





Pump • Fire Fighting Units • Booster Set

# FIRE PUMPS

## CONFORM TO NFPA 20



NFPA 20 Rev:11.09.2021

NFPA 20 standard defines the installation requirements of the fixed pumps for fire protection. This standard is the most common and the most detailed standard in the world used for fire protection services.

The scope of NFPA 20 document include the selection of fire pumps, installation, acceptance tests and operation.

Standart Pompa, being a member of NFPA, follows all studies and publications related within the fire protection area.

Most of the consultant companies related with fire protection system design are making their designs according to NFPA standards. Besides, insurance companies are not taking risk and reducing the policy costs, if the fire system is not designed according to NFPA standards and the fire pumps are not selected according to NFPA 20.

### STANDART Fire Fighting Pump Features

STANDART fire pumps are used to pressurize and keep the pressure of fire fighting systems such as;

- Sprinkler
- Fire Cabinets
- Hydrants

Different type of pumps may be used in fire fighting systems;

- End suction pumps
- Vertical in-line pumps
- Double suction split-case pumps
- Multistage pumps •Multistage multioutlet

### STANDART Fire pumps and groups conform the requirements of NFPA 20

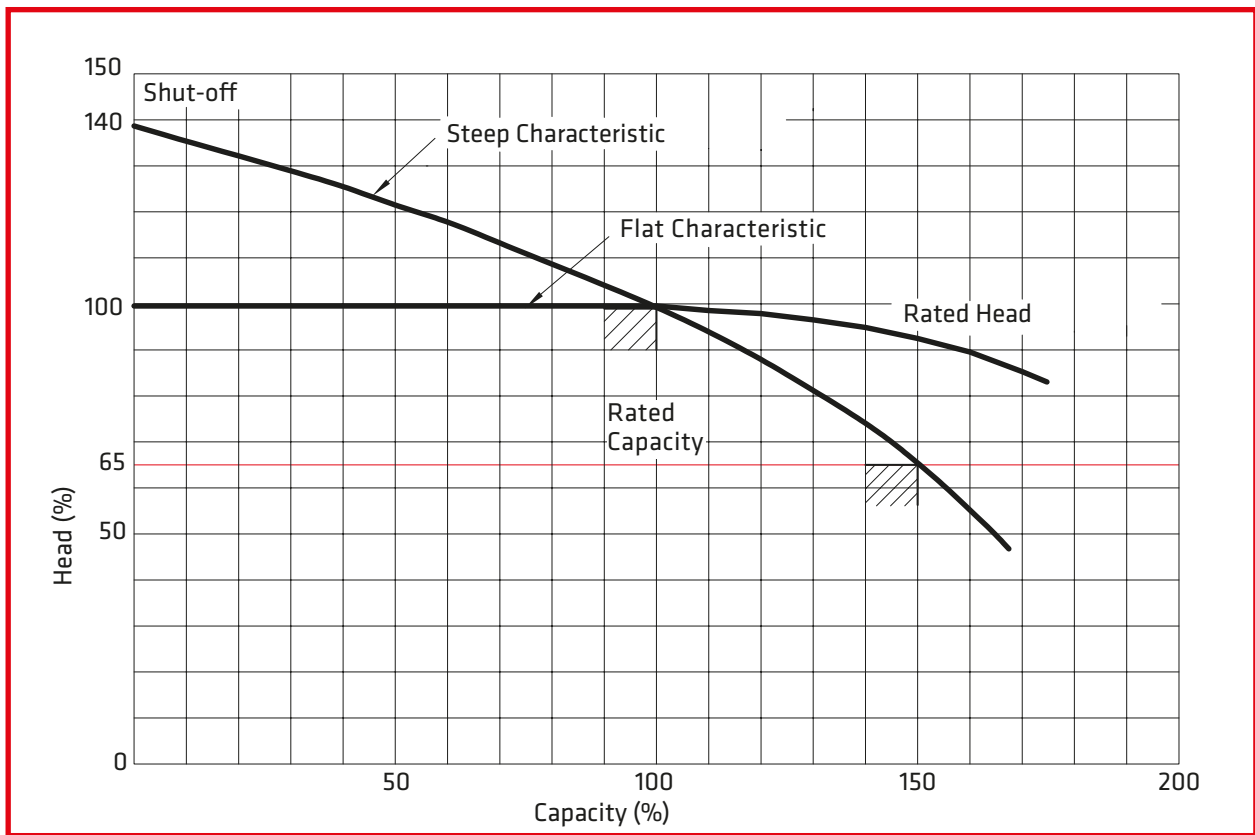
- Seperate controller for each pump.
- Max. flow velocity in suction pipe is below 3 m/s at rated capacity
- Pressure at zero flow is less than 1.4 times rated pressure
- Pressure at 1.5 x rated capacity is not less than 0.65 x rated pressure
- Service factor shall not exceed 1.15
- Materials;

Casing	: Cast iron
Impeller	: Bronze
Shaft	: Stainless steel
- Shaft sealing: Soft packing or mechanical seal
- Bearings: L-10 rating of not less than 5000 hours at maximum load.
- Flanges according to EN 1092-2 PN 16.

