

Choosing Victaulic Supports Environmental, Social, and Governance (ESG) Strategic Objectives in Upstream Oil and Gas

By: Matthew King

Victaulic provides sustainable solutions at every stage of a product’s lifecycle – from research and development, product manufacturing, system installation through efficient operations, for the life of a system.

Victaulic couplings are manufactured using recycled materials with 90% of our ductile iron coming from post-consumer content. Our gaskets offer superior protection from fugitive emissions over flanged joints and Victaulic connections generate zero carbon emissions during installation. Additionally, Victaulic’s focus on safety sets us apart by reducing risk on the job site.

Environmental Factors

Fugitive Emissions

Victaulic couplings support the industry goal of zero emissions by significantly reducing fugitive emissions from pipe connections, as compared to flanged joints.

Victaulic makes significant investments in product and materials testing to ensure the safe and reliable use of its products in a wide range of applications and systems. To this end, Victaulic contracted the services of an independent, 3rd party laboratory to conduct fugitive emissions testing on our Victaulic pipe joints as a comparative evaluation with standard ANSI Class 600 flanges.

The tests were conducted with guidance from standards MESC SPE 77/300 and ISO 15848-1 using high pressure helium that was individually applied to four coupling assemblies and four flange assemblies at 1500 psi. Emissions were collected from each test sample individually and measured by a Varian VSPD031 Helium Mass Spectrometer. In addition, during each test series, all coupling and flange assemblies were thermally cycled to determine the effects of elevated temperature on emission rates. The tests are denoted on the graph below as Test Numbers 1.) Ambient, 2.) Elevated: 150°F, 3.) Ambient, 4.) Elevated: 150°F and 5.) Ambient.

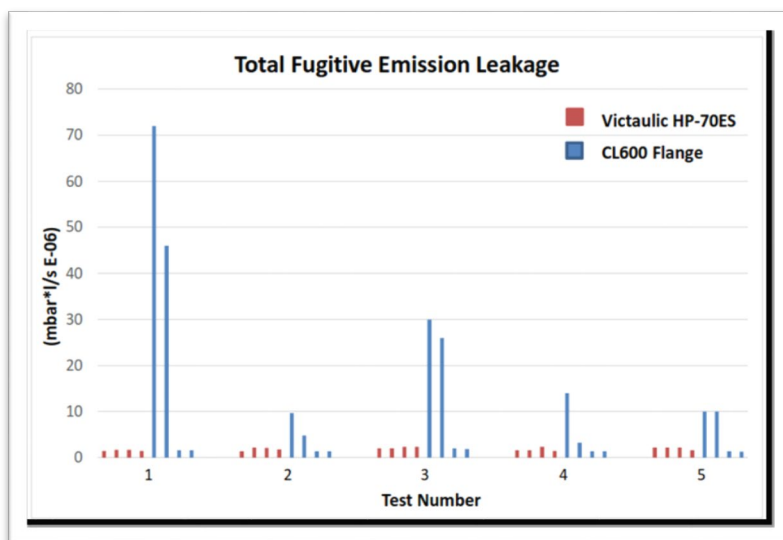


Fig. 1: Test Results (mbar*/s E-06)

The data recorded for each sample clearly shows the sealing performance for the Victaulic couplings and gaskets exceed that of standard flange connections equipped with spiral wound 304SS (2) and 316SS (2) seals at both ambient and elevated temperature conditions.

Victaulic’s pressure-responsive gasket design easily provided consistent and uniform sealing at both the temperature and pressure extremes of these tests.

Zero Carbon Emissions

Victaulic joints, whether on steel or HDPE pipe, eliminate environmentally hazardous emissions generated by the practice of welding or fusing pipe joints. Victaulic joints eliminate the dangerous gases and fumes that are byproducts of the welding process, creating a safer working environment while reducing construction time and costs.

Below is an example of the emissions savings that can be realized by utilizing Victaulic joining technology. In the example production facility, Victaulic pipe joints eliminated 65000lbs of CO₂ emissions, as compared to a welded system.

