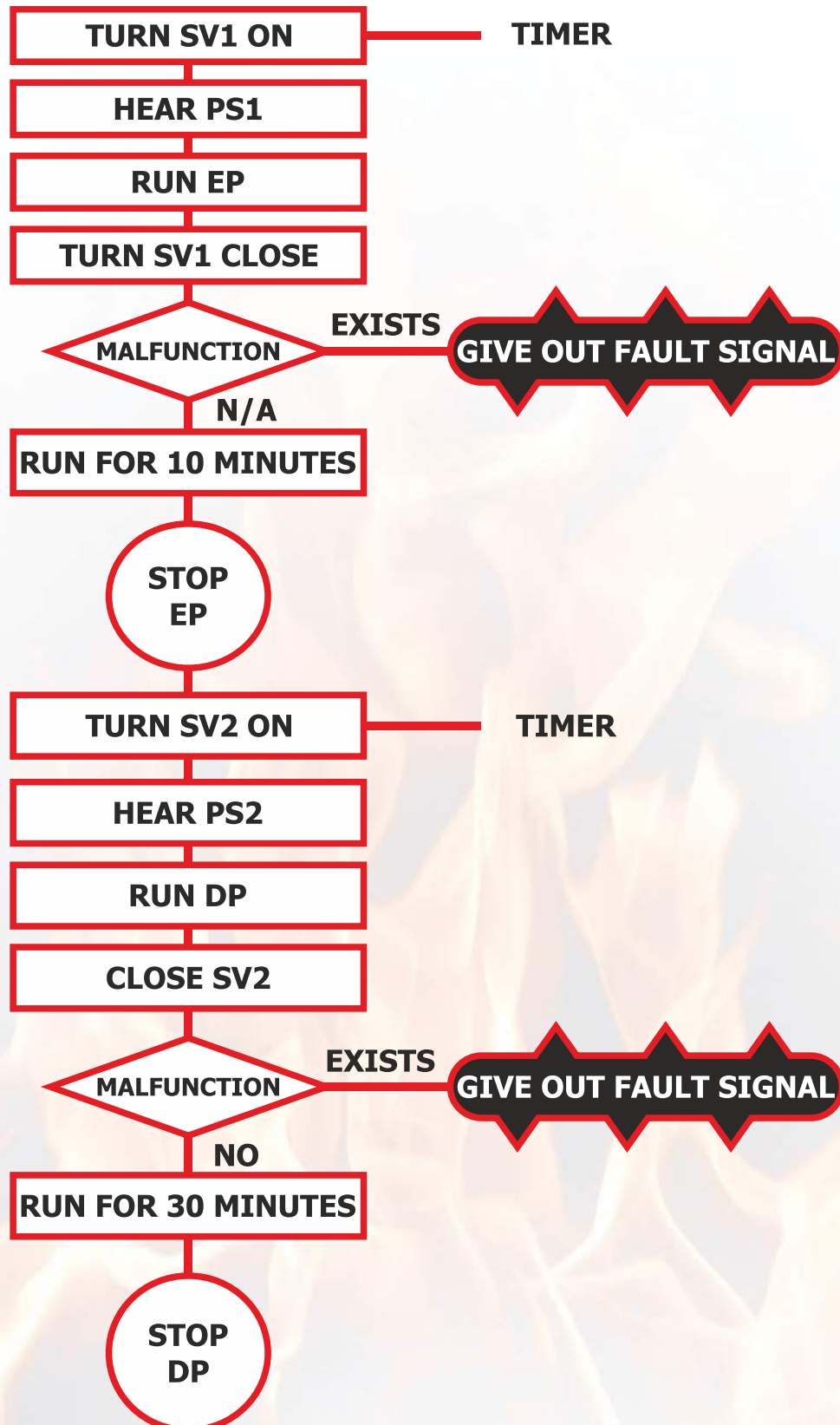
In Accordance with NFPA 20

# FIRE PUMPS

## Sequence of Operation in Automatic Operation in Case of Fire



## Weekly Automatic Test Operation Sequence





# NORM®



## NORM®

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