### Suggested accesories on the pump

- Automatic air release valve
- Circulation relief valve
- Increaser and reducer piping elements
- Pressure gauges at suction and discharge
- Flexible coupling

## Fire Pump Performance Characteristics Conform to NFPA 20



## Fire Pump Capacities Conform to NFPA 20

Rated capacities as per NFPA 20 [2016]

(GPM)	(l/min)	(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
4500	17032	1022
5000	18925	1136

## STANDART Fire Pump Types

### ECO SNT End Suction



Horizontal, radially split volute casing type , single stage, end suction centrifugal pump with closed impeller.

rated capacities (GPM)			rated pressures (m)
25	400	2000	40
50	450	2500	50
100	500	3000	60
150	750	3500	70
200	1000	4000	80
250	1250	4500	90
300	1500	5000	100

### SDS Double Suction



Horizontal, single stage, axially split volute casing pumps with double suction radial impellers.

rated capacities (GPM)		rated pressures (m)
400	2000	50
450	2500	60
500	3000	70
750	3500	80
1000	4000	90
1250	4500	100
1500	5000	110
		120
		140

### SKM Multistage



Horizontal ring section multistage centrifugal pumps with closed impellers and diffusers.

rated capacities (GPM)			rated pressures (m)	
25	300	1000	60	120
50	400	1250	70	130
100	450	1500	80	140
150	500	2000	90	150
200	750	2500	100	160
250			110	170

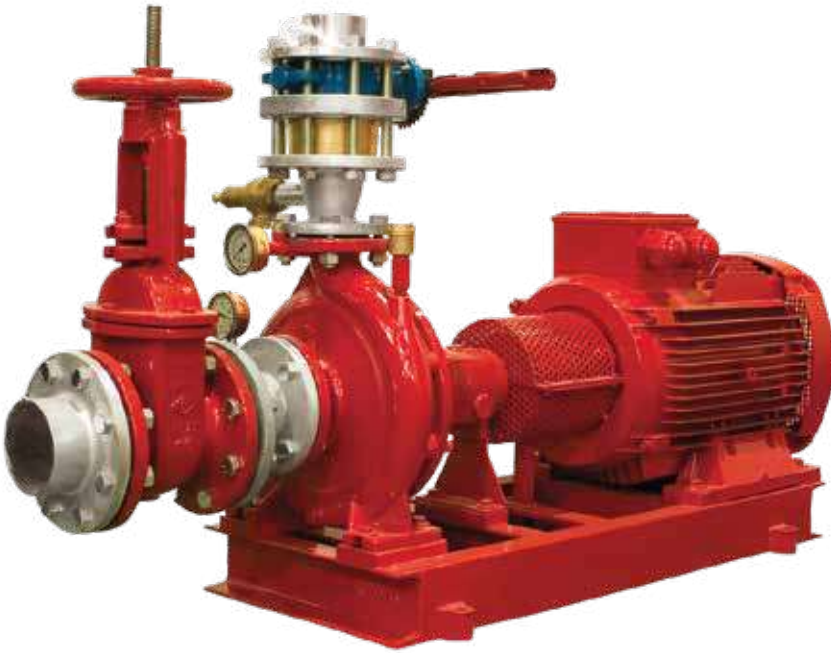
### SKM Multistage - Multioutlet



Multioutlet design horizontal ring section multistage centrifugal pumps with closed impellers and diffusers.

rated capacities (GPM)			rated pressures (m)	
25	300	1000	60	120
50	400	1250	70	130
100	450	1500	80	140
150	500	2000	90	150
200	750	2500	100	160
250			110	170

## Fire Pump with Electric Motor



## Fire Pump with Diesel Engine

Generally 100 % redundancy is obtained by diesel engine-driven pumps. The requirements of diesel engine-driven pumps are defined in NFPA 20.



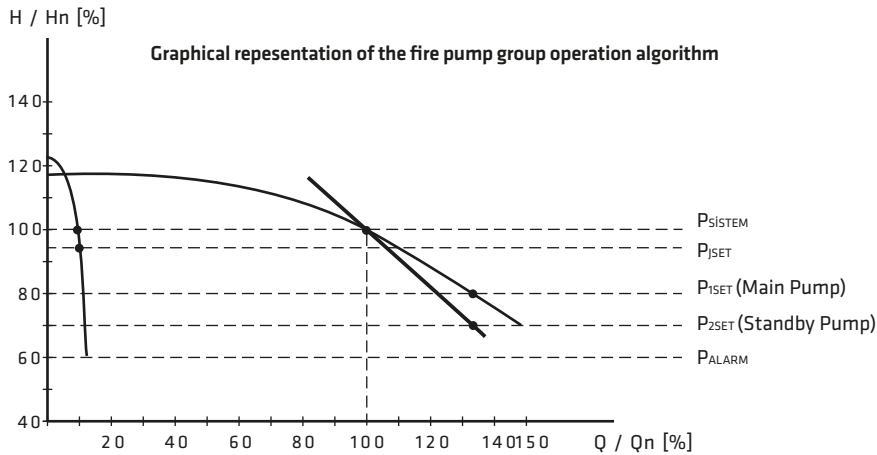
## Jockey Pump

Jockey pumps should be selected at a capacity at which to increase the system pressure to the required value in 10 minutes after sensing the leakage in fire fighting system.

Generally a pump with % 3 of rated capacity (min 1 GPM), % 110 of rated pressure.