Example Production Facility:

- 2,500 linear feet of 4" schedule 40 carbon steel pipe
- 915 pipe joints

	Weld	Victaulic
Total Facility Construction Time	2,196hrs ¹	458hrs ²
Waste Generated	8,235 ³ spent welding rods	Zero waste generated
Hazardous Gases or Fumes Produced	Yes	No
Emissions Generated	64,931.3lbs ⁴ of CO ₂	Zero

1. Based on 2.4 manhours/weld
2. Based on 0.5 manhours/Victaulic joint
3. Based on 9 welding rods per joint average
4. Based on 1.32gal/hr fuel consumption and 22.4lbs/gal* emission coefficient

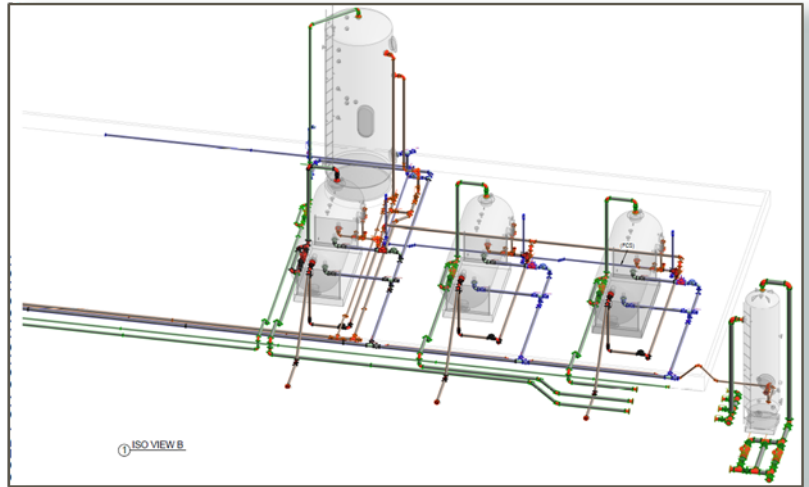


Fig. 2: Example Production Facility Layout

Installation of Victaulic joints eliminates emissions generated by welding while reducing facility construction time and increasing safety.

Victaulic Couplings in Extreme Conditions: API-607



Fig. 3: API-607 TEST PROCESS

Fire exposure tests including API-607 and UL-852 are used routinely to qualify new seal materials and coupling designs that are intended for high hazard applications where the inherent risk of fire is always present. Such standards can involve direct flame temperatures exceeding 871°C (1600°F) as part of the qualification requirements for components used in dry fire protection systems.

Test conducted using the HP-70ES coupling and the Grade T-607 gasket[†]

- Coupling assembled onto water pipe pressurized | 29 psi (2 bar)
- Flame applied 30 minutes | 760°C (1400°F) to 982°C (1800°F)
- Once cooled, pressure tested @ 750 psi for 5 minutes & 1875 psi for 5 minutes
- Zero leakage recorded

Exposure to fire in no way disrupts the ability of Victaulic couplings to provide their full rated pressure and designed joint sealing performance.

Water Management Strategy

Victaulic solutions have been developed to support a variety of piping system designs. If your water management strategy involves buried pipe installations, you can be confident in Victaulic's elastomer gasket technology to provide leak-free performance, protecting both your assets and the environment, regardless of pipe material. Direct buried piping systems are one of the original applications for Victaulic couplings. Victaulic piping systems have been incorporated successfully in buried services for over 90 years with installations dating back to the 1930's. The primary advantages of Victaulic couplings are the characteristics of the joint, specifically coupling flexibility, and their ability to provide allowance for system expansion, contraction, and deflection.

Pipe Material Solutions		Size Range
Non-metallic	HDPE / PERT	2 - 36" 63 - 900mm
	PVC/CPVC	2 - 12" DN50 - DN300
Metalic	Aluminum	1 - 8" DN25 - DN200
	Carbon Steel	3/4 - 96" DN20 - DN2400
	Internally Coated	3/4 - 96" DN20 - DN2400
	Stainless Steel	3/4 - 96" DN20 - DN2400
	Duplex/Super Duplex Stainless	3/4 - 96" DN20 - DN2400

Fig. 4: Victaulic Material Capabilities



Fig. 5: Mixed Material Example

Reduction of Single-Use Materials

Victaulic, the originator and developer of the Grooved Mechanical Pipe Joining Method, takes great pride in leading the industry with identifying and implementing new product concepts and superior materials.

