



Haskel®

Pressure on Demand

*High-pressure customized solutions
for the oil and gas industry*

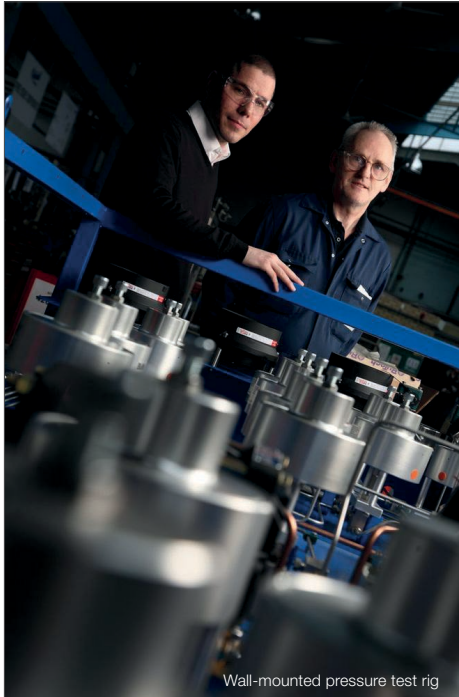
High Pressure

Haskel provides a wide range of high-pressure pneumatic and hydraulic equipment for the oil and gas, defense, aerospace, automotive, fluid power, air power, power generation and process industries.

Haskel has a strong commitment to maintaining world-class quality, upholding the health and safety of employees and customers, protecting the environment and providing excellent service and support.



Delivering quality under pressure



Wall-mounted pressure test rig

Operating in the complex world of oil and gas, Haskel is committed to maintaining a simple approach to business, focusing on three key factors: understanding our customers and their needs; delivering the highest quality products; and dedication to innovation.

This methodology has led us to become the global leader in providing customized solutions for high-pressure liquid and gas transfer, storage and controlling applications.

Designed to enable the controlled use of pressure and flow-generating equipment, Haskel air or gas driven liquid pumps, gas boosters, air amplifiers, and high-pressure accessories are the most comprehensive range of high-pressure liquid or gas handling components available to facilitate the construction of test systems and custom built rigs that meet the exacting standards of the oil and gas industry.

Operators and service companies worldwide rely on our products to deliver optimum

performance and extended product life. As operating environments become more extreme, pressures increase and field life expectancy grows, we continue to deliver products that empower oil and gas companies to operate effectively, while simultaneously allowing them to meet the stringent safety regulations that protect their personnel and the environment.

An international network of highly trained distributors, with application engineering expertise, stand behind our products. These professionals ensure that our customers' expectations are met with a solution specific for their needs.

LIQUID PUMPS & APPLICATIONS

Liquid Pumps

- Haskel pneumatic pumps stall when they reach a pre-determined pressure and maintain that pressure for the duration of operation without consuming power, unlike electric motor pumps that dump fluid across a relief valve, wasting energy and creating heat. Because of this safe air operation, no heat, flame, or spark risk arises.
- Haskel pneumatic pumps have a smaller footprint, weigh less, and are easier to maintain than typical electrically driven pumps.

Hydraulic Pressure Testing

Haskel pumps ensure the integrity of large valves and wellheads over the lifetime of a well.

Hydraulic power units and other purpose-built systems reliably test valves, components, pipe, downhole tools, and oilfield pressure vessels to stringent specifications, ensuring safe operation. Applications include proof, leak, burst, pulse, fatigue and calibration testing in a wide range of oilfield equipment and pipelines, including, but not limited to, tanks, receivers, accumulators, valves, piping, fittings, hoses and gauges.

Valve Actuation

During normal running, hydraulic pressure from a Haskel pump can be used to pressurize valve

“As operating environments become more extreme, Haskel continues to deliver products that meet customer performance needs.”



actuators within remotely piloted valves along a pipeline system. This pressure compresses the actuator springs, keeping the valves in an open condition. While in this condition, there is no heat generated or energy consumed, and no wear to seals is incurred.

