

SANDPIPER®
G SERIES

FREQUENTLY ASKED QUESTIONS (FAQ'S)

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“G” SERIES NatGas Powered PUMP

Frequently Asked Questions

What is the “G” series Pump?

The Warren Rupp, SANDPIPER “G” series pump is a unique metallic pump, designed in conjunction with CSA International (Canadian Standards Association) from the ground up, to be powered by Natural Gas. While this series of SANDPIPER pumps can be powered with compressed air, it is designed to operate safely using NatGas as its power. This dual power offers the safest portable double diaphragm pump in the industry.



What or who is CSA International?

CSA International has been in the business of regulating the North American Natural Gas industry for 75 years. CSA International sets industry standards and performs certification testing for products that utilize Natural Gas to operate. You are probably familiar with their most recognized symbol, the blue flame and blue star used on products that have passed their rigorous testing.

Has the “G” series pump been tested to CSA standards and passed?

Yes, the full range from ½” through 3” “G” series pumps have passed the test, and are certified by CSA as meeting their standards and carry the highest CSA blue star and blue flame symbols, ATEX, ANSI LC6 and Tech Bulletin R-14, and are compliant with NACE standards for corrosion resistance for Natural Gas Liquids (NGL).

Why was the “G” series pump created?

For the past 55 years, the oil and gas industry has been using AODD pumps in the field to move fluids in remote locations. In many cases, electricity was not available to operate an electric driven pump, but produced natural gas was available at sufficient pressures to operate an AODD. Also, the AODD pump was seen as intrinsically safe because electricity was not required to operate the pump. While the term intrinsically safe is not associated with compressed air or compressed gas powered equipment, many end users use that term to indicate the equipment is “ground ‘able”. Natural gas compressor manufacturers also found the AODD pump a useful tool to pre-lube large engines prior to start up and to move liquids around such as glycol and water for maintenance. Of course, these manufacturers had plenty of pressurized gas at their disposal.

AODD manufacturers became aware of this use for the pump in recent years and tried unsuccessfully to discourage this application. The standard, industry wide AODD pump, is designed for use with air only. The pump is not explosion proof and has been known to discharge static electricity, which could ignite gas and result in an explosion or fire.

The Warren Rupp, SandPIPER “G” series pump is designed from the ground up for safe use in these applications where natural gas instead of air is used as the drive fluid.

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Why wouldn't a “UL Listed” pump or ATEX, spark resistant pump, as some manufacturers call them, work in these applications?

First of all, the “UL-79 Listed” pump is specifically designed to pump flammable liquids such as gasoline. They are not designed to be driven by Natural Gas and are not rated for that service. Any manufacturer or distributor who sells a “UL Listed” pump where Natural Gas is the drive fluid is corrupting the UL listing and putting the end user in danger. UL would pull their listing from any manufacturer who offers their “UL Listed” pump verses the “G” series. Please notify Warren Rupp if you are aware of any circumstance where a “UL Listed” pump has been offered against our “G” series pump.

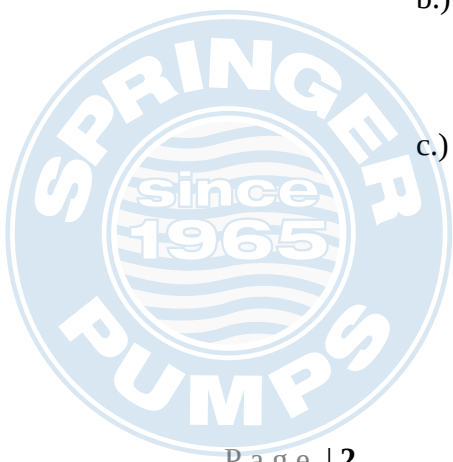
With respect to a spark resistant pump, let the buyer beware. These pumps are not constructed of materials that are resistant to attack from hydrocarbons in natural gas, nor are they tested to design standards that are set to withstand the extreme heat and pressure related effects of an internal fire or explosion. Finally, these spark resistant pumps are not marked with the appropriate warning labels and operational procedures to protect the customer when operating on natural gas, which could result in a dangerous pump installation.

ATEX pumps are rated for various groups and types of potentially explosive environments and are ground ‘able’. G Series pumps are also ATEX certified. However, ATEX certification does not meet the strict CSA and ANSI LC6 requirements for powering the pump with compressed natural gas. Unique requirements are established in the directives to ensure safe operation.

What makes the “G” Series pump unique?

These are the main differences between the “G” Series pumps, designed for operation with Natural Gas, and standard, air driven, industrial AODD pump products.

