

# OIL & GAS EXPERTS

PRESSURE RELIEF & PRESSURE ACTIVATION

WE ARE THE RIGHT SOLUTION





## THE RIGHT SAFETY PRODUCTS WHICH PROTECT

## EQUIPMENT, LIVES & THE ENVIRONMENT

### CONTINENTAL DISC & LAMOT BRAND PRODUCTS

Rupture discs protect tanks, transmission lines, compressors, evaporators, transportation containers, pipes, tubes, coils and instrumentation in all types of gas and liquid handling systems, all while minimizing product loss and keeping your costs low.

As rupture discs become more common in downhole applications, Continental Disc Corporation continues to be the leading expert in developing rupture discs for all phases of the downhole process. Our rupture discs are used to activate tools in the well and to protect valuable components from overpressure failures.

Pressure activation is a common rupture application for downhole tools during the drilling, completion and production of an oil or natural gas well.

### GROTH CORPORATION

In petrochemical and refinery operations, protection from fugitive emissions and from fire are the primary concerns. Groth Corporation pressure safety products protect refineries and petrochemical tank facilities around the globe.

Pressure relief devices are major emission control devices. Relief valves protect against damage from pressure or vacuum and reduce losses from product evaporation. Deflagration and detonation arresters reduce the risk of damage or injury from fire. Blanket gas regulators maintain a constant gas pressure inside the vapor space of a tank to protect against fire or evaporation.



### SAFETY

Safety is defined to be the control of recognized hazards to achieve an acceptable level of risk. This can take the form of being protected from the event or from exposure to something that causes health or economical losses. It can include protection of people or of possessions. Our products serve to protect BOTH!

### QUALITY

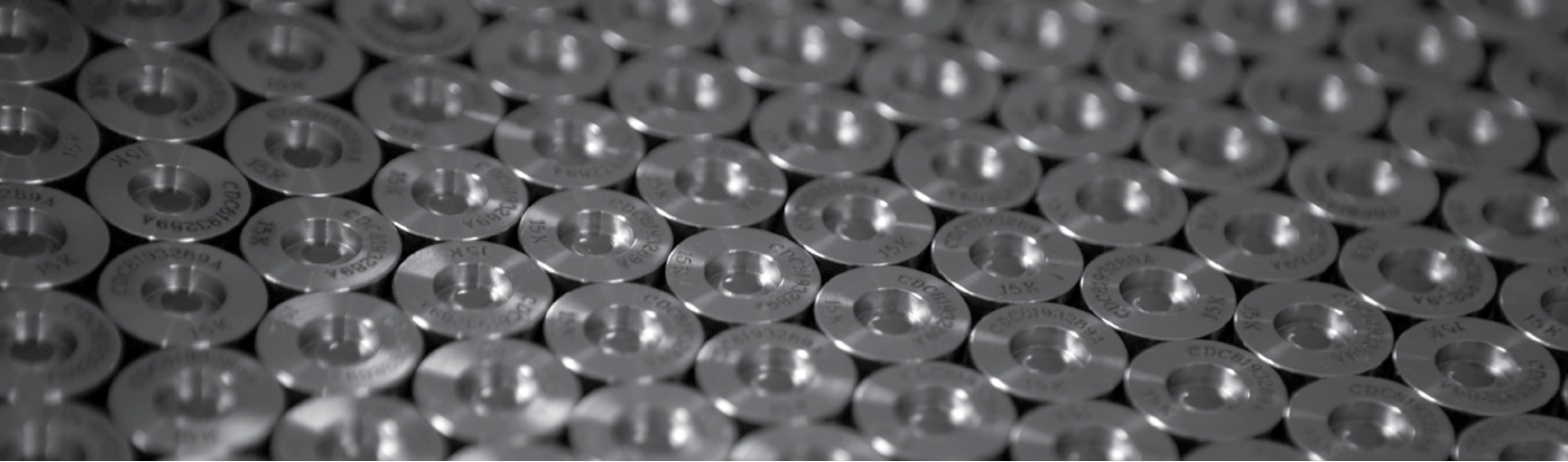
Our commitment to quality is reflected in the certificates and licenses that have been awarded to our qual-

ity system, our manufacturing processes and to our products. In many cases, we were the first manufacturer to be cited, and we have led the way by participating in setting the standards that define our industry.