If a pressure abnormality occurs, the hydraulic pressure is dumped and the valve closes in a fail-safe condition.



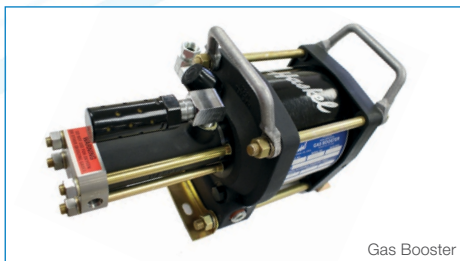
Liquid Pump

Well Emergency Shut Down Systems

Haskel pumps deliver foolproof, fail-safe protection against the serious health and safety problems presented by working with high pressures in conjunction with explosive and toxic products.

During exploration drilling, Haskel pumps can provide hydraulic power to actuate a kill or choke system. Pumps generate hydraulic pressure to actuate a downhole ball valve or flapper valve that automatically closes if a pressure surge or abnormally high pressure is experienced.

In the event of a well blowout, Haskel pumps are used to pressurize banks of nitrogen-filled accumulators with hydraulic oil to activate the blowout preventer.



Gas Booster

Well Equalization System

During startup of both new and out of service wells, the pipe from the platform and/or FPSO deck wellhead to the subsea wellhead located at the ocean floor must be pressurized to well pressure before the wellhead valves are opened. In this application our 8 and 10 hp pumps inject either diesel fuel or methanol line in order to "equalize" the pressure both sides of the wellhead Christmas tree valves. It is necessary to equalize in order to prevent the sudden rush of pressurized hydrocarbon to the deck with is a safety issue.

Fire Protection/Detection

Haskel pumps are used for rapid and precise filling of Halon 1211 (BCF), Halon 1301 (BTM) and liquid carbon dioxide extinguishers. The pump, which transfers and pressurizes the Halon, is designed to automatically halt operation when the required weight (pressure) is achieved. Where nitrogen is used as a propellant, Halon is pumped into the extinguisher against the pressure of the nitrogen, instantly mixing the two. Haskel pumps can also extract high-cost Halon vapor from the supplier's container and convert the vapor pack to liquid by passing through a condenser.

Boosters detect hot-spots using pressurized argon supply cylinders attached to infrared viewers.

GAS BOOSTERS & APPLICATIONS

Gas Boosters

- Haskel air-driven and hydraulic-driven gas boosters provide high-pressure gas transfer, charging and storage of pressures up to 2,700 bar (39,000 psi). These boosters offer a flexible and efficient source for delivering high-pressure gases such as argon, nitrogen, oxygen, hydrogen, helium, carbon dioxide, liquefied gas and many other specialty gases.
- Our boosters are ideal for gas pressure increases, high-pressure gas transference, cylinder charging and scavenging.



Helium Booster

Leak Detection

Haskel gas boosters are used for high-pressure leak testing of underwater Christmas trees and other subsea installations to ensure hydrocarbons do not leak from the structure and risk contaminating the sea or creating a fire explosion. Helium gas is used at pressures up to 2,000 bar (30,000 psi) because of its leak-searching capabilities, particularly in detecting porous castings. Sulphur hexafluoride (SF6) can also be used in leak detection gas.

Dry Gas Seal

Centrifugal compressors equipped with dry gas seals use the process gas as a seal gas. During normal operation, the compression of the gas generates heat, pressure and flow to the seal, preventing contamination and condensation. During start up or shut down, however, these conditions are not met and the seal is at risk of contamination specifically from heavy condensate.

Haskel dry seal gas boosters are used to ensure seals are pressurized with dry gas during start up and shut down preventing damage to the seal from contaminants.

Nitrogen Gas Pressure Testing

Haskel air-driven gas boosters are used to pressurize a wide range of gas pressure-maintaining devices both on and offshore. Anything from relief valves, pipe spools, and small pressure vessels are tested with nitrogen gas to prove they are leak tight before being put into service on gas production facilities.