## Fire Pump Group Operation Algorithm



If the pressure drops below the set value (P<sub>JSET</sub>), jockey pump starts running with the signal coming from the pressure switch and continues to run for 10 minutes until the system pressure reaches the set value (P<sub>SYSTEM</sub>). If the pressure continues to drop, (P<sub>ISET</sub>) first the main pump starts to run. If the system pressure (P<sub>SYSTEM</sub>) can not supplied and pressure continues the drop

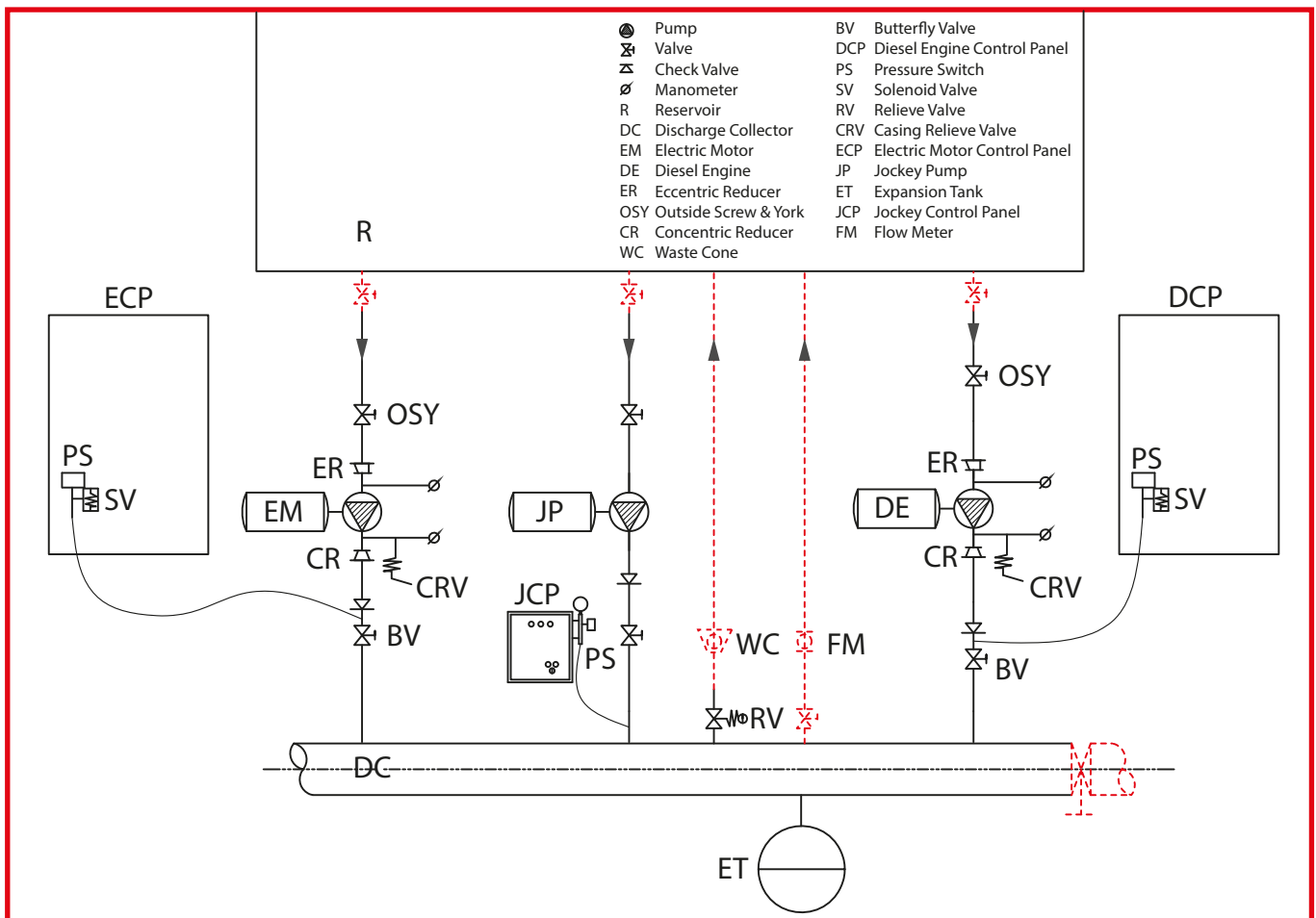
## Manual Electric Control

The manually operated switch (push button) can be used to run the motor manually. In this case operation can not be affected by the pressure-actuated switch.

