SHIELD Lite V2.0
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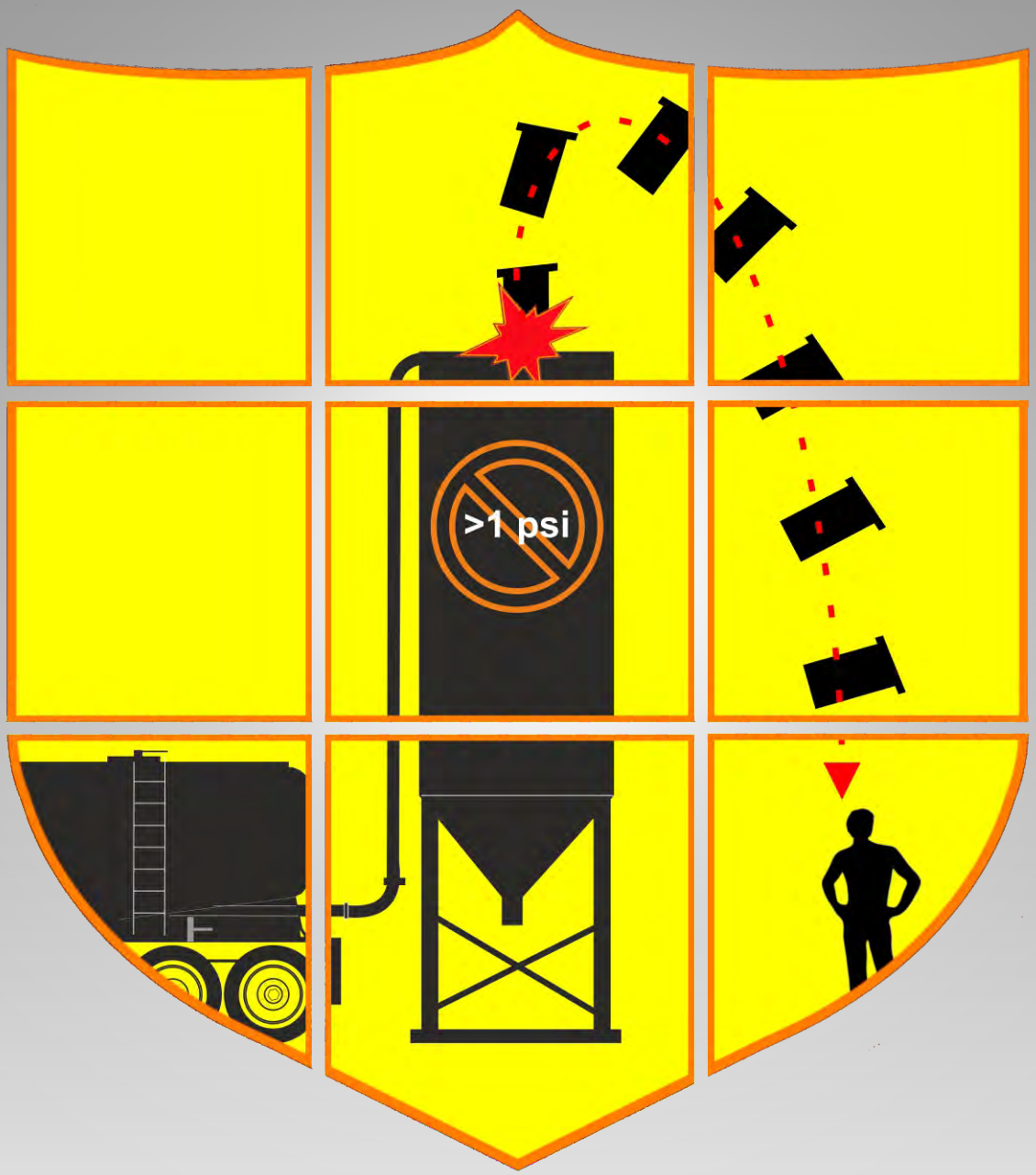


SHIELD LITE

IT'S TIME TO MAKE SILOS SAFE

HYCONTROL

WHAT MAKES POWDER DELIVERIES DANGEROUS?

The pneumatic discharge of powders into silos occurs hundreds of times every day across many industries. The powder is fluidised and blown in at high pressure.