Nitrogen Gas Accumulator Charging

Nitrogen gas boosters are used for charging nitrogen filled accumulators and pulsation dampeners. As pressures increase within the industry, the need for higher pre-charge on gas accumulators becomes more commonplace. Often, the gas pressure supply from commercially filled gas cylinders is in excess of 500 bar (7,200 psi), lower than the pre-charge required.

Haskel gas boosters have the capability to charge to pressures in the region of 1,000 bar (14,500 psi) advantageously using most of the gas in the supply cylinder.

Barrier Gas Seal

Nitrogen gas is typically used as a gaseous buffer on some gas-lubricated mechanical seals. The buffer gas prevents process leakage to the atmosphere, can prevent ice in low temperatures and helps avoid reaction of product leakage with the air. In high-pressure pumping applications, the buffer media needs to be at a higher pressure than the process fluid.

Haskel gas boosters are widely used to boost the low-pressure nitrogen gas, automatically adjusting to the demand and providing a buffer gas to the seal.

Multi-Booster Nitrogen Gas Systems

Gas boosters are ideal for nitrogen gas generators and enabling storage within high-pressure gas cylinders. In periods of low demand, surplus gas can be transferred and boosted into high-pressure storage vessels where it can be kept and ready should gas be required to shut down the facility safely. The high-pressure storage can also be used to maintain production during routine maintenance of the nitrogen supply plant.

Safety Systems

Fire Fighting: The SafetyAmp breathing-air booster compresses breathing-air up to 345 bar (5,000 psi) for use in rescue work.

Life Support: Our specialty boosters fill resuscitation cylinders with oxygen for use in life-support applications.

Survival Craft: Haskel air boosters inflate and pressurize totally enclosed survival craft that submerge and resurface.

Helicopter Bootstrap: Nitrogen or helium-fed boosters automatically inflate floats, in the event that the helicopter needs to land on water.

Diving

Haskel air-driven gas boosters pressurize gas for offshore deep-sea diving operations. Gas boosters can be arranged in series or in parallel to achieve the required flow combinations of pressurized gases including oxygen, nitrox and helium. Haskel gas boosters are noted for their cleanliness and can handle pure gases, such as oxygen, without risk of contamination.

Gas boosters for breathing air applications are oxygen cleaned per Mil Spec 1330, for oxygen use.

Chemical Injection

Different types of chemical injection equipment are required for different applications, and we feature low, medium and high flow systems.

The unique Haskel injection rate control device (IRCD) has been designed for single and multi-point chemical regulation.

IRCD Capacity

Low flow specifications:

- 15,000 psig (1034 bar) maximum operating pressure
- 0.5 to 320 LPH flow range (0.13 - 84 GPH)

Medium flow specifications:

- 15,000 psig (1034 bar) maximum operating pressure
- 320 to 2000 LPH flow range (0.84 - 528 GPH)

High flow specifications:

- 10,000 psig (690 bar) maximum operating pressure
- 2000 to 5000 LPH (528 - 1320 GPH)

Haskel pumps are used for methanol injection where flows and pressure are higher.

AIR PRESSURE AMPLIFIER & APPLICATIONS

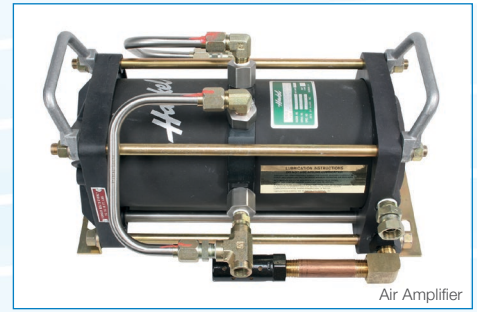
Air Amplifiers

- Haskel air amplifiers are compact, require no electrical or mechanical drive connections, and are powered by the same air that they amplify. Available with pressure outputs to 5,000 psi (344 bar).

Diesel Engine Starter

Haskel air amplifiers can be used to charge an air cylinder from a standard air-line to 35 bar (500 psi) for air-starting oilfield and marine diesel engines.