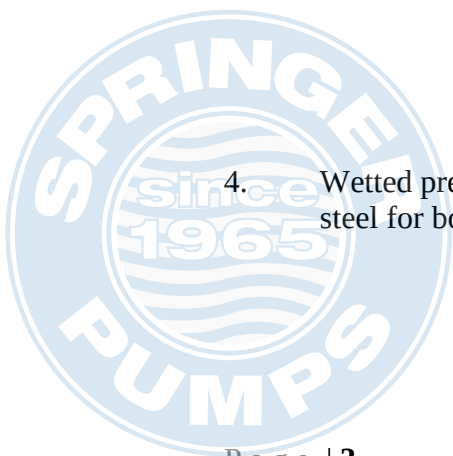
1. The primary consideration is safety. The G-series pumps are designed to dissipate static electrical charges.
2.
 - a.) The pumps are unpainted so all metal surfaces remain in contact.
 - b.) The power or center section (natural gas operating area) is constructed of conductive, all metal inner chambers, intermediate bracket, pilot valve, and gas distribution valve.
 - c.) The power end or center section is equipped with conductive nitrile gaskets to assure a continual grounded path throughout the pump. (There are no isolated conductive components to allow static electrical charges to build up).



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- d.) The pumps are not equipped with mufflers. Specific instructions warn to vent the exhausted natural gas to a safe, low-pressure area using conductive hoses or piping. This is to be done in accordance with local fire safety and environmental codes, an industry or national recognized code having jurisdiction over the specific installations, and/or CAN/CGS B149, Installation Codes.
 - e.) Instructions are given to ground the pump to a natural earth ground. This can be done usually through screwing the mounting bolts into a conductive base or surface. The pumps have grounding cables so the pumps can be grounded even if they are not permanently mounted (i.e., a temporary pumping application).
 - f.) The pump is designed to conduct electricity created anywhere on or within the pump to ground, preventing static discharge and eliminating the potential hazard of a spark.
2. An additional safety feature is the ability to withstand high heat and pressure.
- a.) The assembled pump must be able to withstand a hydrostatic test at a pressure 5 times the maximum operating pressure of the pump. This test is performed on an assembled pump, less the diaphragms, balls and seats. Canadian Technical Letter R-14 requires 5 times (500 PSI) and ANSI LC6 requires 4 times (400 PIS) the operating pressure.
 - b.) All metallic components must be able to withstand a temperature of 800 degrees Fahrenheit without deformation.
3. Power or center section materials of construction are specified to be compatible with natural gas.
- a.) For sweet and sour natural gas operated models, all center section components are constructed of aluminum. There are no plastic-pressure bearing components. The diaphragms, balls and seats, (nitrile or PTFE only) as well as valving components that are offered for this product are the same as our standard industrial models.
 - b.) An optional gas valve on 1 ½" through 3" pumps is available where all components making up the center section are constructed of stainless steel. There are no plastic pressure bearing components and no aluminum. FKM elastomers are available for higher concentrations of HS2 and other chemicals found in sour natural gas.
4. Wetted pressure bearing parts are available in either aluminum or 316-stainless steel for both sweet and sour gas designs.



Where does the gas pressure come from that is used to drive the “G” Series pump?

Natural gas is produced in the oil field both as a stand-alone product and as a by-product of oil production. In many cases, the gas is produced at a pressure great enough to feed directly into a gas transmission line (greater than 300 psi) but it is also common for the gas to be produced at a pressure below that required to feed a transmission line. In these cases, the gas is collected, compressed and pressurized to a pressure great enough to feed the transmission line. Natural gas compressors are also sometimes used to draw down the pressure in the casing that connects the below ground hydrocarbon producing formation with the surface. Reducing the pressure in this casing increases oil and gas production by allowing these fluids to flow into the wellbore at reduced pressures.

As you can see, the pressure from produced gas or from the natural gas compressor in all cases is great enough to drive a “G” series diaphragm pump. The pressure must be regulated down in many cases so as not to exceed the maximum pressure of the pump of 100 psi (7 Bar).

How will I know there is natural gas present in an oil producing well site?



There is typically a wind sock located above the storage tanks. This indicates the presence of natural gas.

Can our standard Filter/Regulators and other accessories be used with these pumps?

No. Chemical compatibility with natural gas and electrical conductivity are the issues. Use of a SANDPIPER Interceptor 3P U filter is imperative as particulate in the natural gas will cause premature gas valve failures. The CSA certified SANDPIPER Regulator is highly recommended. This has been designed and certified specifically for SANDPIPER and is safe for operating at CSA approved pressures up to 100 PSI (7 Bar). Regulator is rated up to 400PSI (28 bar) inlet pressure.