### PROTECTION

Whether it is protecting your equipment, your team's lives or the environment, Continental Disc Corporation, LaMOT Brand Products and Groth Corporation are poised and ready...we are your Oil & Gas Industry Experts!





## INSPIRED TO DEVELOP NEW APPLICATIONS

### THE RIGHT SOLUTIONS // CDC & LAMOT

#### REVERSE ACTING RUPTURE DISCS

**Reverse Acting Rupture Discs** are oriented in a system with the process media against the convex side of the disc, placing the rupture disc in compression. Reverse Acting Rupture Discs are ideal for primary relief, secondary relief or in combination with pressure relief valves. Common applications for the HPX® and LOTRX® Rupture Discs are separators, distillation columns, choking drums or isolation of a PRV. The HPX® Rupture Disc has optimal operating ratio, extreme pressure cycle durability and is designed to be non-fragmenting. The LOTRX® Rupture Disc is designed for extremely low pressure applications.

**Reverse Acting Rupture Disc Holders** are designed to meet the needs of the oil and gas industry. The INSERT Holder fits between two companion flanges and allows for easy installation and replacement of the rupture disc. PRE-TORQUED Holders are available for applications where the companion flanges are not able to achieve the required torque to seal the rupture disc device. A Double Disc Assembly has two rupture discs in-line for the following applications: to isolate backpressure from a common header or detect corrosion in a process system without releasing harmful agents to the environment. A proper holder is an integral part of the rupture disc relief system. The holder provides a controlled environment for the rupture disc to operate properly, providing maximum performance and process safety.

#### TENSION ACTING RUPTURE DISCS

**Tension Type Rupture Discs** are fail-safe, pressure relieving devices which are ideal for primary and secondary relief applications. Common applications for Standard, Composite Type and MICRO X® Rupture Discs are sepa-

rators, storage tanks and wellhead protection. Standard and Composite Type Rupture Discs are available in a wide range of pressures. The MICRO X® Rupture Disc is cross-scored, designed for non-fragmentation and available with higher operating ratios.

**Tension Type Rupture Disc Holders** are also designed to meet the needs of the oil and gas industry. The UNION® Holder provides flexibility in tight piping configurations while ensuring easy assembly of the holder. The FULL BOLTED Holder incorporates the rupture disc seating area into a set of companion flanges. The INSERT Holder fits between two companion flanges and allows for easy installation and replacement of the rupture disc. WMP™ (Welded Muffed Plug), SCREW TYPE Holders, TITE-SEAL and THROWAWAY devices are designed for applications that require pressure relief for small threaded installations. SCREW TYPE Holders are ideal for high pressure applications. WMP™, TITE-SEAL and THROWAWAY Rupture Disc Assemblies are single use devices that are fully assembled at the factory to ensure proper rupture disc installation.

The **Well Activation Safety Protection Valve (WASP) Rupture Disc** is the most versatile rupture disc for downhole applications. The WASP-Type A is a rupture disc that is used to activate downhole tools. This rupture disc is commonly installed into the downhole tool and pressure is applied to the annulus to burst the rupture disc. The WASP-Type I is used for pressure protection and other applications that require pressure to be released from the internal pressure of the drill string, casing or downhole tool. The WASP Rupture Discs line is used in downhole tools in cementing, completion and hydraulic fracturing applications.

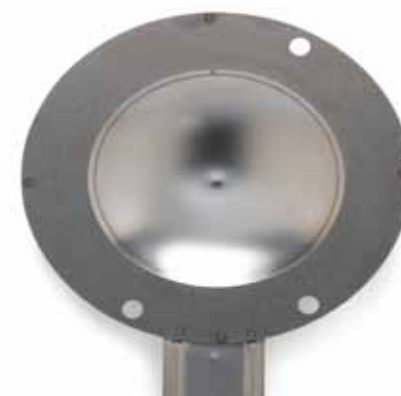
#### CUSTOMIZED RUPTURE DISC SOLUTIONS

Customized rupture disc solutions are specifically designed to meet the unique needs of the oil and gas industry. If the rupture disc is intended to be used upstream or downstream, for pressure protection or activation, Continental Disc Corporation customized solutions is the right choice!