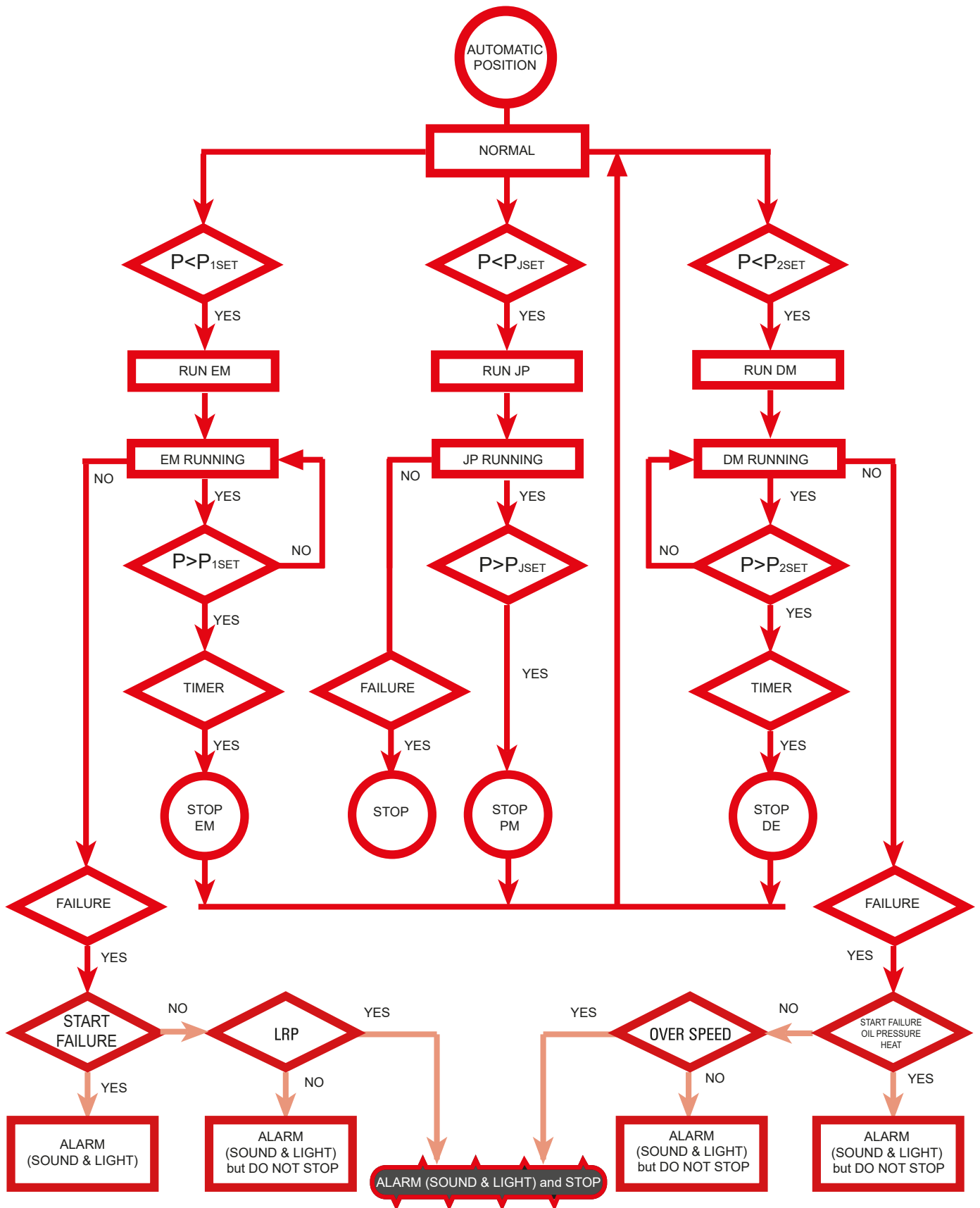
## Mechanical Control

Emergency run handle on the controller can be used to operate pumps by mechanically closing the motor-circuit switching mechanism.

## P&I Diagram for Fire Fighting Groups Conform to NFPA20



# Automatic Operation Algorithm In Case Of Fire



NOTE: Pressure adjustments must be like  
 $P_{SYSTEM} > P_{JSET} > P_{1SET} > P_{2SET}$

## Control Panels

- Individual control panels are used for electric pump, diesel pump and jockey pump
- Lock mechanism are used on panels
- Continuous grounding
- Pumps can run by manual control and emergency-run mechanical control on controller
- No thermic protection on controller (except jockey pump controller)
- One batteries for diesel engine
- Two batteries for diesel engine (if required)
- Battery charger

### For Electric Motor (Type B)



### For Diesel Engine (Type B)



The pictures are representative.

- Alarm signals on electric pump controller

1. pump running
2. pump failure
3. phase reversal (if required)
4. loss of phase (if required)
5. power suitable (if required)
6. lamp test (if required)
7. audible and visible (can not be switched off) alarms

- DRY contacts on electric pump controller

1. general alarm
2. weekly test started
3. pump running

- Additive alarm signals for diesel driven pumps

1. high motor temperature (if available in diesel engine)
2. low oil pressure
3. over speed
4. control is in automatic mode
5. failure of 1st battery
6. failure of 2nd battery (if required)
7. starting failure
8. engine running
9. audible and visible (can not be switched off) alarms

- DRY contacts on diesel engine controller

1. control is in automatic mode
2. pump running
3. general alarm

STANDART fire pump groups can communicate with building automation systems. But to operate and stop fire pump groups from the control room is not suggested because of safety reasons.

Pressure switches are very important, because they generate "run command". There shall be at least one pressure switch for each pump and at least two for the system.

After the adjustments pressure switches should be locked at the factory. They should be in control panel and not effected from vibrations. Min and max set levels could be adjusted individually.

Fire pumps should operate automatically by pressure switches and also should operate manually by pressing an electric push button or pressing a mechanical handle.



## Control Panels According to NFPA 20

The control panels has many requirements that are required in NFPA 20. Like a voltage surge arrester, isolation switch emergency run mechanical control, overspeed...

- Individual control panels are used for electric pump, diesel pump and jockey pump
- Lock mechanism are used on panels
- Continuous grounding
- Pumps can run by manual control and emergency-run mechanical control on controller
- In the electric motor pumps, by the help of Locked Rotor Protection (LRP), in case of locking rotor main switch is automatically shut down.
- In the diesel engine pumps, the diesel is stopped in case of overspeed
- No thermic protection on controller (except jockey pump controller)
- Two batteries for diesel engine
- Battery chargers

### For Electric Motor (Type C)



### For Diesel Engine (Type C)



The pictures are representative.

