

VAN WIJK & BOERMA FIREPACKS B.V.

Technical Solution for Diesel driven High Pressure Watermist set

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VAN WIJK & BOERMA FIREPACKS BV

- 50 years “custom-built” Firepacks
- Total pumphouse solutions
- All specifications
- WBFP - controllers
- Teststand – calibration
- Service department
- Whole premises sprinklered.



INTRODUCTION

- Lower water consumption compared to conventional sprinklers.
- Smaller size pipe dimensions, therefore easier to integrate in building constructions
- Smaller size of water storage tank
- Less water damage
- No hazard for occupants
- Environmentally friendly



INTRODUCTION

- Flowrates between 100 and 1000 L/min (6 - 60 m³/h).
- Pressures 120 – 140 bar.
- The high pressure combined with relatively low capacities require the use of plunger pumps.
 - Water must be filtrated and boosted before entering HP pumps.
 - Pressure control system (relief valves) required to recirculate excess flow back to water supply.
 - High starting torque required when operating at rated pressure.
- Due to these requirements most watermist pumps are driven by electric motors.

CASE FOR DIESEL DRIVE

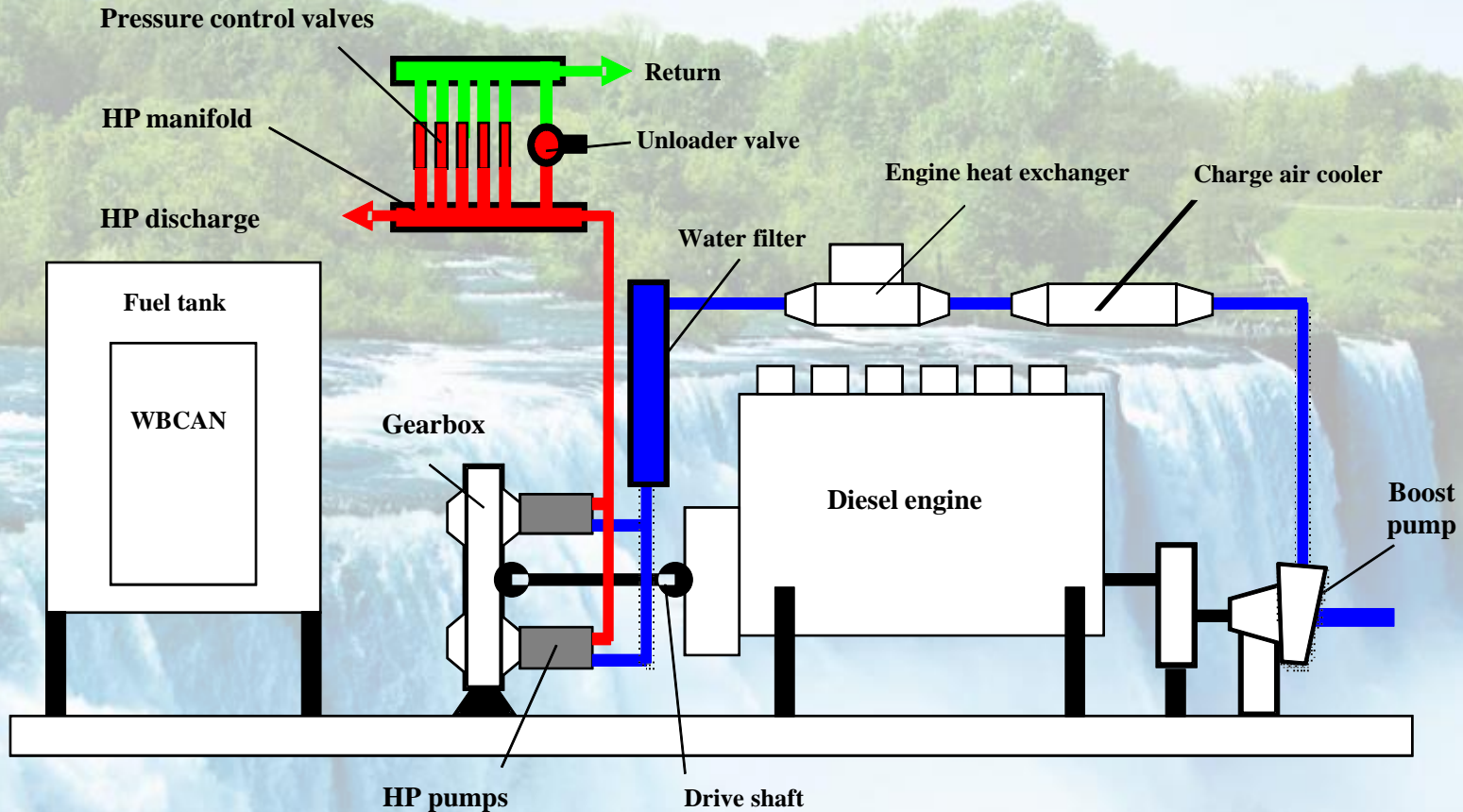
For higher capacities diesel drive would be beneficial:

- Available power not limited.
- Independent operation.
- No backup generator required.
- Lower total costs.

Challenges:

- Providing engine cooling.
- Unloading pumps during start / stop of the engine.
 - Risk of introducing pressure spikes.
- Providing boosted & filtered water to HP pumps.

WORKING PRINCIPLE OF HI-PR FIREPACK



CONTROL SYSTEM

Control system requirements:

- Unload the pumps (operate with low discharge pressure) at engine start and acceleration.
- Provide a smooth transition from unloaded operation to operation at nominal pressure without pressure spikes.
- Unload the pumps before engine stop to extend engine life.

CONTROL SYSTEM

Operation phases HI-PR Firepack

1. Startup phase

Unloader valve is open during engine start. After start engine accelerates smoothly to nominal speed during which process the unloader valve is gradually closed.

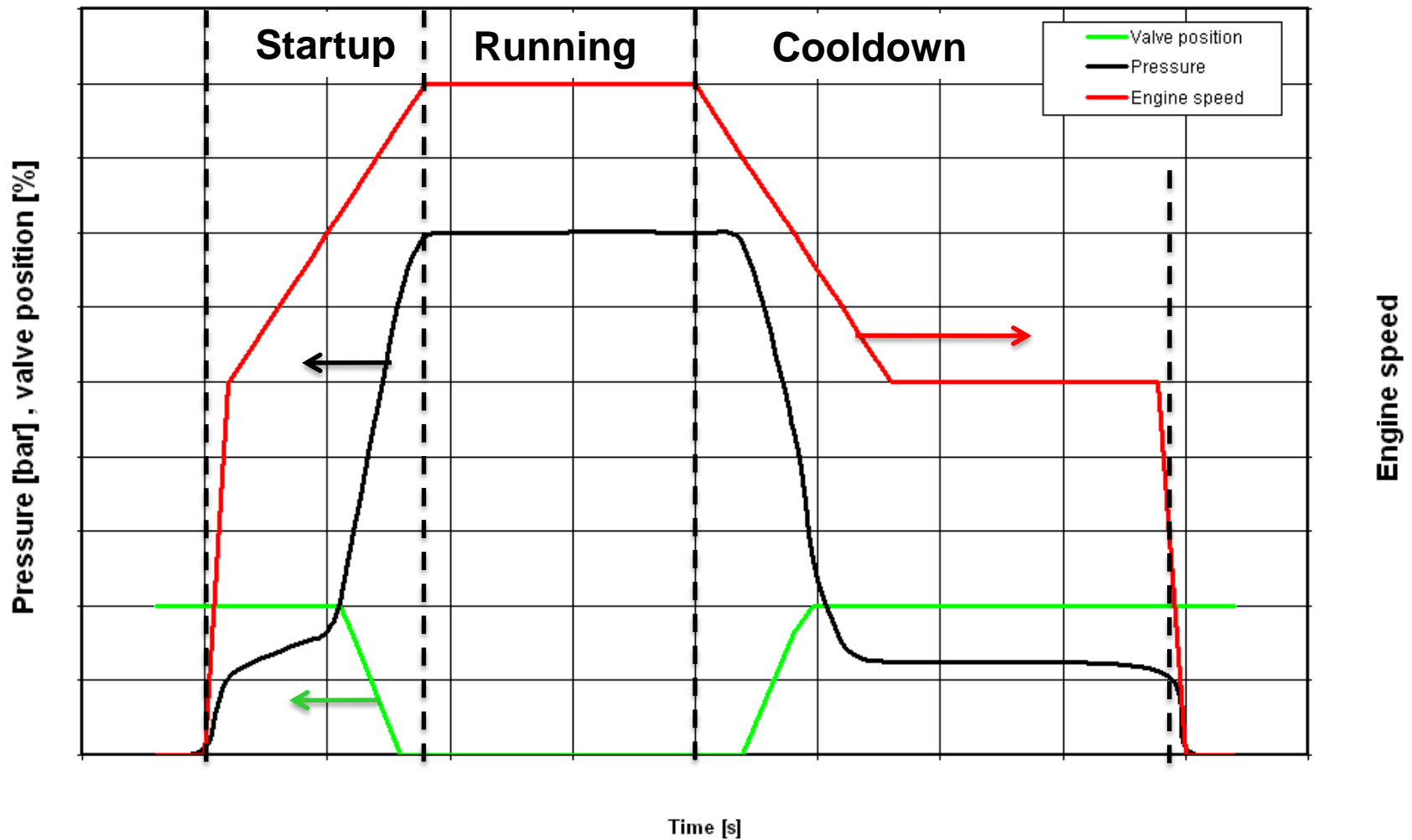
2. Nominal phase