Welded rupture disc devices are designed to meet the needs of the oil & gas industry. These designs are available with reverse acting or tension type rupture discs, for high pressure and high temperature applications. The material of construction of the assembly is available with exotic materials such as ALLOY 600 or ALLOY C276. It is common for downhole applications to withstand a high amount of backpressure, and customized backpressure support designs are available.

The MRA (Machined Reverse Acting) Rupture Disc is a single-use device that incorporates the rupture disc membrane and the rupture discs' body into a single machined device. The MRA Rupture Disc is able to relieve pressure or activate downhole tools at extremely high burst pressures. The MRA is well suited for pressure protection for high pressure pump for hydraulic fracturing or high pressure/high temperature downhole applications.

For more details on how Continental Disc Corporation can design a customized solution for your needs, please contact your local representative or the factory directly.





## THE RIGHT SOLUTIONS // GROTH

### PRESSURE/VACUUM RELIEF VALVES

Pressure/Vacuum Relief Valves are protection devices typically mounted on a nozzle opening on the top of a fixed roof atmospheric storage tank. Their primary purpose is to protect a tank against rupture or implosion by allowing the tank to breathe, or vent, when pressure changes in the tank due to normal operations.



### PILOT OPERATED RELIEF VALVES

Pilot Operated Relief Valves serve the same primary purpose as pressure/vacuum relief valves, but with better performance characteristics than weight or spring loaded valves. Lower leakage and better flow performance make a pilot operated valve the solution when the focus is product conservation, expanded tank working band, and reduced fugitive emissions. A pilot operated relief valve provides the maximum available leakage control technology as specified in the Clean Air Act of 1990.



### BLANKET GAS REGULATORS

Blanket Gas Regulators can provide both pressure and fire protection for storage tanks by supplying a blanketing gas which maintains a constant positive pressure in the vapor space of a storage tank. In addition to preventing outside air and moisture from entering the storage vessel, a blanket gas regulator reduces the evaporation of the stored product to a negligible amount, resulting in product conservation and greatly reduced emissions.



### DEFLAGRATION FLAME ARRESTERS

Deflagration Flame Arresters are fire safety devices used to protect stored or process media from deflagrations. A deflagration flame arrester can be used on the top of a tank or as an in-line safety device where combustible gases are transported through low pressure pipe lines.



### DETONATION FLAME ARRESTERS

Detonation Flame Arresters provide flame protection and prevent high speed flashback in cases where a pipeline restriction, turn, etc. are located and at a compressor inlet and outlet to prevent flashback damage to equipment.



### EMERGENCY RELIEF VALVES

Emergency Relief Valves protect tanks against excessive pressure caused by external fire exposure or flashes within the tank. Emergency relief valves provide higher flow capacity than standard pressure/vacuum relief valves.



## THE RIGHT SOLUTIONS

### Rupture Discs as Secondary Pressure Relief Devices for Separators

#### THE ISSUE:

Equipment failures in the field became an issue for a large manufacturer of separators for the oil & gas industry. The root cause of the failures was improper maintenance of pressure relief valves, which caused the valves to stick and work improperly.

#### THE PRODUCT(s):

LaMOT Standard Rupture Discs  
LaMOT Union Holders

#### THE SOLUTION:

After consulting with LaMOT's technical team, the manufacturer decided to install a LaMOT Standard Rupture Disc in a LaMOT Union Holder as a secondary pressure relief device. The rating of the rupture disc was set at 105% of the separator maximum allowable working pressure in accordance with ASME Section VIII code.

#### THE OUTCOME:

The LaMOT Standard Rupture Disc and LaMOT Union Holder were installed on the separators as secondary relief devices with pressure relief valves as the primary relief device.

The failure of the equipment from an overpressure scenario was eliminated since the LaMOT Standard Rupture Disc has no moving parts and is easily replaced during routine maintenance of the separators.



### Rupture Discs Protect Low Pressure Storage Vessels and Reduce Emissions



#### THE ISSUE:

In an area with a high population of low pressure storage/processing vessels, the combined fugitive emissions exceed mandated limits. The use of vapor recovery and containment systems, flares, relief valves or rupture discs is required to regulate tank pressure and prevent overpressure conditions. Increasingly tighter emissions standards are requiring the use of low pressure rupture discs in place of conventional vent valves, which over time, fail to maintain the tight sealing requirements.