Deliveries that are not well controlled and monitored or silos that are not correctly equipped and maintained risk silo over-pressurisation. The consequences of this can include a blowout or the silo rupturing. Over-pressurisation results from a blocked silo air filter or an uncontrolled tanker discharge and poses several dangers:

Silo Failure/Risk to Personnel

Most silos are not pressure vessels. It will only take a one psi pressure increase during a fill to buckle and weaken the silo, cause it to rupture, or even blow the filter off the silo roof. If a filter unit (which may weigh over 100 kg) falls from the silo-top onto an area where site personnel are working, it could cause severe injury or a fatality.

Risk to Site and the Environment

The over-pressurisation that results from failing to control a fill or missing maintenance frequently leads to clouds of powder blowing out of the silo. Leaked product eventually blocks pressure relief valves, risking a full-blown over-pressurisation event. Furthermore, leaking corrosive or hazardous products will cause considerable environmental damage, resulting in fines or removing permits to operate.

Risk from Working at Height

To control a delivery and safely vent pressurised air, one must fit safety equipment at the silo top. Therefore, working at height is needed to check this equipment is working, risking trips or falls. Ironically, testing and checking these safety devices puts workers directly in danger.

Even with the correct safety gear, working at height is dangerous. **It is the single highest cause of workplace fatalities in the UK and other countries.**

WHAT ARE THE WARNING SIGNS OF DANGER?

The most common indicator of silo over-pressurisation is powder on and around the pressure relief valve (PRV). A common misconception is that when PRVs vent powder, it is due to overfilling, or it shows that the system is doing its job correctly. Neither of these is the case. **Venting powder is a sign that the silo protection system has failed.** Product is escaping because the silo is under too much pressure. Vented powder is dangerous if left to pile up, as it will solidify and block the PRV completely.

The images below show some of the common symptoms of silo pressure problems. Powder may blow out of PRVs, encasing the valve and covering the silo top. Pressure sensors may be damaged or faulty. Filter cartridges may show signs of blockage. **Site must investigate these warning signs of silo protection failure.**







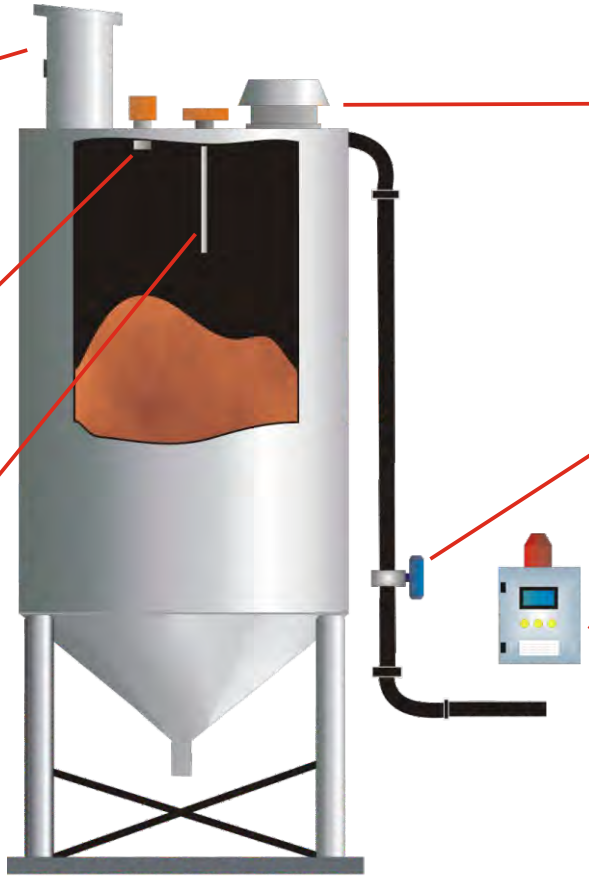


HOW DO YOU STOP SILO OVER-PRESSURISATION?

The typical error sites make is installing a 'Frankenstein' system of general-purpose parts, which are inadequately maintained or tested. Critically, this equipment is unlikely to be failsafe, so when it fails, it goes dangerously unnoticed.

Over-pressurisation is quite simple: primarily a silo safety system failure or a driver error, commonly described as an uncontrolled delivery. The solution to these problems is to **monitor and control** the delivery. For this, you require a silo protection system, *as outlined below.*

Monitoring the pressure in the silo means greater control, removing the risk of over-pressurisation. Like any safety-related system, this equipment must be **failsafe**. An everyday example is a house smoke alarm that beeps when the battery starts to fail, indicating you need to replace it. Unfortunately, most silo systems on the market today are not failsafe.