Unloader valve is closed, engine runs at nominal speed, pressure is controlled by control valves.

3. Cooldown phase

After stop signal engine speed is reduced and unloader valve is opened. Engine runs for 2 minutes at low load before shutdown.

CONTROL SYSTEM



Engine speed

Pressure [bar] , valve position [%]

Time [s]

DESCRIPTION OF HI-PR

HP Pumps.

For the HP pump a axial plunger pump is selected which has the advantages:

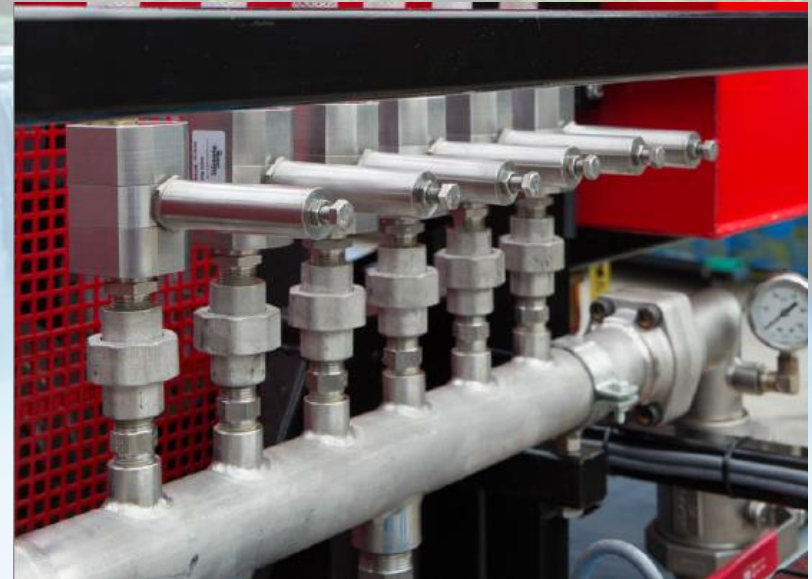
- Self lubricating design, cooled by the pumped water.
- No spring loaded check valves
- High plunger count providing small ripple.
- Direction of rotation both ways possible without modifications.
- Low noise operation

DESCRIPTION OF HI-PR

Water filter.

The pressure control valve are of a sliding piston design and open when the nominal pump pressure is reached.

- Stable operation over complete flow range.
- Cavitation free operation.
- Low noise



DESCRIPTION OF HI-PR

Water filter.

The HP pumps require 10 mu filtering of the water.