#### THE PRODUCT(s):

LOTRX® Rupture Discs

#### THE SOLUTION:

Available in burst ratings as low as 1.5 psig, LOTRX® Rupture Discs and holders are tight sealing devices that are durable in field storage tank conditions. The pressures present while filling/draining these tanks will not compromise the reliability of the LOTRX® Rupture Disc as it provides tank pressure protection due to overfill.

#### THE OUTCOME:

With proper maintenance of the rupture disc assembly, environmental contamination is controlled, thus eliminating one source of process leakage. Periodic replacement of the rupture disc is a scheduled process with a predictable cost and turnaround time which makes the maintenance of the relief system much simpler to plan and execute.

### Pilot Operated Valves for VOC Storage

#### THE ISSUE:

A chemical plant was utilizing traditional relief valves for overpressure protection for VOC storage. The conventional relief valve was venting to atmosphere before it was required to open and releasing volatile organic compounds into the air. The incorrect type of valves had been specified. A neighborhood of many families within a few miles of this facility were quickly able to discern that there was a release, based on the odors coming from the plant, now occurring several times per day. The authorities were quickly contacted due to health concerns and this portion of the facility was shut down until the releases were corrected.

#### THE PRODUCT(s):

1660A Pilot Operated Relief Valve

#### THE SOLUTION:

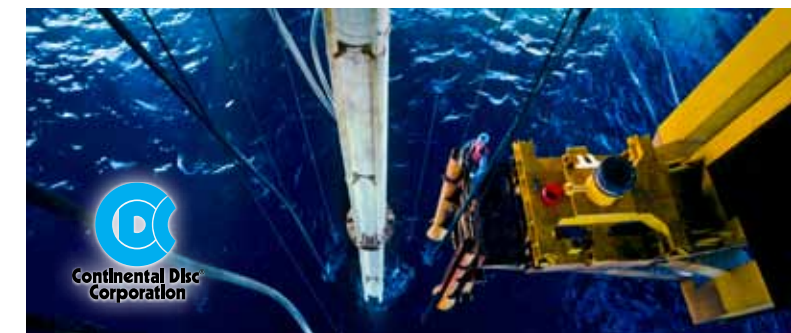
After consulting with the Groth technical team, the 1660A Pilot Operated Relief Valve with snap action was the only logical selection, especially when zero leakage until set point is required. The 1660A meets seat tightness requirements of environmental regulations, even when the operating pressure is close to the set pressure of the relief valve.

#### THE OUTCOME:

After replacing all the existing relief valves with the Groth 1660A Pilot Operating Relief Valve, there was complete elimination of any premature leakage of these valves. The plant was able to resume activities and the nearby residents were again safe.



### Rupture Discs for Subsea Accumulators



#### THE ISSUE:

An international oil company was experiencing failure of their existing pressure relief solutions on their subsea accumulator. When the subsea accumulator was deployed to 8,000 ft (244 m) the existing product would see backpressure at approximately 3,600 psig (248 barg). Their existing product would buckle under the backpressure causing the equipment to fail during service.

#### THE PRODUCT(s):

Customized Welded Threaded Plug with  
Machined Backpressure Support

#### THE SOLUTION:

The oil company expressed the need to withstand a high amount of backpressure without modifying their equipment. Our technical team was able to design a customized rupture disc with a machined support to withstand the high backpressure. An approval drawing of the customized rupture disc was submitted to the oil company for design approval.

#### THE OUTCOME:

Once the design was approved and a site test performed on the customized rupture disc, it was officially installed on their subsea accumulator. During the deployment, the machined support was able to withstand the pressure without affecting the performance of the rupture disc.



# IN ALL THE RIGHT PLACES

## OIL & GAS PRODUCTS... BY THE NUMBERS

Wherever you are is where we will be. Not only around the globe, but in every Oil & Gas application you can imagine.

