



Under Pressure? Safeguard Your Sprinkler System with a Clarke Pressure Limiting Driver (PLD-D).

Sprinkler systems are vital components of any fire protection strategy, designed to operate at their maximum allowable working pressure to suppress fires effectively.

Achieving and sustaining this optimal pressure is not without challenges. The risk of over-pressurization can jeopardize the entire fire protection system.

Select a variable speed diesel fire pump engine and components that are high quality and economically viable to mitigate this risk. You won't find a better option than a diesel fire pump engine with a pressure-limiting device (PLD), variable speed diesel with a standard diesel fire pump controller, to significantly enhance the reliability and performance of your fire pump system.

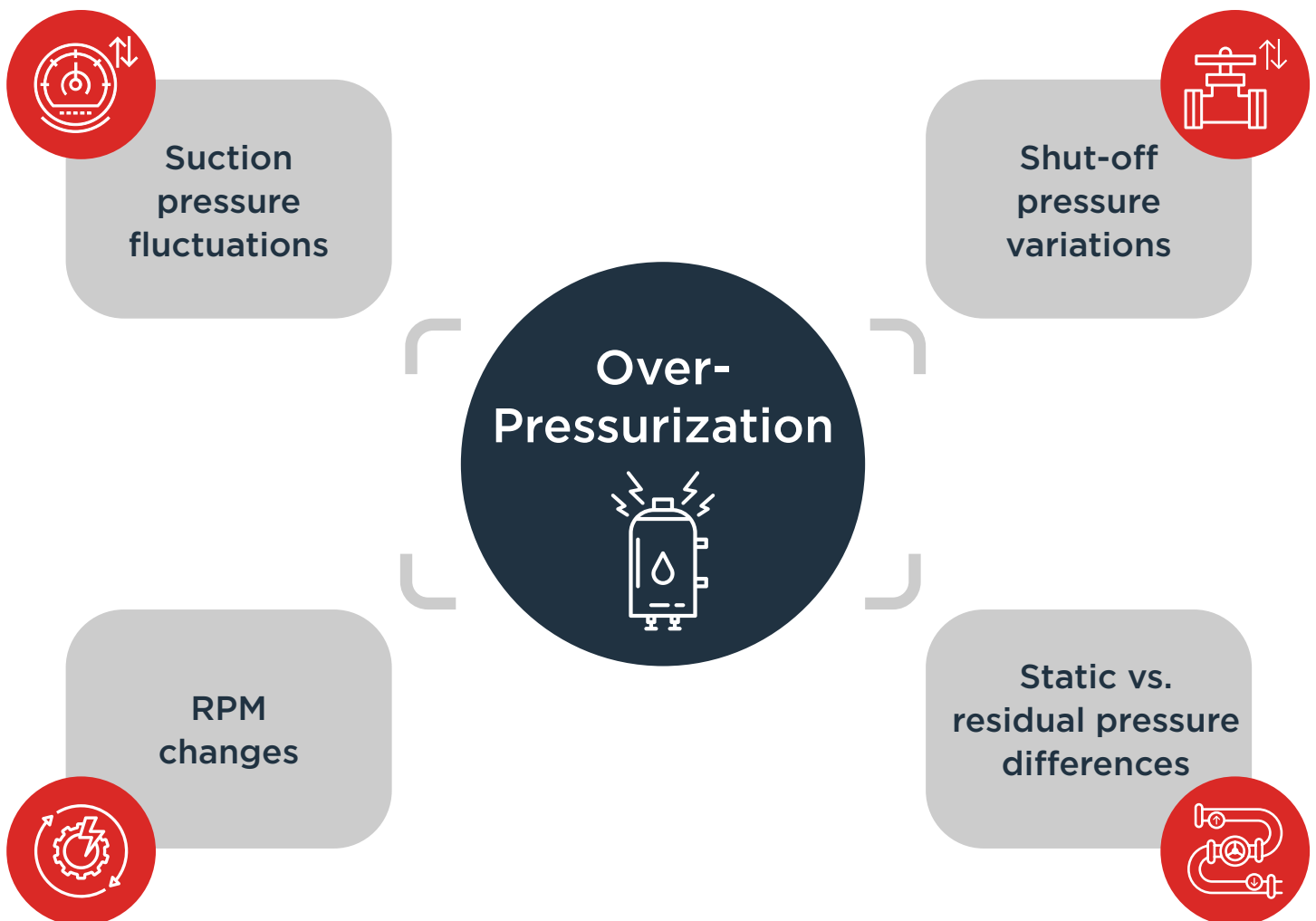
Over-Pressurization — More Common Than You Might Expect!