- Filter element easy to replace.
- Pressure loss < 0.3 bar @ rated flow.
- High dirt capacity (2 bar dP allowed).



DESCRIPTION OF HI-PR

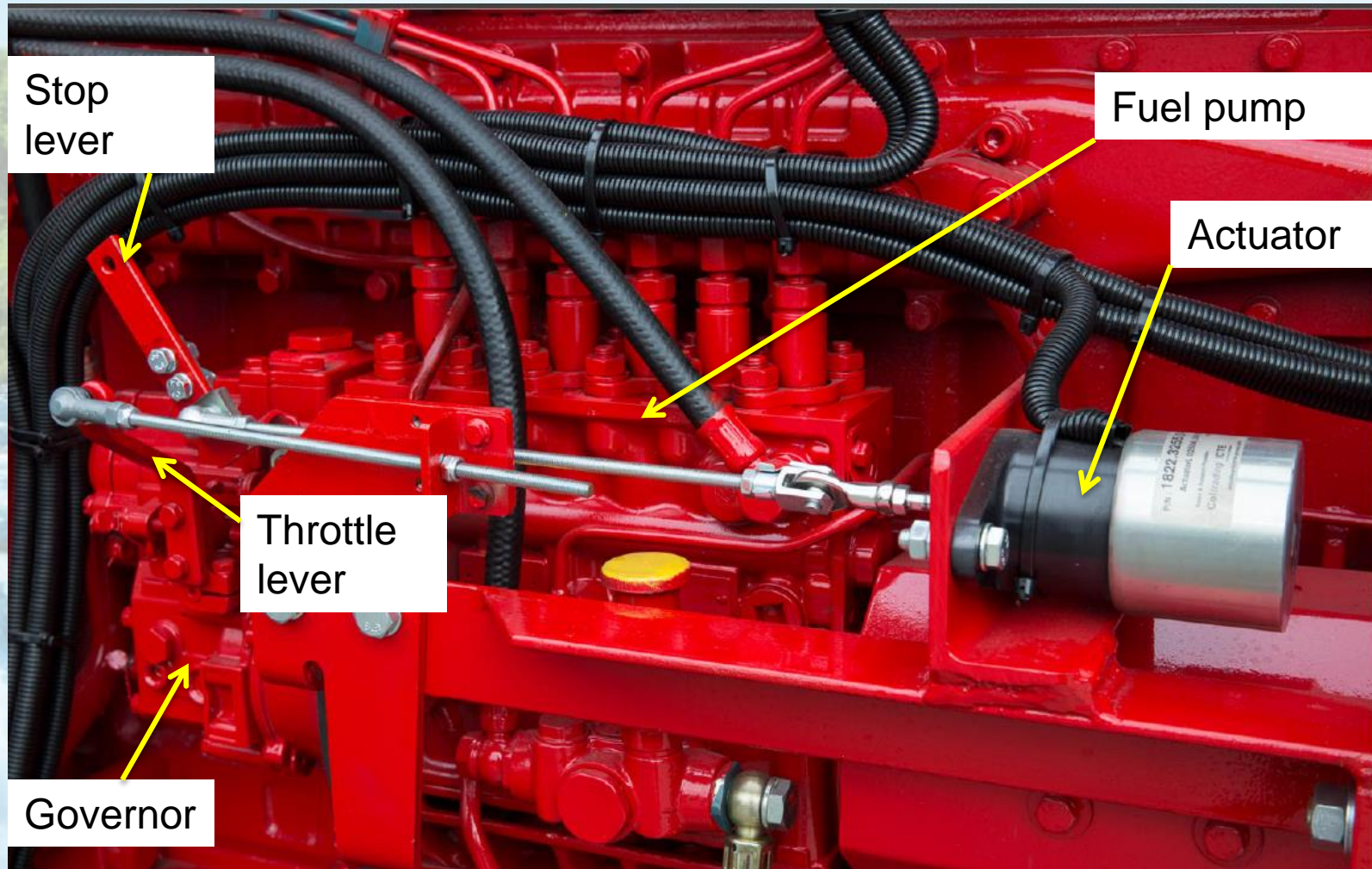
Speed control system

During the Running phase the engine speed is controlled by a mechanical governor on the fuel pump.