What is the difference between sweet and sour gas?

Sweet gas is natural gas that does not contain Hydrogen Sulfide (H₂S) or contains Hydrogen Sulfide in amounts that are very small and are non-corrosive. Sour gas contains Hydrogen Sulfide, which is an extremely corrosive gas that is also deadly. Hydrogen Sulfide is found in specific parts of the world and is a relatively common part of natural gas production that must be dealt with. (See additional information on Sour gas below)

What is sour gas?

Natural gas is largely composed of methane but also includes other hydrocarbons such as ethane, propane and butane as well as contaminants such as carbon dioxide (CO₂) and water vapour. Sour gas is natural gas containing hydrogen sulphide (H₂S), a compound that is composed of two hydrogen atoms and one sulphur atom.

H₂S is flammable, has a rotten-egg odour and is poisonous to humans and animals. The rotten-egg odour is detectable between 0.01% and 0.3% and it may be deadly at concentrations of 750 parts per million or greater. There are various definitions of sour gas. For example, a pipeline is considered a sour gas pipeline if it carries gas containing more than one per cent H₂S. Many people in the oil and gas industry also adopt this definition, one per cent, to distinguish between sweet gas and sour gas. Under worker safety regulations, a well or processing facility is defined as a sour gas worksite if the gas contains more than 10 parts per million H₂S 0.001%.

How is sour gas formed?

H₂S is formed during the anaerobic (without oxygen) decomposition of organic materials. This process can be observed today in sewers, manure piles, swamps and bogs, or even a poorly maintained compost heap. A similar anaerobic process occurred during the formation of oil and gas millions of years ago. This accounts for the small amount of H₂S and other sulphur compounds – typically one or two per cent – found in many oil and gas reservoirs around the world.

However, many petroleum-bearing rock formations contain iron that bonds with the sulphur in H₂S. When there is ample iron present, the result is sweet oil and gas containing little or no H₂S. Sour gas formations do not contain enough iron to neutralize the H₂S.

What concentrations of sour gas can the sour gas version of the “G” series pump handle?

This is a very difficult question to answer. The main question is what experience does the customer have in the area where the pump is to be used and is the 316SS gas valve available for the 1 ½” through 3” pumps, required. Many sour gas fields use standard equipment because the concentration of H₂S is not great enough to be corrosive. In other areas of the world, H₂S concentrations are great enough to require the 316SS and FKM elastomers in the power or center section as a better option. The decision about what gas valve to use must be left up to the customer.

Can the “G” series pump be driven by utility grade gas like what is found in my home or in general industry?

In theory, yes it could, but in reality, probably not. The problem becomes what to do with the exhausted gas. You cannot simply exhaust natural gas into the air without creating a potential hazard. If the gas could be exhausted to feed a furnace, as long as the exhaust pressure does not exceed 20 psi, then the “G” series pump could be used on utility grade natural gas. Local regulations as to the handling of natural gas must be adhered to.

Is 20 psi the maximum allowable exhaust back-pressure for the “G” series?

Yes, until additional field data is generated and lab testing is performed, 20 psi is the maximum allowable pressure that the exhausted gas should see.

How will the oil field deal with the issue of exhausted natural gas?

Again, local regulations will dictate how natural gas is collected but there are numerous ways that the field presently collects exhaust gas. One way is for the gas to be piped back into the tank battery where oil is stored. Oil naturally emits natural gas over time and there are vapor recovery systems to collect this gas. These systems are typically low pressure and suitable for use with the “G” series pump. In other cases, the exhausted gas is used to feed separators that separate water and gas from produced oil. These separators normally incorporate a burner that is fired from produced natural gas. These systems are very similar to your home natural gas water heater.

Another method used to collect exhaust gas in the oil field is to tie the exhaust line of the pump into the suction side of a natural gas compressor. These suction pressures are sometimes positive pressure and not on a vacuum, so you must be careful in these applications not to exceed the maximum allowable exhaust pressure of 20 psi.

Will any type of muffler be available if the customer insists?

No, the “G” series cannot be supplied with a muffler. It is up to the customer to determine what local regulations govern the exhausting of the drive gas.

Will the “G” series be available with Viton® Diaphragms?

No. Viton® (FKM) is used in oil field applications. FKM diaphragms are available for use in air powered applications using our “S” series products. CSA has strict requirements for endurance and FKM diaphragms will not pass the testing procedure. We do offer FKM elastomers in the center section of the CSA certified “G” series.