Sprinkler system components are typically designed for a pressure threshold of 175 psi. Although this number may sound substantial, over-pressurization is a more common problem than one might expect.

Even a well-engineered fire protection system can become over-pressured due to several unpredictable variables, including:

- Fluctuating suction supply pressure
- Shut-Off pressure at no flow
- Shifting driver speeds between full and partial loads

These factors can cause pressures to exceed safe levels and pose a serious threat to the integrity of the fire pump system.



Not an Easy Problem to Solve

Addressing over-pressurization is no simple feat. Several methods exist, but many introduce new complexities or are cost prohibitive. These methods include:

- Some fittings and brass components — including valves and sprinkler heads — can fail when exposed to pressures exceeding 175 psi. Using components that are rated for higher pressures can be expensive.
- Pressure control valves (PCV's) can help you maintain a constant suction pressure for high rise applications, but these can be expensive to install and maintain. Clarke's PLD reduces the quantity of pressure control valves by capping the maximum pressure sent to the sprinkler system.
- A generously sized pressure relief valve (PRV) or main relief valve (MRV) might help reduce discharge pressures — but NFPA 20, Section 4.7.7.2 (2025) prohibits this approach. Moreover, designing a system to discharge water every time it runs or is tested is inefficient and poor design practice.
- A break tank could be used as the suction supply for the fire pump, but that adds to the cost of the installation and requires an automatic fill arrangement, which may reduce the overall reliability of the system.
- Installing a ground water storage tank that meets the total fire flow requirement adds significantly to the cost of the installation, and requires additional space to locate the tank.

SOLUTION	OVER-PRESSURE CONTROL	COST EFFICIENCY	UL/FM COMPLIANT	DESIGN SIMPLICITY
Pressure Relief Valve	✗	✗	✗	✗
Break Tank	✓	✗	✓	✗
Pressure Control Valve	✓	✗	✓	✗
Clarke PLD Engine	✓	✓	✓	✓