During the Startup and Cooldown phases the engine speed is reduced by operating the stop lever through an actuator. This actuator is controlled by the controller.

The actuator is “fail safe”, i.e. when not in operation the stop lever is fully released so the engine will run at nominal speed controlled by the governor.

DESCRIPTION OF HI-PR



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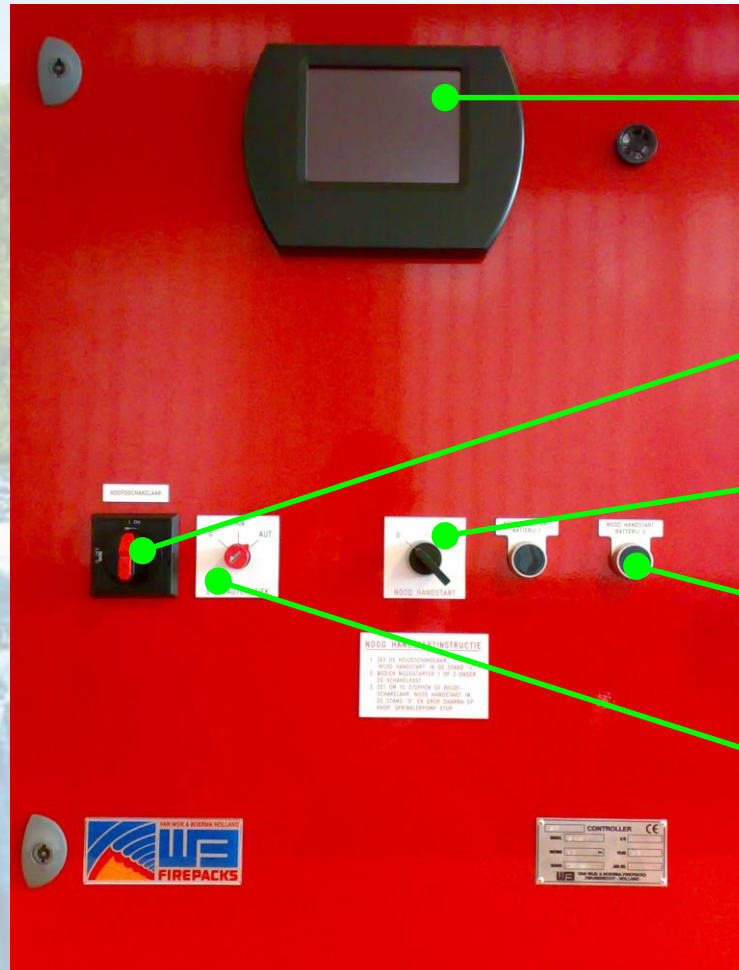
Unloader valve

To unload the pumps and engine an motor operated ball valve is fitted. The valve is driven with a 24V electric motor from the batteries.

To minimize cavitation restrictions are installed behind the valve which provide 25 bar backpressure @ idle speed.



WB-CAN CONTROLLER



Control panel
(touchscreen)

Main switch

Emergency start

Emergency stop

Key switch

AUTOMATED TEST RUN

Fire fighting regulations stipulate:

- Engine protection not allowed, i.e. “Run to destruction”.
- Pump set should run weekly for 30 minutes, initiated by simulating a fire command.

