Haskel®
INTERNATIONAL, INC.

OIL & GAS INDUSTRY

APPLICATIONS FOR HASKEL PRODUCTS

OUR PRODUCTS ARE BACKED BY OUTSTANDING TECHNICAL SUPPORT, AN EXCELLENT REPUTATION FOR RELIABILITY AND WORLDWIDE DISTRIBUTION

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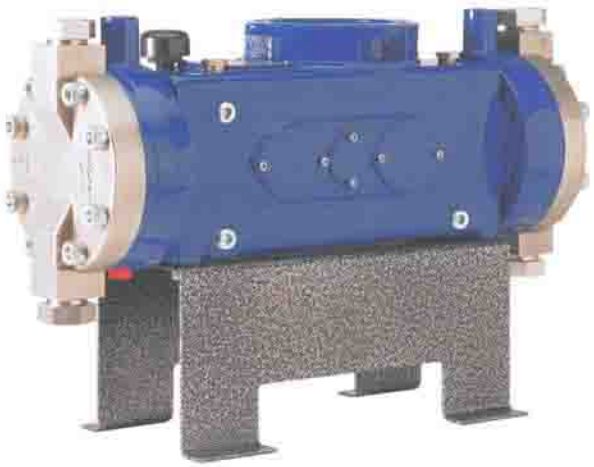
Haskel®
INTERNATIONAL, INC.



Haskel is the market leader in the supply of air/gas driven liquid pumps, gas boosters, air amplifiers and associated equipment to the onshore and offshore oil and gas industry.

Haskel air/gas driven chemical injection pumps, electric driven hydraulically actuated diaphragm metering pumps, systems and skids are successfully used by major oil and gas producers throughout the world. Contact factory for applicable reference details.

Strategically placed subsidiaries, regional offices and dedicated distributors ensure that we offer the best support and service whether it be the USA and Canadian oil regions; Aberdeen, Scotland; Stavanges, Norway; Perth, Australia; Miri, Malaysia; Singapore or countless other oil and gas centers around the world.

The following applications cover both offshore and onshore oil and gas exploration, production, development, storage, refining and processing. While by no means covering every application, it serves to show Haskel's depth and experience in meeting the many "pressure" requirements of this industry.

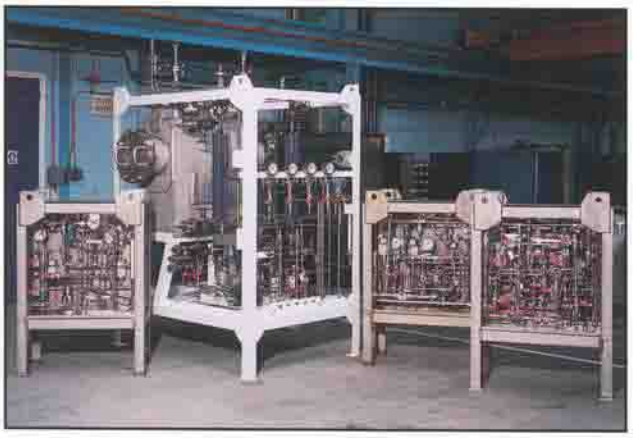
For specific brochures or data, contact any local Haskel facility or distributor.

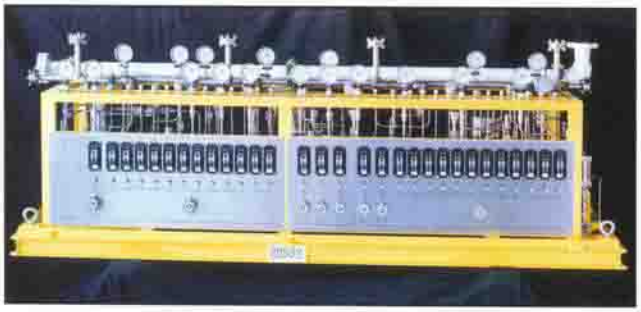
Haskel chemical metering pumps are ideal for injecting additives, corrosion inhibitors and various chemicals into production pipeline systems. The wide range of Haskel pumps means that almost any pressure, chemical and flow injection requirement can be met.

DURAMETER
A Haskel® INTERNATIONAL, INC. Product

LIQUID PUMPS AND SYSTEMS

The Haskel-Palpro IRCD is a unique and revolutionary system for the multipoint injection of chemicals into oil and gas production systems. The IRCD can be supplied as individual units or in a panel configuration which can be installed adjacent to the point of injection.