- Alarm signals on electric pump controller (except jockey pump)

1. pump running
2. pump failure
3. minimum water level(if required)
4. phase reversal
5. loss of phase
6. power suitable
7. Lamp test (if required)
8. audible(can be switched off) and visible(can not be switched off) alarms
9. LRP

- DRY contacts on electric pump controller

1. general alarm
2. start failer
3. weekly test started
4. pump status
5. phase loss
6. phase opposite
7. power suitable

- Additive alarm signals for diesel driven pumps

1. high motor temperature
2. low oil pressure
3. over speed
4. control is in automatic mode
5. charger lamp
6. failure of 1st battery
7. failure of 2nd battery
8. starting failure
9. failure of battery charger
10. engine running
11. lamp test button (optional)
12. audible(can be switched off) and visible(can not be switched off) alarms

- DRY contacts on diesel engine controller

1. selector switch is at wrong position
2. pump runing
3. general alarm

## Periodic Tests During Operation

### Weekly Automatic Test

The timer which is preset at a certain time of the week, opens the solenoid valve. System pressure decreases due to discharge water and solenoid valve is closed after motor starts running. Pump runs for a period which is already programmed and then stops.

During weekly tests the fire security person is supposed to be at the test area (It is not easy to recognise mechanical failures during automatic test).

Minimum run time is 10 minutes for electric motor driven pumps and 30 minutes for diesel engine driven pumps. Diesel engine controller should generate an alarm signal in case of failure which is 15 seconds of cranking and 15 seconds of rest, in six consecutive cycles.

### Weekly Manual Test

After completion of automatic weekly tests, manual-electrical (by pressing a button on controller) and manual-mechanical (by pressing a handle on controller) tests are done for a short period of time.

### Monthly and Annual Test

These tests are for the purpose of protective maintenance and defined in NFPA -25  
Standart Pompa technical team is ready to help on this matter if required.

### Factory Test

Each fire pump is hydrostatically tested 1.5 times of shut off pressure (not less than 17 bars) for a minimum 5 minutes period.

Each fire pump is factory tested as per NFPA-20 requirement.

Fire pump groups and fire booster sets are functionally tested at factory.

### Optional Accessories of Fire Pump Group (\*)

Standart fire pump groups include all the required elements per NFPA-20.

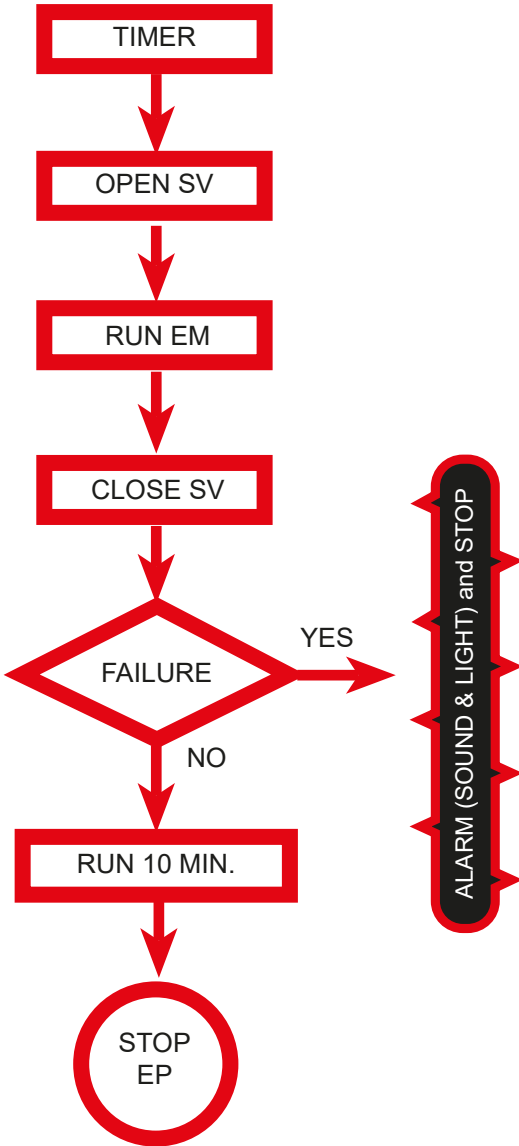
Optional elements are shown below :

- suction valve position monitoring switch
  - suction valve lock
  - waste cone
- discharge valve position monitoring switch
  - discharge valve lock
  - flowmeter at the flow rate 1.75 times of rated flow

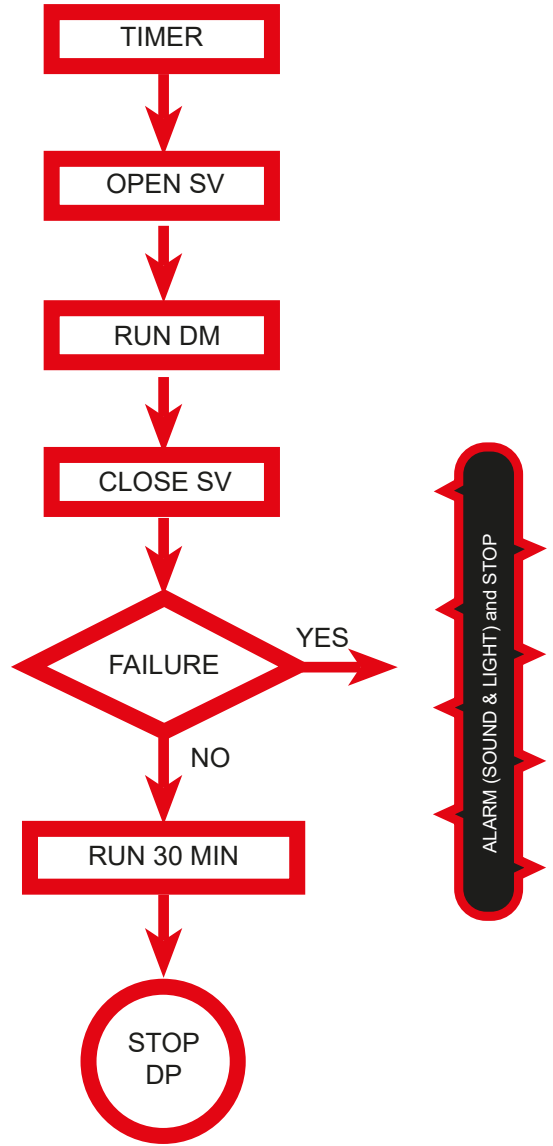
**(\*) Fire Pump Group** : Main pump, stand-by pump, jockey pump, electric control panels, collectors, valves etc. all on common base plate.

