LIFEGUARD™
SAFETY SYSTEM

HYDROGEN HOSES | CRYOGENIC LIQUID CYLINDER HOSES | METAL PIGTAILS | LIFEGUARD COMPRESSED GAS HOSES | CARBON DIOXIDE BULK LIQUID TRANSFER HOSES

What is LifeGuard™ Safety Hose Technology?

The ***LifeGuard Safety Hose technology*** is a proven hose technology designed to counteract the hazardous effect of hose rupture or failure during fluid or gaseous transfer operations. All

LifeGuard Safety Hose designs, **LifeGuard Safety Hose I, LifeGuard Tri-Bolt Breakaway**

Safety Hose utilize the unique, patented and patent pending design eliminating the potential fordisaster through the use of an internal cable connected to specially designed, normally unseated valve "flappers or plungers" located on each end of the cable. The "LifeGuard™ Safety" system will shut-off the flow of product conveyed in both directions instantly in the event of a hose coupling ejection, hose stretching to an unsafe condition or hose separation.

How does *LifeGuard Safety Hose* technology work?

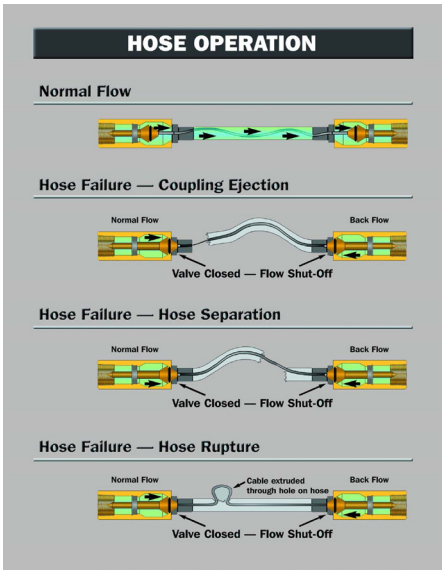
LifeGuard Safety Hose incorporates a coated cable within the hose bore that is connected to the valve plungers, or flappers. This cable acts as a compression spring providing thrust in the direction of both ends of the hose, holding the valves open. Should this thrust be eliminated due to coupling ejection, hose stretching or hose separation, the valves release and instantly seat, stopping flow in both directions.

In the event of hose separation, stretching to the point of an unsafe condition or coupling-to-hose separation, the valve "Flappers or Plungers" are released and instantly seat **stopping the flow in both directions.**

LifeGuard Safety Hose Features

Some of the elements of our fundamental value proposition - innovation, safety and cost:

1. All major industrial gas producers use LifeGuard Safety Hose with three issuing global specifications!
2. History - Over 400,000 hoses using this technology are in service.
3. No significant cost differential between LifeGuard Safety Hose and Non-Safety-Hoses
4. Eliminate costs associated with environmental damage and remediation - Reduced legal and insurance costs.
5. No additional training required for operators- Many employees will not even know that they are using a LifeGuard SafetyHose!
6. LifeGuard Safety Hose costs slightly more but in all events this cost is immaterial when compared to the safety benefit.
7. Allows industry players to respond to warnings as they relate to reliance upon Excess Flow Valves in the event of hose failure in related applications.



LIFEGUARD TECHNOLOGIES
The next generation in safety hoses

info@lifeguard-tech.com | www.thesafesthose.com | Toll Free 855-GPSS-USA | 855-477-7872

LIFEGUARD™
SAFETY SYSTEM

HYDROGEN HOSES | CRYOGENIC LIQUID CYLINDER HOSES | METAL PIGTAILS | LIFEGUARD COMPRESSED GAS HOSES | CARBON DIOXIDE BULK LIQUID TRANSFER HOSES

Typical Questions About LifeGuard

We have been asked many different questions, some of which your company may know but much has been developed over the last several years.