Design and fabrication of customized chemical injection skids

Valve Actuation

On most long pipeline systems, valve stations are installed at regular intervals. The valve stations are normally unmanned and are designed to be "fail-safe" in the event of an abnormality.

Hydraulic pressure from the Haskel pump pressurizes the valve actuator and compresses the actuator spring keeping the valve in an open condition.

If a pipeline pressure abnormality occurs, the hydraulic pressure is dumped and the valve closes in a fail-safe condition. This principle can be applied to any type of valve that uses an actuator. For most of the time, the Haskel pump is in a stall condition maintaining pressure in the valve actuator. While in this condition, there is no heat generated, energy consumed or seal wear.

LIQUID PUMPS AND SYSTEMS

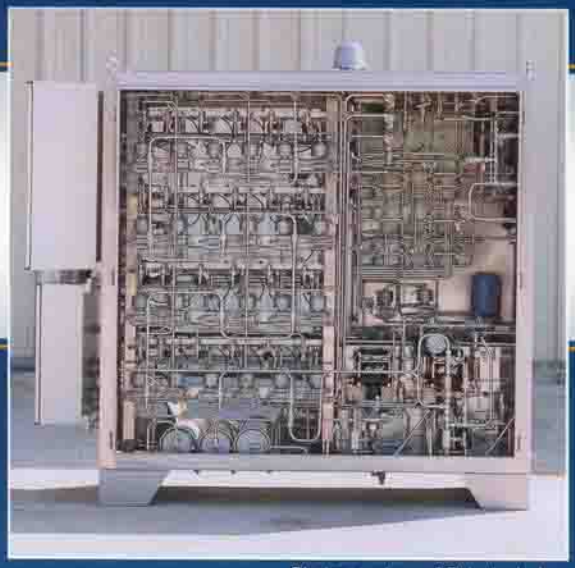
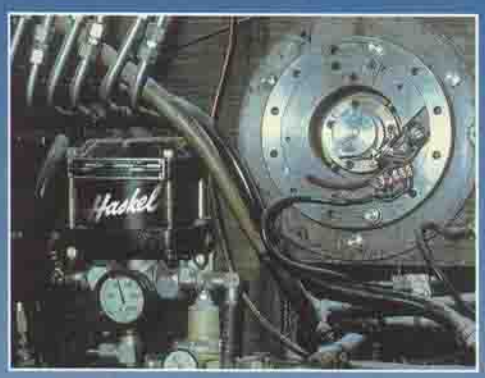


Photo courtesy of Petrotech, Inc.

Oil/Gas Well Emergency Shut Down Systems

Onshore and offshore exploration and production operations need to be fool-proof and fail-safe as high oil and gas pressures combined with explosive and toxic products can present serious safety and health problems.

Haskel pumps generate the hydraulic pressure to actuate the down-hole ball valve or flapper valve that automatically closes if a pressure surge or abnormal 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. During initial exploration drilling, Haskel pumps can also provide hydraulic power to actuate a "Kill or Choke System."



Bolt Tensioning and Nut Torquing

Haskel high-pressure liquid pumps are used to generate hydraulic pressure for hydraulic wrenches or bolt tensioning equipment. On pipeline systems, where flange joints vary in size, pressure and hazardous nature of product, the torque figures can be set precisely and consistently to prevent leakage. Also for underwater use.

Valve Test Benches

A complete range of:

- Shut-off, relief and swing check valve testing
- Patented clamping bench for valves up to 600 lbs.
- Pressure generating module
- One person operation
- 2-5 minute valve test time
- Data acquisition, analysis and storage system

Haskel Testpacs For Hydraulic Pressure Testing

All oil/gas transmission pipelines, after initial prefill, must be pressure tested to stringent specifications. Oil field pressure vessels and components in the form of tanks, receivers, accumulators, valves, piping, fittings, hoses, gauges, etc., are subject to regular pressure tests to check their integrity. Haskel Testpacs and other purpose built systems are used for proof, leak, burst, pulse, fatigue and calibration testing to ensure safe operation.