# Automatic Weekly Test Algorithm

## For Electric Pump



## For Diesel Pump





Pump • Fire Fighting Units • Booster Set

# SDS / SNK

## FIRE PUMPS



### Who UL is and What UL Does

- UL (Underwriters Laboratories Inc.) is a global independent safety science company offering expertise across five key strategic businesses: Product Safety, Environment, Life & Health, University and Verification Services. Since the year UL founded in 1894, nearly 70,000 manufacturers in 100 countries have produced 100.000 different types of totally 22 billion UL Marked products.
- UL engineers scientifically investigate and test thousands of types of products, materials, constructions and systems to evaluate the electrical, fire and injury risks; the burglary or fire resistance; or the ability to detect, control or limit fires.
- UL has developed 1,600 Standards for Safety, which serve as the bedrock of compliance in over 200 industries.
- There is an “Online Certifications Directory” in UL’s website and all the products listed by UL can be found here.

### UL Safety Standard: UL 448

- The requirements of this standard cover design and test features of centrifugal fire pumps intended for use in water-supply systems for fire-protection service.
- The pumps covered by these requirements are intended for installation and use in accordance with the Standard for the Installation of Stationary Pumps for Fire Protection, NFPA 20.

### Who FM is and What FM Does

- FM (Factory Mutual) Global is one of the world’s largest business property insurers who also serves engineering solutions to be protected against basicly fire, natural disaster or other types of property risk.
- FM Approvals is a unit of FM Global who certifies industrial and commercial products and services for companies. When a product or service meets the standards of FM Approvals, it is issued the “FM APPROVED” mark to signify it will perform as expected.
- Currently there are 60.000 certified products and services and these are listed in “FM Approval Guide” which can be found in FM website.

### FM Approvals Standard: 1311 / 1319

- FM Class 1311 states approval criteria for horizontal or vertical split case centrifugal fire pumps while FM Class 1319 states about horizontal end suction centrifugal fire pumps that supply water to fire protection systems.
- The requirements in these standards are mainly based on ANSI Hydraulics Institute (HI) and NFPA 20 standards.

## General Information

## Design Features According to UL & FM

• Only the specified capacities in the below table are allowed for rated capacity. For capacities higher than 5000 GPM, 500 GPM increments are allowed.