- 1

reverse acting rupture discs (CDC)
- 2

tension type rupture discs (CDC, LaMOT)
- 3

specialized rupture discs (CDC)
- 4

screw type assemblies (CDC, LaMOT)
- 5

vent panels (CDC)
- 6

low pressure isolation seal (CDC, LaMOT)
- 7

pressure/vacuum relief valves (Groth)
- 8

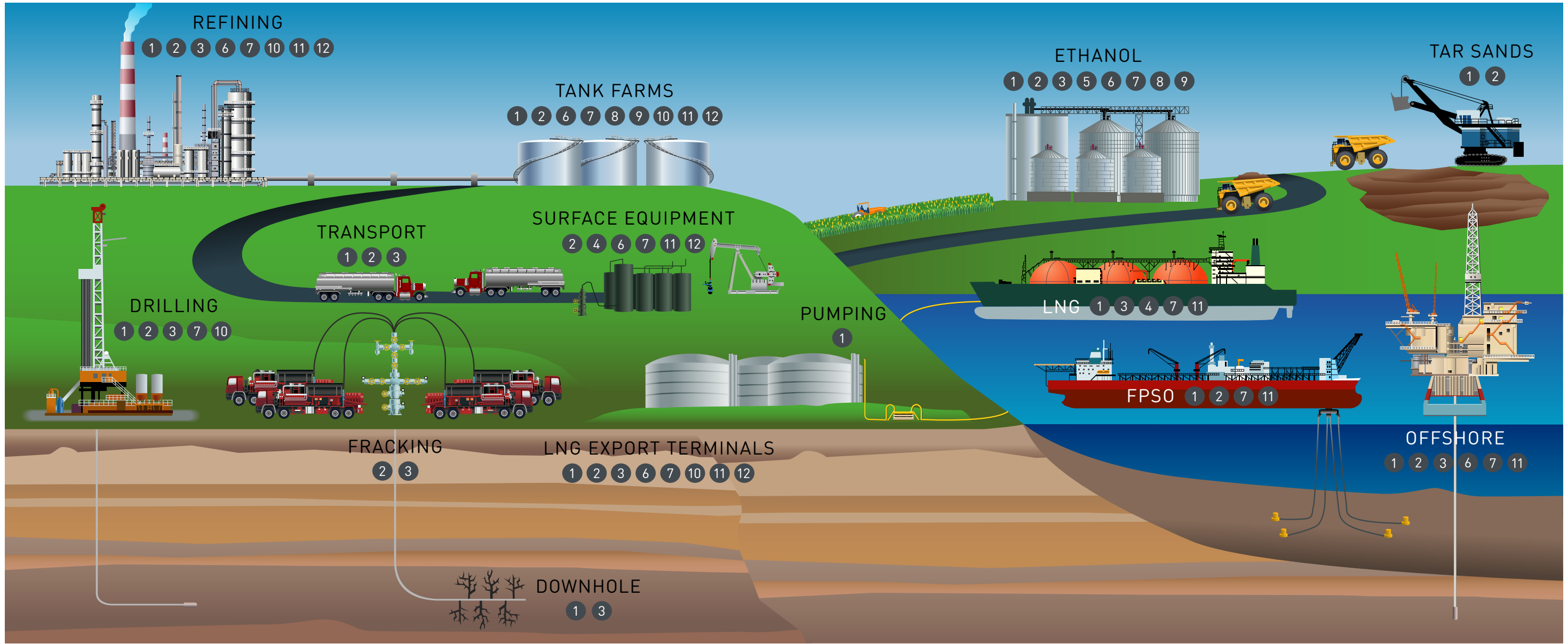
pressure relief valves (Groth)
- 9

vacuum relief valves (Groth)
- 10

pilot operated relief valves (Groth)
- 11

deflagration/detonation flame arresters (Groth)
- 12

blanket gas regulators (Groth)



## THE RIGHT SOLUTIONS

### Screw Type Holders Used with Hydraulic Actuators

#### THE ISSUE:

A manufacturer of actuators for wellhead safety protection had a pressure relief device installed on the housing that would leak and require maintenance of the PRD. The manufacturing company's internal initiatives to extend the preventative maintenance schedule and reduce the cost of pressure relief device lead them to evaluate rupture discs.

#### THE PRODUCT(s):

LaMOT Screw Type Holder  
LaMOT Standard Rupture Disc

#### THE SOLUTION:

After consulting with LaMOT's sales team, the manufacturer decided to install a LaMOT Standard Rupture Disc in a Screw Type Holder as a replacement for the existing pressure relief device. The ease of installation of the holder and the ability to replace the rupture disc in the field made it the right choice for the manufacturer.