Victaulic elastomers are optimized for long life, designed to be permanently installed or reused as desired. The result is an environmentally friendly pipe joining solution that is superior to flanged connections.

Social Impact

Safety-oriented Joining Method

Mechanical engineers can positively affect safety by specifying Victaulic couplings, as couplings contribute to the constructability, practice and maintenance of a facility.

- By specifying Victaulic, you chose to partner with expertise in product development, product selection, on-site training, installation support, and final inspection, driving a safety culture from start to finish.
- Victaulic pipe joints remove major hazards including; open arcs, sparks or flames, volatile tanks, lead line trip hazards, and noxious fumes.
- Victaulic pipe joints are ideal for routine inspection as proper installation can be visually verified.
- Maintenance and repairs or system expansion are simplified, as every Victaulic joint is a union.
- Schedule risk is reduced as Victaulic joints can be installed in any weather condition.

OSHA Voluntary Protection Program

Victaulic facilities in Easton, PA have attained Star level certification in the Voluntary Protection Program (VPP) initiated by the Occupational Safety and Health Administration (OSHA) aimed at preventing workplace injuries and illness through hazard prevention and control.

Governance Impact

Code of Conduct

Victaulic adheres to the highest standards of professional behavior and ethics in all of its interactions with employees, customers and local communities. Integrity and professionalism have been the hallmarks of our business, the reason for our longevity, and will contribute to the company's ongoing success. Further information regarding Code of Conduct can be found online at [Victaulic.com/code-of-conduct](https://victaulic.com/code-of-conduct).

Regulatory

Our Global Regulatory group ensures Victaulic products are fully tested and certified to meet and exceed a wide range of national and regional regulations, codes and standards governing product performance and safety.

For information regarding trade compliance please refer to our online portal found at [Victaulic.com/trade-compliance](https://victaulic.com/trade-compliance).

Conclusion

For many reasons, Victaulic solutions can play an important role in your ESG strategy and contribute to the protection of our natural resources. Minimize fugitive emissions, eliminate carbon emissions during installation, protect your application in difficult conditions, and support water reuse strategies regardless of piping design, all while increasing safety at your site with Victaulic pipe joining solutions.

References:

- * Calculated using the carbon dioxide emission coefficient of diesel fuel.
- † L. Swantek and C. Lam, "Performance Capabilities of Victaulic Mechanical Pipe Joints Under Extreme Fire Conditions," White Paper [WP-35 10842 Rev A 05/2017](#) – VICTAULIC

Global Manufacturing Consistency

As the originators and innovators of the grooved pipe joining system, Victaulic maintains strict process control all the way through the product life cycle, from initial development to post-production testing and inspection. When temperature, pressure and fluid ratings for these products are established, these ratings must be consistently supported by the materials, sub-assemblies and complete finished products. The organization is dedicated to providing high quality products from all of its global manufacturing locations and works closely with its customers to ensure critical requirements are being met or exceeded. Victaulic products are also closely monitored by a large number of national and international regulatory authorities, who conduct routine assessments to ensure consistency and compliance with local codes and standards.

Author Biography

Matthew King is the Application Engineering Group Leader at Victaulic. He is responsible for supporting several product markets including the North American Oil, Gas, and Chemical market. His team of Application Engineers provide various support roles to customers and the Victaulic Sales teams ranging from technical applications assistance, onsite training, new product development, and continued educational training.

Prior to joining Victaulic, Matthew worked as a Field Engineer for Baker Hughes Inc. in their Pressure Pumping Service unit. Matthew holds a Bachelor of Science Degree from The Pennsylvania State University in Petroleum and Natural Gas Engineering. He is also a member of the Society of Petroleum Engineers (SPE).

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