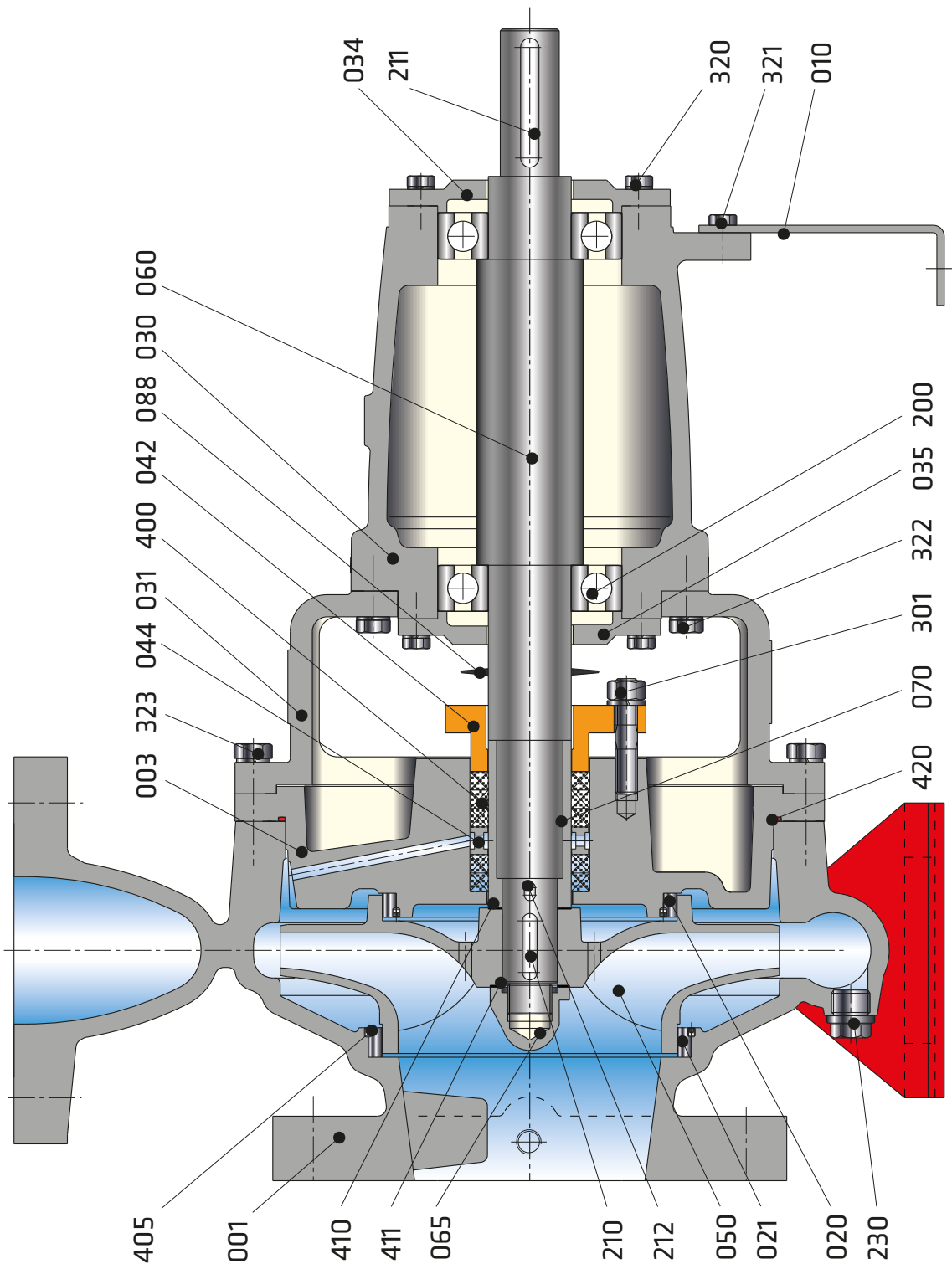
GPM	m <sup>3</sup> /h	GPM	m <sup>3</sup> /h	GPM	m <sup>3</sup> /h
25	5.68	400	90.8	2000	454
50	11.3	450	102.2	2500	568
100	22.7	500	113.5	3000	681
150	34.0	750	170	3500	795
200	45.4	1000	227	4000	909
250	56.8	1250	284	4500	1022
300	68.1	1500	341	5000	1136

- All interior bolt or screw that are exposed to pumped liquid shall be of rolled bronze or corrosion resistant material
- The pump shall be provided with automatic air-release valve, circulation relief valve and pressure gauges
- Bearings shall have an L-10 rating of not less than 5000 hours at maximum load.
- The pumps shall be provided with at least four packing rings plus a lantern ring. The lantern ring may be permitted to replace one ring of packing.
- Impellers, wear rings, shafts, lantern rings, glands shall be made of corrosion resistant material.
- Following material specifications are applied to STANDART UL/FM fire pumps:

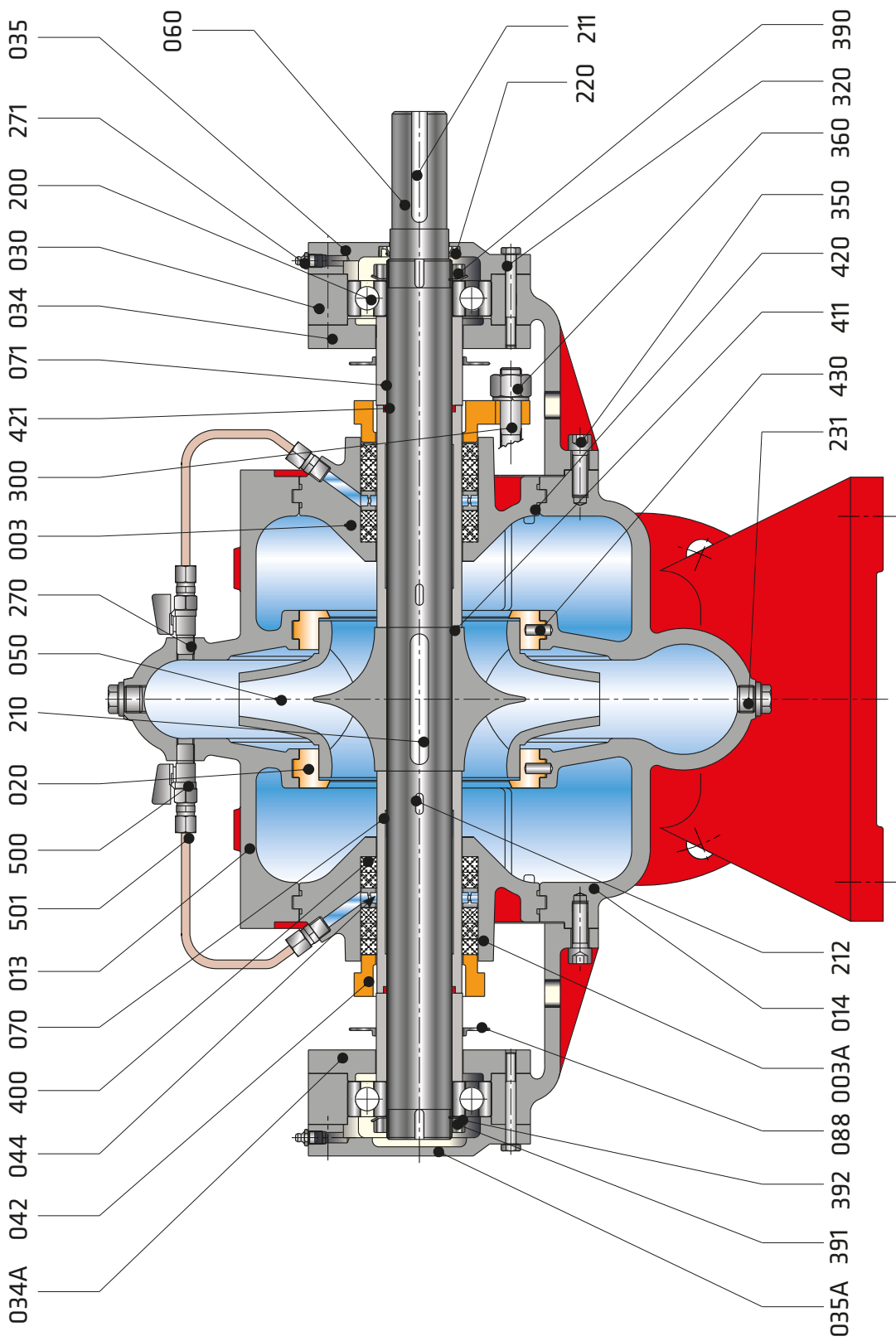
Part List	Definition	DIN / EN		AISI / SAE / ASTM
Casing	Nodular Cast Iron	0.7040	EN-GJS-400-15 (GGG40)	A 536 60-40-18
Impeller	Cast Bronze	2.1050.01	G-CuSn 10	B427 C90700
Shaft	Stainless Steel	1.4021	X20 Cr 13	A 276 Type 420+QT
Shaft Seal	Stainless Steel	1.4404	X2 Cr Ni Mo 17-12-2	A 276 Type 316L
Wear Ring	Cast Bronze	2.1050.01	G-CuSn 10	B 427 C90700
Bolt & Screw	Stainless Steel	1.4301	X5 Cr Ni 18-10	A276 Type 304