Filter unit
often referred to as a dust collector, bin vent or reverse jet filter
- allows air to escape and the dust to be returned to the silo

Pressure relief valve (PRV) (FAILSAFE)
- emergency back up for the silo protection system - this opens if all else fails but ordinarily should never be used. It is the last line of defence

Pressure sensor (FAILSAFE)
- the primary safety device that detects dangerous increases in pressure to shut down the delivery before the PRV lifts

Inlet shut-off valve (FAILSAFE)
- to automatically control the delivery on a high-pressure, PRV lift or a high-level, without driver intervention

High-level sensor (FAILSAFE)
- to stop filter blinding and indicate silo full.

Silo protection control panel at fill point (FAILSAFE)
- this auto shut-off panel connects to sensors and shut-off valve to monitor and control the process. Provides audio/visual alarms for the silo; controls the filter on/off during deliveries

SHIELD Lite Safety System

The new **SHIELD Lite** safety system from **Hycontrol** is different. It is the *only* silo pressure safety system on the market that exceeds standards set by the UK MPA (Mineral Products Association).

All the components of SHIELD Lite are entirely failsafe. If the pressure sensor, level probe, PRV or panel has a fault, the system will highlight this so action can be taken before another delivery takes place.

SILO SAFETY - STRAIGHT OUT OF THE BOX

SHIELD Lite is the one-box answer to the question of silo pressure safety. Everything you need to prevent over-pressurisation ships to your site in one package.

Integrated System

SHIELD Lite arrives with all integrated silo-top components (PRV, pressure sensor and level probe) assembled and pre-wired as a single unit, ready to bolt in place. This whole system uses a single process connection, minimising the silo-top footprint. Minimal cabling on the silo roof reduces risk from trips and falls.

Simple Installation

Simplified wiring between the silo top and panel has been reduced to just four wires, cutting installation time and costs. SHIELD Lite is pre-programmed and configured, so the system is ready to go once connected. The first system test will highlight any user wiring errors so that you can put them right immediately.

Manuals and Installation Videos

Hycontrol provides complete documentation and instructional videos for installing, commissioning, and operating the SHIELD Lite system. Rather than multiple manuals for different components, SHIELD Lite requires only one.

All these resources are available through Hycontrol's specialist website, **www.siloprotection.com.**

What's in the Box?

Pictured right are all the system components included in the SHIELD Lite package. The system is carefully boxed for transit and ready for installation when it arrives on-site.

SHIELD Lite will connect to and control the dust collector/air filter and the inlet valve, thus overseeing the whole silo system during the delivery.

HOW DOES SHIELD LITE REMOVE THE RISK?

The safety triangle, *opposite*, highlights the three key delivery risk areas. Failure in any of these can lead to over-pressurisation. An uncontrolled delivery, incorrect safety equipment, or lack of maintenance can result in system failure and silo over-pressurisation.

SHIELD Lite deals with each of these problems to remove the risk.

Employees/Uncontrolled Deliveries

The driver's delivery process is manual. They listen for a change in sound, tap the side to check the level and try to control the flow rates and pressures from the back of the truck. So it is no surprise that things go wrong. SHIELD Lite takes control of the whole delivery to stop this. SHIELD monitors the fill - if an over-pressurisation or high-level is detected, it takes action, closing the fill line.

Incorrect Safety Equipment Fitted

It's common to find sites fitting the cheapest, non-failsafe equipment. Therefore they have no way to detect failure. In contrast, all elements of SHIELD Lite are wholly failsafe. As a result, cable breakages, PCB failures and switch problems will be exposed, triggering an alarm to alert operators.

Maintenance Issues

Poor maintenance is a universal problem; human error will always create issues. However, even with good upkeep, things can go wrong. SHIELD Lite's patented **Ground Level Test (GLT)** function tests the pressure sensor, pressure relief valve, level probe and inlet valve before filling is permitted. This six-second routine ensures everything is fully functional; it even cleans the pressure sensor.

A recent survey of 100 silos fitted with low-cost sensors found nearly 25% had faulty equipment installed, undetected by their current maintenance providers. GLT prevents this and eliminates unnecessary working at height, making sites even safer.