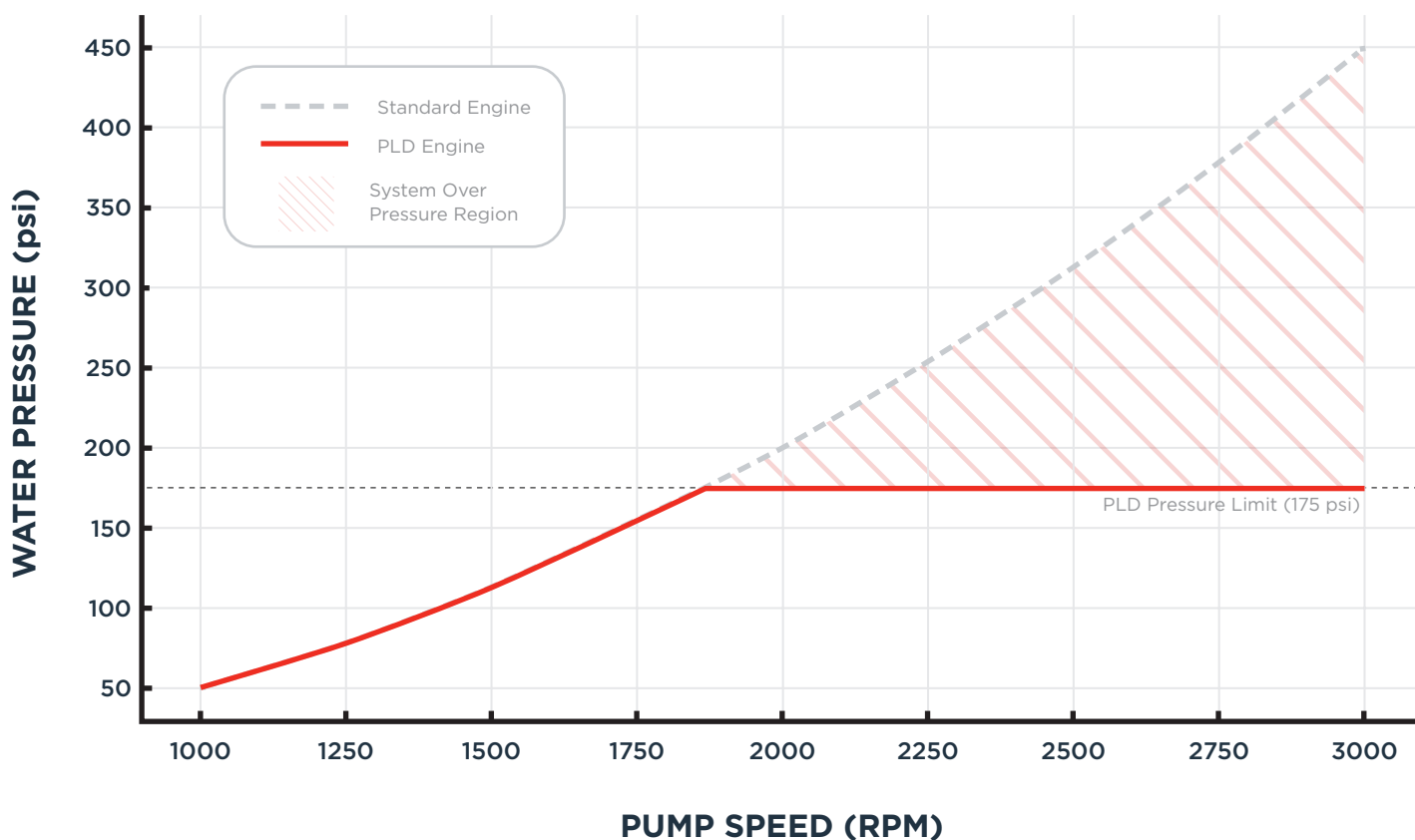
Clarke recognized the limitations of each of these so-called solutions. In 2004, they revolutionized the market by engineering the first PLD variable speed diesel engine, specifically designed to address over-pressurization challenges without these drawbacks.

Understanding Clarke PLDs

The Clarke PLD for discharge pressure limiting control (-D) is a UL/FM-certified diesel engine fire pump driver. Clarke's PLD device is designed to effectively reduce engine speed to limit maximum pump discharge pressure. Because water pressure increases with the square of the pump's speed ($\text{pressure} \propto \text{RPM}^2$), even modest speed reductions can significantly lower pressure. This reduction enables precise pressure management and the ability to maintain a constant, safe sprinkler system pressure.

"PLD technology is very unique," Bryan Griffin, training manager for Clarke Fire. "From my experience, I don't think there's anything else there that really compares to what it's accomplishing in terms of providing flow and pressure without having to worry about over-pressurizing the system."