1. **Is there a flow restriction?** We have had extensive testing performed by Air Liquide, Praxair and Linde and independent laboratories all indicating that nominal flow restriction exists. Please review the attached report for further information.
2. **If the hose stretches but does not separate, will the flow be stopped?** Hoses are designed to have nominal, if any, stretching. Far too often, hose failure and the attendant results are caused by hoses that have been stretched to a less than optimal operational length and then returned to active service. With LifeGuard, the hose would require a 5% elongation (on average) before our patented internal shutoff mechanisms would function. Therefore a hose that has been stretched to a dangerous length is returned to active service, our system will safeguard its use by preemptively stopping the flow. Should the hose be a rubber or flexible type that returns to its standard length, our system will reset itself and no flow will be stopped. Note: all hoses are tested for cable thrust to insure that all components meet the LifeGuard Safety Hose specifications.
3. **What holds the "Plunger" in an open position to ensure against accidental closing?** Valve plungers, or flappers installed at both ends of the hose, accomplish closure. During normal operation they are kept open by a coated cable (where appropriate) incorporated within the hose bore. This cable acts as a compression spring providing thrust in the direction of both ends of the hose, holding the valves open. The cable thrust is carefully determined to insure against premature closure. Should this thrust be eliminated due to coupling ejection, hose stretching or hose separation, the valves are released and instantly seat, stopping flow in both directions. The picture above illustrates this principle.
4. **What applications has LifeGuard Safety Hose been sold for?** LifeGuard Safety Hose is a technology that reduces the consequences, associated with certain hose ruptures. It may also reduce operating costs by eliminating an operator's position in cases where government regulations require constant personnel attention while using hoses. We have sold in excess of 400,000 hose assemblies over the last eight years for the following applications: High Pressure Cylinder Filling (¼" to 1"), cryogenics transfer (¼" to 1"), cryogenics trailer hose (1"-2"), LP (units from ¾" to 3"), NH3 (in size from 1" to 6"), SO2 (2"), Metallic hose (from ½" to 2"), CO2 (½" to 2"), HCL (at 1"), Chlorine (1-2"), Petroleum Transfer (2-3"), General Chemical (1"-2") of such hoses to companies like Shell, Dow Chemical, Dow Corning, Amerigas, Linde, Air Liquide, AGA Sweden, BASF, PPG and others.
5. **What are the various fitting designs?** Three styles of LifeGuard Safety Hose shut off devices, known as Lifeline I, II. Lifeline I is used for most small hose applications, ¼ - inch to 1¼ - inch. The coupling is constructed of monel, brass, or stainless 316. Lifeline II is used with 1-inch and 2-inch hoses and the coupling is constructed of Monel, stainless 316 steel, or carbon steel. Our Tri-Bolt Breakaway design is used with most large hose diameters, 1½ - inch to 6 - inch. The coupling is constructed of stainless 316 for most applications.

LIFEGUARD™ SAFETY SYSTEM

HYDROGEN HOSES | CRYOGENIC LIQUID CYLINDER HOSES | METAL PIGTAILS | LIFEGUARD COMPRESSED GAS HOSES | CARBON DIOXIDE BULK LIQUID TRANSFER HOSES

6. **What are the additional benefits of this technology?** A primary benefit of the shut off design used with LifeGuard Safety Hose is the reduction in consequence related to hose separation. After a hose separation occurs, the shut off device stops flow reducing the amount of product that is released. Other potential benefits are:

- When replacing a hose, the couplings (in most applications) can be re-used, thus reducing the cost for replacement hose.
- LifeGuard Safety Hose is certified as a passive shutdown system per CFR 49 paragraphs 171 through 180 for hazardous materials. This allows the attendant during unmetered truck unloading to move up to 25 feet (7.6 meters) away from the manual shutoff valve rather than remaining within 3 feet (1 meter) where such a system is not provided.
- LifeGuard Safety Hose is an exemption to the attendance requirement for Railcar delivery as required under 49 CFR 174.67 (Exemption No. 12325-N)
- LifeGuard Safety Hose has a pending exemption for the attendance requirement for tank truck delivery for products such as gasoline, chemicals (Exemption No. 12625-N)
- LifeGuard Safety Hose is under consideration by the US Coast Guard for exemption status under 49 CFR 151.

The following are answers to some common questions about the LifeGuard Safety Hoses:	
Sizes	Available in all sizes between ¼″ and 6.″ A 12″ size is in the design phase.
Weight of Assemblies	Comparable to standard hose. See chart below
Limitations on Flow Rates	The hose specified in the design determines the flow limitations. The Lifeline design does introduce a restriction equivalent to 4% reduction in flow area. LifeGuard Safety Hose can be used in any application for liquid or gas including gravity drop
Flow Turbulence	Yes, but unmeasured.
Pressure Drop	Nominal.
Are hose strings acceptable	Yes.
Hose Weight with Product For Hoses in hanging applications we've engineered the system to accommodate the weight of hose, connections and weight of product in the hose assemblies	Hose designed to address issue.
Leak size required to stop flow through the hose	Will vary, but hose is not designed for leak protection.
Is "back flow" required to close seating mechanisms	No.
Are valves "spring loaded"	No, the internal cable acts as a spring.
What is the valve closure time	Instantly in both directions.
Is the manufacturing site ISO certified	All of our facilities are in compliance