Hydroswaging

The Haskel Hydroswage is a patented concept in tube expansion. Direct hydraulic pressure is used to expand heat exchanger tubes in tube sheets. The operation is fast, safe, accurate, consistent and extends the life of the heat exchanger by reducing/eliminating work hardening and crevice/stress corrosion.

Other uses for Haskel Liquid Pumps:

Vertical Drilling:	To pump water and chemicals to flush drill pipes and to pump lubricating oil into the airflow to ensure continuous lubrication of the down hole hammer
Laboratory Analysis:	As power source for high-pressure liquid consistometers and chromotographs
Line Flushing:	To flush out hydraulic pipes and hoses
Water Jetting:	For high-pressure water jet cleaning and cutting
Lubrication:	To pump grease for lubrication of wireline operations
Fuel Pumps:	To prime large marine and off-shore diesel engines
Fuel Injectors:	To examine the spray characteristics under idling conditions and for checking injector pressure

Diving

Haskel air-driven gas boosters generate high-pressure gas for offshore deep sea diving operations. Gas boosters can be arranged to operate in series or parallel to achieve the required pressure flow combinations of various gases (Oxygen, Nitrox, Helium).

Oil and Gas Emergency Well Shut Down Systems

Many land based oil and gas wells use high-pressure air to power valve actuation so that they "fail-safe" in the event of an abnormal occurrence. A Haskel amplifier is often selected as the pressure generator in the control panel.

Water injection schemes for secondary recovery normally experience well pressure surges. To prevent any pipe or system damage, a dump squeeze valve surface is installed. The squeeze valve is normally kept in the closed position by applying compressed air to the external part of the flexible squeeze valve. In the event of a pressure surge, a sensor is activated which dumps high-pressure air, allowing the valve to be opened. The drop in air pressure automatically restarts the air amplifier which generates sufficient pressure to reclose the squeeze valve ready for the next pressure surge.

GAS BOOSTERS, AIR AMPLIFIERS AND SYSTEMS

Leak Detection

Haskel gas boosters are used for high-pressure leak testing underwater Christmas trees and other subsea installations to ensure that crude or gas will not leak from the structure and risk contaminating the sea or creating a fire or explosion.

Helium gas is used at pressures up to 2000 bar (30,000 psi) because of its leak searching capabilities particularly in detecting porous castings. Sulphur Hexafluoride (SF6) can also be used as a leak detection gas.

Gas Transfer Circuit Breaker

Sulfur Hexafluoride (SF6 Gas) is used in onshore and offshore electrical circuit breaker installations for arc suppression and insulation and is both expensive and difficult to transfer under pressure. The Haskel SF6 Transfer System eliminates many of the cascading problems resulting in reduced labor costs and consumption of SF6 due to the pump's capability to transfer both in liquid and vapor form. If maintenance is required on a circuit breaker, the unit can pump the SF6 into a cylinder and then pump it back when repair is complete.

Fire Protection

Haskel pumps are used for rapid and precise filling of Halon 1211 (BCF) extinguishers, Halon 1301 (BTM) extinguishers, and liquid Carbon Dioxide extinguishers.

The Haskel pump which transfers and pressurizes the halon is designed to automatically stop when the required weight (pressure) is achieved. Where Nitrogen is used as a propellant, the Haskel pump has the ability to pump Halon into the extinguisher against the pressure of the Nitrogen – resulting in instant mixing. The Haskel pump has the ability to extract the high-cost Halon vapor from the supplier's container and convert the vapor back to liquid by passing through a condenser.

Diesel Engine Starter

Oilfield and marine diesel engines are normally fitted with an air start. A Haskel air amplifier is normally used to charge an air cylinder from a standard air line to 35 bar (500 psi) for air starting the engine.

Safety Systems

Fire Fighting: Safety Amp breathing air booster is used for compressing breathing air up to 345 bar (5000 psi) for rescue work

Life Support: Specially designed boosters used for filling resuscitation cylinders with Oxygen for life support in accidents

Diving: Air, Oxygen, Nitrox, Helium and mixed-gas boosting

Fire Detection: Boosters used pressurize Argon supply cylinders attached to infrared viewers for detecting hot spots

Survival Craft: Totally enclosed lifeboats which submerge and resurface use Haskel air boosters to pressurize and fill survival craft with air

Helicopters Bootstrap:
Boosters that are powered and fed by Nitrogen or Helium gas cylinders allow floats to automatically inflate in the event the helicopter needs to land on water

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