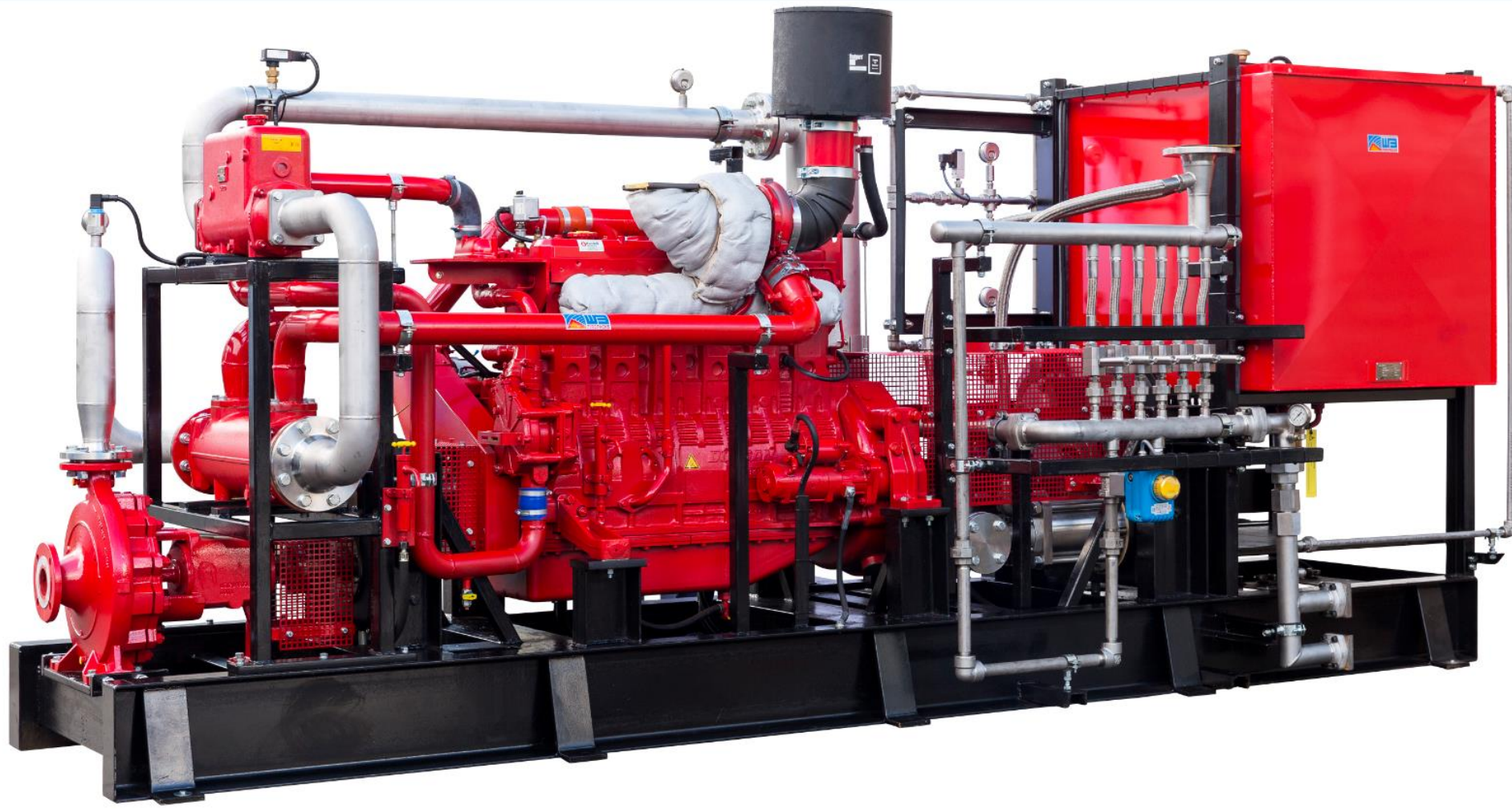
Consequences:

- The engine runs unprotected during test.
- The engine is immediately brought up to speed and load from a cold start.

Therefore the HI-PR Firepack is equipped with an automated test run.

- Engine protection enabled.
- Insertion of Warmup phase between Startup and Running phases.

HI-PR Firepack



The never failing
power behind safety

Unique features of the HI-PR Firepack

- Integrated boost pump so the **HI-PR Firepack** functions as standalone unit, without external energy source.
- Cooling of diesel engine integrated in the main circuit, no need for separate cooling pumps and piping.
- Standard equipped with WBCAN controller, listed according NFPA-20.
- Combination of electronically controlled valves and speed control ensures gradual pressure control without pressure spikes.
- Long service life due to automatic test procedure and “cool-down” cycle.

Questions ??