Part List

001	Volute Casing
003	Stuffing Box
010	Support Foot
020	Wear Ring (back)
021	Wear Ring (front)
030	Bearing Housing
031	Bearing Bracket Lantern
034	Bearing Cover (outboard)
035	Bearing Cover (inboard)
042	Stuffing Box Gland
044	Lantern Ring
050	Impeller
060	Shaft
065	Impeller Nut
070	Shaft Protecting Sleeve
088	Thrower
200	Ball Bearing
210	Impeller Key
211	Coupling Key
212	Sleeve Key
230	Drain Plug
301	Stud+Nut+Washer
320	Hex. Head Bolt
321	Hex. Head Bolt
322	Hex. Head Bolt
323	Hex. Head Bolt
400	Stuffing Box Packing
405	Set Screw
410	Gasket
411	Gasket
420	O-Ring



003	Stuffing Box (right side)
003A	Stuffing Box (left side)
013	Volute Casing (top)
014	Volute Casing (bottom)
020	Wear Ring
030	Bearing Housing
034	Bearing Cover (inboard)
034A	Bearing Cover (inboard)
035	Bearing Cover (outboard)
035A	Bearing Cover (outboard)
042	Stuffing Box Gland
044	Lantern Ring
050	Impeller
060	Shaft
070	Shaft Protecting Sleeve
071	Sleeve (spacer)
088	Thrower
200	Ball Bearing
210	Impeller Key
211	Coupling Key
212	Key
220	Oil Seal
231	Drain Plug
270	Nipple
271	Grease Nipple
300	Stud
320	Hex. Head Bolt
350	Allen Screw
360	Nut
390	Locknut (non drive end)
391	Locknut (drive end)
392	Lock Washer
400	Stuffing Box Packing
411	Gasket
420	O-Ring
421	O-Ring
430	Pin
500	Valve
501	Flushing Pipe



034A 042 044 400 070 071 034 030 200 271 035

060

220 211

231 430 411 420 350 360 320 390

035A 391 392 088 003A 014 212

## Selection Table



UL Listed & FM Approved Fire Pumps			
Pump Type	Capacity (GPM)	Pressure Range (PSI)	Speed (RPM)
SDS 65-250	100	102-171	3000
	150	100-171	3000
	200	100-171	3000
	250	99-171	3000
	300	98-171	3000
SDS 80-250	400	103-162	3000
	450	102-162	3000
	500	102-161	3000
SDS 80-315	500	173-208	3000
	750	167-204	3000
SDS 100-250	750	89-172	3000
	1000	85-171	3000
SDS 125-315	1250	117-199	3000
	1500	112-198	3000
	2000	130-192	3000
SDS 150-315	2000	92-125	2100
	2000	116-156	2350
	2500	87-123	2100
	2500	113-156	2350

UL Listed & FM Approved Fire Pumps			
Pump Type	Capacity (GPM)	Pressure Range (PSI)	Speed (RPM)
SNK 50-250	200	93-150	3000
	250	91-150	3000
	300	88-148	3000
SNK 65-250	300	92-142	3000
	400	88-142	3000
SNK 80-250	450	84-141	3000
	450	87-148	3000
	500	84-148	3000

(\*) NOTE :

- Engines are rated at standard SAE conditions of 29.61 inches (752 mm) Hg barometer and 77°F (25°C) inlet air temperature [approximates 300 ft. (91.4 m) above sea level] by the testing laboratory (see SAE Standard J 1349).
- A deduction of 3 percent from engine horsepower rating at standard SAE conditions shall be made for diesel engines for each 1000 ft. (305 m) altitude above 300 ft. (91.4 m)