#### THE OUTCOME:

The LaMOT Standard Rupture Disc with metal-to-metal seal eliminated the issue with the actuator leaking in the field as well as reduced the preventative maintenance schedule of the actuator. The manufacturer of the actuator was able to reduce the cost of their pressure relief device by switching to a LaMOT Screw Type Holder with a LaMOT Standard Rupture Disc.



### Double Disc Assemblies Used to Eliminate Backpressure in a Common Header for Flares



#### THE ISSUE:

An offshore operating company had a number of old technology rupture discs protecting their gas compressor heat exchangers on a platform that were failing regularly. Those failures led to unplanned outages and shutdowns that were compromising the safety of the asset as well as production, so urgent re-engineering was required to eliminate this common problem.

#### THE PRODUCT(s):

HPX® Rupture Discs  
HPX® Double Disc Holders  
B.D.I.® (Burst Disc Indicators)

#### THE SOLUTION:

Following a review of the existing system and operating conditions, our team determined that the existing rupture disc designs were failing due to fatigue damage. Double disc holders were then designed to fit the existing piping space without modification, and HPX® reverse acting rupture discs were used along with excess flow valves and pressure gauge assemblies to the inter-disc space, as well as Universal B.D.I.'s after the holders.

#### THE OUTCOME:

The unbeatable cycling resistance of the HPX Rupture Discs eradicated the fatigue failures and stopped unplanned shutdowns. With optimized installation, dependable pressure detection and burst indication, the outages were stopped and the customer's production efficiency along with overall safety of the platform was greatly improved.

### Deflagration Flame Arresters Used for Lightning Protection

#### THE ISSUE:

Tank farm facilities with free venting tanks containing flammable vapors are vulnerable to direct lightning strikes. Tank fires have occurred when combustible vapor has been ignited by direct lightning strikes. After several lightning strikes caused tank fires in a neighboring facility, the reliability manager contacted Groth's technical team.

#### THE PRODUCT(s):

Model 8800A Combo Relief Valve and Flame Arrester (ATEX Certified Model: 1200A-FA1)  
Model 7678 End-of-Line Vertical Deflagration Arrester (Alternate solution if no need for a valve)

#### THE SOLUTION:

After evaluation of the tank venting equipment, a decision to include deflagration arresters on each tank was decided. The deflagration arrester's spiral-wound, crimped-ribbon flame element permits gas to pass through the flame element which allows the tank to breathe in normal operations, but the channels in the flame element are too narrow to allow the flame front to pass through.

#### THE OUTCOME:

After retrofitting the tank farm with Groth's Model 8800A Combination Relief Valve and Flame Arrester (ATEX Certified Model: 1200A-FA1), the possibility of a flame front caused by a lightning strike entering the tank has been eliminated. On a follow-up visit just after a series of severe thunderstorms, the deflagration arrester needed a replacement element from a lightning strike, but the tank and hydrocarbons were protected.



### Rupture Discs Used for Tool Activation of Drill Stem Testing, Replacing Shear Pins



#### THE ISSUE:

An oil and gas service company was designing a downhole tool to perforate and hydraulic fracture a well using shear pins. The shear pins did not perform to high level of accuracy during the development stage of the downhole tool. The service company determined the shear pin performance would not be acceptable for downhole operation.

#### THE PRODUCT(s):

Well Activation Safety Protection Rupture Disc

#### THE SOLUTION:

After an on-site meeting, the service company lead engineer contacted Continental Disc about our WASP Rupture Disc. The Well Activation and Safety Protection Rupture Disc is manufactured with a  $\pm 2\%$  burst tolerance for a wide range of downhole applications.

#### THE OUTCOME:

After receiving the WASP Rupture Disc the service company was able to verify the performance of the rupture disc. The service company completed on-site testing of the WASP Rupture Disc installed on the downhole hydraulic fracturing tool, and was able to perform at a highly accurate level. The highly accurate WASP rupture disc allowed the service company to use the downhole tool for hydraulic fracturing oil and gas wells.

