System Operation

Broadwind-SAFE’s CNG Boost hydraulic compressors can operate with a wide range of suction pressure without any regulator. When the compressor is used as a booster, the system always supplies compressed gas at the right pressure, assuring the highest refueling pressure throughout the vehicle refueling cycle, maximizing the use of storage volume and providing a vehicle full-fill. This type of compressor is also well suited for trailer unloading at daughter stations.

The compact design allows for installation in locations with limited space. In addition, the operating speed and oil free design result in almost zero maintenance.

The storage on a CNG station has two functions:

1) Regulate the operation of the main compressor, reducing the number of starts and stop per compression hour. Usually this need is more crucial at the beginning of the life of a station, when the demand is not yet very high and scattered during the day. The best thing to do in this case is to keep the start threshold on compressor priority panel as low as possible, in order to have the maximum possible utilization of the storage volume.

2) Increase the capacity supplied by the main compressor for a limited time. Usually this need prevails when fuel demand increases, and the capacity of the main compressor is not sufficient during high demand periods. In this case, it is important to keep the start threshold as high as possible, in order to be sure that the storage is as full as possible when rush hour begins. The compressor will pump regularly anyway, because in these cases, usually the demand of CNG is high, and the compressor will keep pumping for longer periods of time.

Adding a hydraulic booster on a station can help in both cases. The hydraulic booster intakes from each storage bank and can compress to medium or high storage bank, or directly into the vehicle. With this approach, gas is gradually displaced from low to medium bank, then from medium to high, and eventually from high bank directly into vehicles, increasing the amount of gas that is extracted from the storage, before the storage is considered empty since the vehicle thank pressure is higher that the storage pressure.

If the booster is used to regulate the main compressor, because the storage capacity is kept as small as possible due to lack of available footprint, permissions, or to reduce the cost, then the start threshold of the booster will be set higher than that of the main compressor. In this fashion the booster starts compressing before the main compressor, to keep it stopped as long as possible.
System Operation (continued)

If the booster is used for peak shaving, because the main compressor is not capable of supplying enough capacity since the demand of the station has increased unexpectedly, then the start threshold of the booster is set lower than that of the main compressor. The booster will then pump only when the main compressor is unable to keep the storage pressurized, and will pump out as much gas as possible.

In both cases, the booster is a compact and simple solution to maximize storage utilization.

Hydraulic Operation Description

The compressor is driven hydraulically. The hydraulic oil is stored in a tank and is drawn by double pump powered by electric motor and alternatively sent, by means of main spring-loaded distributor to the oil chambers of the pumping units. The hydraulic circuit also includes maximum pressure relief valves. Maximum pressure relief valves discharges the main capacity section of pump when a predetermined hydraulic pressure value is reached. This value can be read by pressure gauges. The oil level in the tank must be kept in the middle of the visual indicator.

Gas Circuit Description

The natural gas is taken from the inlet line with pressure values between 145 psig and 3600 psig. The inlet pressure is controlled by a pressure transducer in order to operate the compressor within certain operational parameters. A shut-off valve must be fitted between the line and the compressor. It is crucial to filter the gas intake thoroughly as small very hard foreign particles could deteriorate the cylinders and sealing rings. A heat exchanger is fitted on the outlet of each stage together with a gas block in which a gauge and a safety valve

Cont.→
Gas Circuit Description (continued)

are fitted. The gas is cooled by the circulation of a mix of water and glycol. The compressed gas goes through a filter-damper. A pressure transducer is fitted in the delivery block of the last stage to prevent the maximum pre-set threshold from being exceeded. The high pressure delivery line, it’s controlled by a pressure transducers. The compressor according to the pressure values and during the vehicle refueling operation compress the gas to the low, medium, high and direct line pressure to the dispenser.

CNG-Boost Key Customer Benefits

- Two-stage design maximizes storage capacity up to 90% by utilizing stranded CNG content created by pressure equalization in storage vessels
- Deliver up to 19 GGEs per minute to minimize refueling time
- Reduce main compressor starts-stops to lower O&M costs
- Provide a lower cost alternative to added storage or reciprocating compression capacity with the benefit of a minimal foot print
- Offer flexible configurations to meet a wide range of station demand scenarios

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