OUR PARTS NUMBERING SYSTEM:

Example: from below	
TF04	Designates what type of hose (teflon) and working pressure (4500 PSI)
002	Designates size (ID) (in this case ¼")
60	Designates material and thread configuration (in this case BSPP threads)
0036	Designates the length in inches (in this case 36 inches)
TF06-002-11-003-S	
TF06	Designates tefon hose (6000 PSI WP)
002	Size ¼" ID
11	Designates material 316 S/S fitting (in this case ¼") NPT female threads
0036	Designates length in inches (in this case 36 inches or 3 feet)
S	Designates safety loop at each end of hose.
BH22-004-11-0120	
BH22	Designates metal hose (316 S/S core with double braided 304 S/S covering) 3500 PSI
004	Designates size (in this case ½" ID)
11	Designates material 316 S/S fitting (in this case ½" NPT female threads)
0120	Designates length in inches (in this case 120 inches or 10 feet)
TZ51-02-17-0060	
TZ51	Designates type of hose (in this case tefzel) 3500 PSI
002	Designates size (ID) in this case ¼"
17	Designates material brass (in this case ¼" NPT female threads
0060	Designates length in inches (in this case 60 inches or 5 feet)
IR01-004-15-0000	
IR01	Designates type of hose (in this case LPG) 350 PSI
004	Designates size (in this case ½")
15	Designates material 316 S/S fitting (in this case ½" NPT threads)
0000	Designates length in inches and in this case no length was given

LIFEGUARD™ SAFETY SYSTEM

HYDROGEN HOSES | CRYOGENIC LIQUID CYLINDER HOSES | METAL PIGTAILS | LIFEGUARD COMPRESSED GAS HOSES | CARBON DIOXIDE BULK LIQUID TRANSFER HOSES

LifeGuard™ Standard Hose Products

HYDRAULICS		
High & Low Pressure Hose	Adapters	
Crimped & Reusable Ends	Return Line	
Quick Disconnect Couplings	SAE Flanges	
SAE / Metric	Tube Fittings	
Couplings / Clamps	Swivel Joints	
Spiral Hose	Braided Hose	

INDUSTRIAL HOSE		
Ducting	Food Grade	Welding
Composite	Fire	Hand Built
Air	Spray	Hydraulic
Water	Blast	Petroleum
Chemical	Material Handling	Vacuum
Suction	Discharge	Thermoplastic
Teflon	Pressure Washer	Metal
Acid	Special Applications	Washdown
LPG	Concrete Pump	Chlorine
Steam	Vapor Recovery	Snow

ACCESSORIES		
Strainers	Hose Reels	Nozzles
Ball Valves	Clamps	Testing
Covers	Swivel Joints	Gauges

TUBING		
TYGON	NEOPRENE	PVC
Polyethylene	Stainless	Teflon
Nylon Reinforced	Silicone	Nylon
Clear	Assemblies	Gum

CONVEYOR BELTING SERVICES		
Field Splicing	Flexco Fasteners	Flanges
Vulcanization	Lacing	V-Guides
Repairs	Punching	Lap Preparation
		Stringing
Pulley Lagging	Cleat Installation	
Field Installations		

COUPLINGS / CLAMPS / FITTINGS		
Hydraulic	Reusable	Quick Disconnects
Crimped	Dry Disconnect	Cam Lock
Brass	Push-On	Sanitary
Tri Clamp	Stainless Steel	Victaulic
Pre-Formed	Punch-Lock	Boss Clamps
Bolt Clamps	Steam	Worm Gear Clamps

CONVEYOR BELTING		
Heavy Duty	Abrasion Resistant	Cotton
Lightweight	Oil Resistant	Polyester
Rubber	Heat Resistant	Monofilament
PVC Wire Mesh	Nylon	
Urethane	Skirt Rubber	Woven

SHEET RUBBER PRODUCTS		
Molded	EPDM	Diaphragm
Extruded	Gum	Sponge
SBR	Skirtboard	Silicone
Military Spec	Neoprene	Floor Matting

METAL HOSE		
Stainless Steel	Expansion Joints	Monel
Hastelloy	Pump Connectors	Interlock
Bronze	Bellows	Certified

PACKING / GASKETS / SEALING PRODUCTS		
PUMP	NON-ASBESTOS	TEFLON TAPE
Valve Stem	Teflon	Lip Seals
Compression	Graphite	Klozure
Molded	Kevlar	Spiral Wound
Mechanical Seals	Die Formed Rings	Gore Tex
Sheet	Fiberglass	Joint Sealant
Inflatable	Expansion Joints	