## THE RIGHT APPLICATIONS

### JUST A FEW EXAMPLES...

Land-Based & Offshore Well-Drilling & Servicing  
 Safety Relief Valve Isolation  
 Refinery Operations  
 Pipeline Pumping Stations  
 Offshore Platforms  
 Oilfield Production Tanks  
 Ethanol Process Tanks  
 Gasoline Storage  
 Crude Oil Storage  
 Raw Product Tanks (Oils)  
 Rich Oil Storage  
 Lube Oil Storage Tanks  
 Vapor Recovery System  
 Extreme Thermal Effect Protection  
 Hydrocarbons & Organic Corrosives  
 Storage Tank Terminals  
 Heater Treater Fans  
 Shell & Tube Heat Exchangers  
 High & Low Pressure Storage Vessels  
 Transportation Tanks  
 OEM's for Cylinders, Vessels & Trailers  
 Hydraulic Fluid Storage  
 Oilfield Service Applications  
 Liquefied Natural Gas (LNG)  
 Offshore Platforms & Pumping Stations  
 Double Discs for FPSO Heat Exchangers  
 Separation Towers  
 • Oxygen                      • Hydrogen  
 • Nitrogen                    • CO<sub>2</sub>  
 • Argon  
 Syngas  
 • Biodiesel                    • Ethanol  
 • Algae                        • Coal to Gas  
 • Gas to Liquid



UNRIVALED IN OUR PRODUCT  
QUALITY AND CRAFTSMANSHIP







## THE RIGHT TECHNOLOGY

Our experience in problem solving extends to a wide range of industries around the world, which makes us the industry leader in the utilization of manufacturing technology.

Utilizing laser cutting technology enables us to meet your manufacturing requirements efficiently by building rapid prototypes, thus reducing the need for customized tooling which also provides a reduction in the lead time from conceptual design to production shipment.

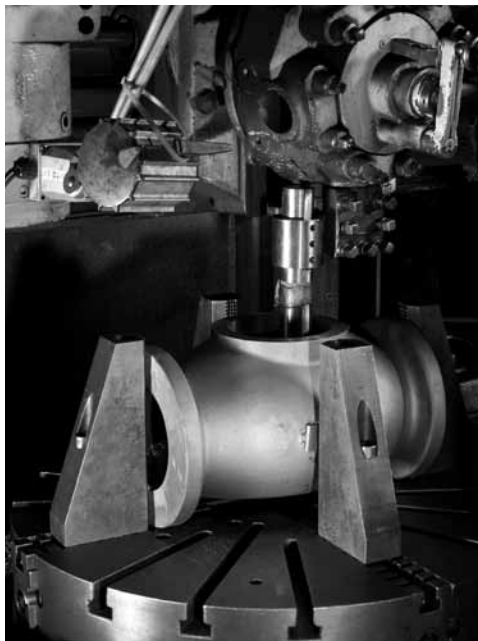
In order to further reduce lead-times, improve cycle times and eliminate waste...CNC Machining, DC Spotwelding, FaraArm for 3D inspections, Helium Leak Detection, Laser Marking and Automated TIG

Welding are also utilized.

Our state-of-the-art flow labs are managed and operated by experienced research and development personnel.

Our manufacturing process uses ERP master schedules to properly plan production needs and work in tandem with six sigma and lean manufacturing concepts.

Our engineers have access to the latest advanced modeling and simulation tools. Designs can be created, analyzed and optimized before the first piece of metal is cut. Having the ability to run both stress and flow analysis enables us to keep design costs low and product reliability high.



CUTTING EDGE  
PROTECTION SOLUTIONS

## THE RIGHT PEOPLE

With centuries of combined experience, the global staff of Continental Disc Corporation, LaMOT Brand Products and Groth Corporation really outpace the competition.

Unlike many companies in today's marketplace, we consistently have employees who retire from our company after more than 30+ years of service!

Value, service, quality, integrity and dedication are what we strive to provide to our customers every day. We are hard workers who care about your success and ours.

Trusted, reliable and professional. We are passionate about our work and regularly visit customers directly at their locations to provide necessary support.



RELIABLE WE'RE THERE  
WHEN YOU NEED US



WE ARE QUALITY



[www.grothcorp.com](http://www.grothcorp.com)



[www.contdisc.com](http://www.contdisc.com)



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