INTELLIGENT MONITORING FOR PREDICTIVE MAINTENANCE

Monitoring your silo constantly during deliveries is essential. But SHIELD Lite does much more; in the background, it continuously records information to assist with preventative and predictive maintenance. **SHIELD Lite logs multiple data streams during a delivery, including:**

- **High-pressure events**
- **High-level events**
- **Pressure relief valve lifts (emission events recording)**
- **Override statistics**
- **Filter run time stats for cartridge life optimisation**
- **Valve override or tampering**
- **Worn valve alarm**
- **Ratio alarms for high-pressure events**
- **Predictive filter blocking issue**
- **Poor driver behaviour monitoring**

The new ratio alarms help identify driver behaviour problems. Excessive high pressure or PRV events from uncontrolled discharges will lock the system, pointing clearly to the source of the problem and forcing site management to take corrective action. Hazardous performance cannot be hidden or ignored.

The system identifies blocked or faulty filters, tracking the run time to advise when to change cartridges, meaning there is no excuse for poor maintenance.

It’s Time to Make Your Silo Safe

SHIELD Lite is an extra pair of eyes fixed on your silo at all times. It supervises every delivery into the silo, monitoring and controlling throughout. The system enforces best practices amongst drivers and operators.

SHIELD Lite offers an optimum return on investment by significantly reducing risk, removing product loss, improving efficiency and enforcing best practices. **The failsafe SHIELD Lite silo protection system will keep a silo operating safely for years to come.**

SYSTEM OVERVIEW

The **SHIELD Lite silo protection system provides control and test functions** to prevent silo over-pressurisation and filter blinding during a tanker delivery. The system works with one or two level probes of different lengths; these can be Hycontrol level probes with built-in GLT or an alternative manufacturer (providing it is compatible with the SHIELD Lite system).

A successful test opens the failsafe fill point valve to allow filling for 90 minutes, after which it will close. Simultaneously, a siren and beacon will also sound to test their operation.

During a fill:

If a **high-pressure alert** is detected, the alarm and beacon activate and instantly close the inlet valve.

If a **PRV opening** is detected, the alarm and beacon activate and instantly close the inlet valve.

If a **high-level alert** is detected, the alarm and beacon activate, and the inlet valve closes after 30 seconds.

Logs totalised counts for pressure, level, PRV, override, and vacuum detection incidents. Ratio alarms provide early warning of blocked filters or poor driver behaviour. The control panel switches the silo filter on and off.

Simple, unique key operation with information displayed clearly on a backlit LCD screen.

SPS-SHIELDLITE Specification

Material specification

PRV weather cover:	Pinseal Polypropylene
Main GLT module:	Powder coated mild steel
Valve seal:	EPDM rubber
6mm tubing:	Polyurethane
6mm fittings:	Nickel plated brass
External regulator body:	Polyamide
Air cylinder:	Aluminium, anodised
Proximity sensor:	Nickel plated brass
Pressure transmitter:	Stainless steel

PRV components specification

Inlet regulator:	6mm male pipe
Spring:	50 to 60 millibar (0.73 to 0.87psi)
	302STST

Pneumatic specification

Air supply quality:	Clean dry filtered air 25 micron
Air supply required for GLT:	6.0 bar (87 psi) typically
(6mm tubing)	5.5 bar (80 psi) minimum

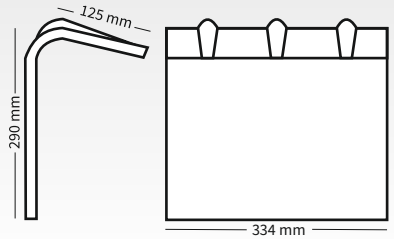
Control box specification

Enclosure:	ABS
IP rating:	IP66/IP67
Connectors electrical entry:	M20 cable gland (Ø 7-12.5mm) (Ø 9/32 – 1/2”)
	M16 cable gland (Ø 3-6.5mm) (Ø 1/8 – 1/4”)
Pressure sensor:	-100 to +100mB (-1.45 to 1.45 psi)
Electrical supply:	24 VDC (provided by SHIELDLITEDB panel)
Temperature range (ambient):	-20°C to +50°C (-4°F to +122°F)
Weight:	20 kg with mounting flange

Control panel

Enclosure:	ABS
IP rating:	IP65
Connectors electrical entry:	3 x M20 cable gland (Ø 7-12.5mm) (Ø 9/32 – 1/2”)
	1 x M16 cable gland (Ø 3-6.5mm) (Ø 1/8 – 1/4”)
Electrical supply:	100-240 VAC (50-60 Hz)
Outputs:	(*Optional*) MODBUS R485 serial comms.

Control panel weather shield
Material: UV-resistant Polypropylene



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