Haskel gas boosters and amplifiers are used in helium recovery, deep-sea diving operations, leak detection, well emergency shut down systems, topping of accumulators with nitrogen, operating oxygen concentrators, electrical circuit breaker installations, starting diesel engines, and fire protection.

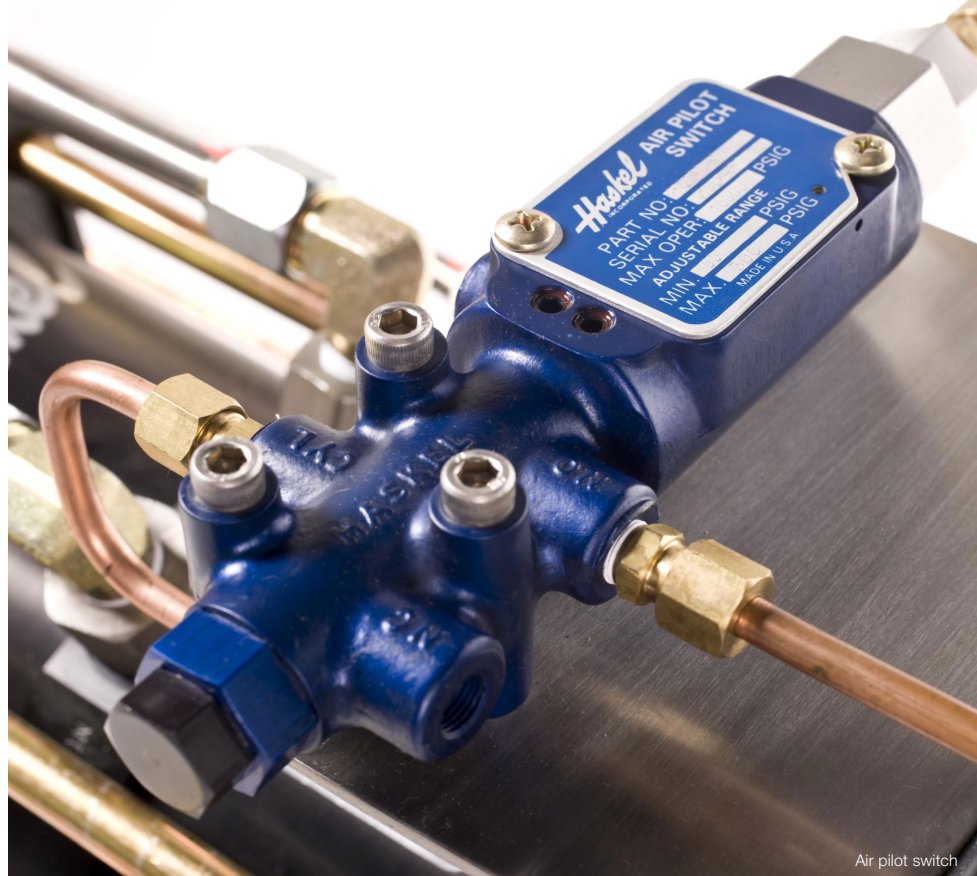


HIGH-PRESSURE VALVES & SYSTEM COMPONENTS

A complete family of high-pressure controls and system components to complement Haskel's extensive line of pumps, gas boosters, and air pressure amplifiers.

Panel fabricators, control panel shops and OEMs use Haskel accessories to control or store pressure and flow.

- Check valves to control direction and flow
- Relief valves to protect against over-pressurization of systems
- High Pressures 10,000 psi (690 bar) accumulators to store hydraulics fluid as energy source



“Because of our safe pneumatic operation, no heat, flame or spark risk arises.”

For more information on our high-pressure products,
visit Haskel.com or contact your local Haskel representative.



Haskel is part of Ingersoll Rand. Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands— including Club Car®, Ingersoll Rand®, Thermo King® and Trane®—work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are committed to a world of sustainable progress and enduring results.



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