Effect of RPM on Water Pressure: Standard vs. PLD Engine

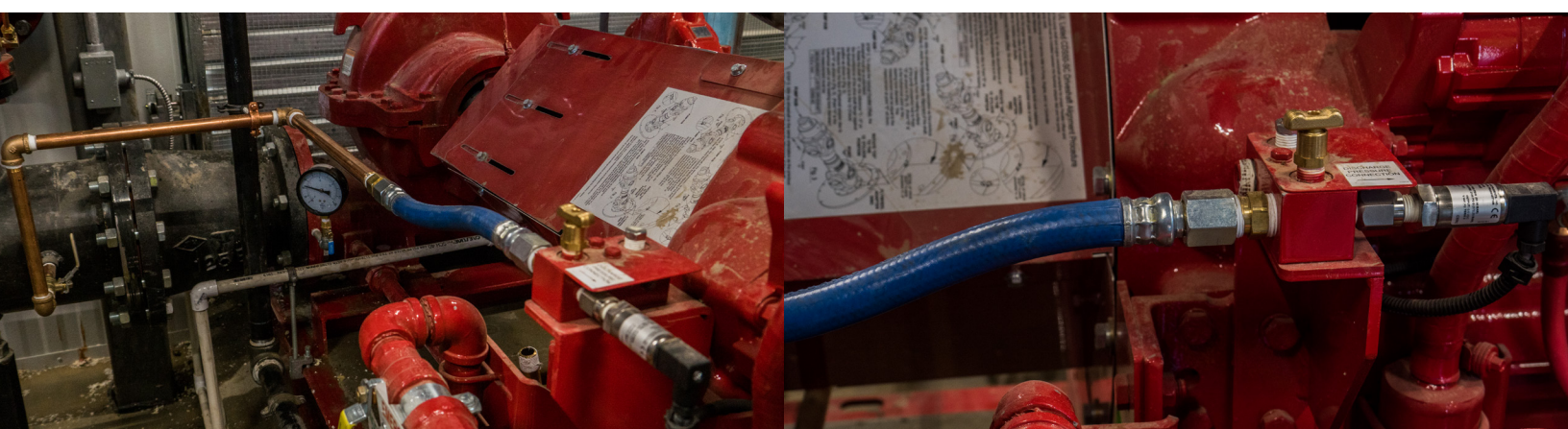


Configuring the Clarke PLD-equipped Engine for Your Application

The Clarke PLD-equipped engine can be factory set at any specific pressure between 100 and 350 psi. These engines can be used for many versatile applications, such as:

- Diesel-driven fire pumps using municipal water supplies with pressure ratings of 125 psi or higher could exceed 175 psi while running weekly tests at no flow.
- Facilities requiring two water sources.
- Multi-building fire protection systems using a single fire pump (new)
- Installations experiencing large static and residual suction pressure differences often found on ESFR equipped sprinkler systems

APPLICATION	BENEFIT OF PLD
Municipal supply >125 psi	Prevents over-pressurization while running at no flow
Multi-building systems	Simplifies design
High static suction pressure	Enables stable control
High-rises	Reduces PCVs needed



PLD Technology Offers Compelling Advantages

Clarke's innovative and industry-first patented PLD has many benefits:



Control of system over-pressure. The foremost benefit of PLD engines is reliable control of system over-pressure without the need for any device in the main supply line. This control eliminates a major vulnerability — a device failure in the main line could otherwise interrupt the water supply during critical moments.



Steeper shutoff curves. PLDs allow the use of pumps with steeper shutoff curves, which need less horsepower — potentially reducing both engine and pump costs.



Eliminate Wasting Treated Water. Clarke's PLD engines eliminate the need for dumping water out of the pressure relief valve during weekly pump tests, to reduce pressure below the system pressure, saving water and reducing maintenance costs.



High-rise applications. High-rise applications particularly benefit from PLDs. They reduce the quantity of required pressure control valves (PCV's) by limiting maximum pressures applied to sprinkler systems.



Design efficiency. With PLD's, designers no longer need to specify multiple engine/pump combinations for different pressure scenarios, to keep the pump pressure from exceeding the system pressure. The result is a streamlined engineering process and reduced margin for error.



Avoiding break tanks. Facilities can also use Clarke's PLD engines to avoid installing costly and space-consuming break tanks. This translates into immediate cost savings and frees up valuable real estate for other purposes.



Help to guide selection. Each PLD engine maintains a minimum operational RPM. To ensure sufficient pressure reduction for specific installations, Clarke Fire offers an online calculator and expert consultation. These services can guide customers in selecting the appropriate equipment.



Optimized pipe sizing. PLD enables smaller pipe size saving costs for large facilities like warehouses. "A half million dollars for a 1,000,000 square foot building is the difference between a 2.5" and 3" pipe size," explains Griffin.

Safety Starts with Smart Design

Clarke's PLD technology has evolved from an option to a necessity for designing safe, efficient, and reliable fire protection systems. PLDs enable significant sprinkler system and standpipe cost savings, all while improving the overall reliability and performance of fire suppression systems.

When you invest in Clarke's proven PLD solutions, you safeguard your property and occupants. You also ensure your fire protection system operates at peak performance when it matters most.

REFERENCES

<https://www.nfpa.org/news-blogs-and-articles/blogs/2021/11/19/standpipe-system-design-and-calculations>

<https://www.csemag.com/articles/learn-to-specify-pressure-regulating-devices-in-water-based-fire-protection/>

"Solving Overpressure Problems with a Variable-Speed Fire Pump," by William F. Stelter, PE, and James Peterkin, PE, Plumbing Systems & Design Magazine, September 2011

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