NOT ONLY FOR GAS, BUT ALSO FOR COMPRESSED AIR, OXYGEN AND NITROGEN

IGA stations for a clean environment

A positive trend can be identified in the design of central compressed air systems. Whereas until now factories have generally had their own compressed air stations, it now appears that a central installation can be more economical.

In the case of individual systems, there is always a big reserve available to avoid problems in the supply of compressed air in case of breakdown. This reserve varies from 30% up to even 50%. In a central supply, there can be considerable savings made on these reserves since the chances of peak loads arising simultaneously are rather small. On top of this, another advantage can be found in the fact that the pipeline system, because of its large volume, can act as a buffer so that compressed air is available to avoid shortages. So, the total investment can then be lower.

Groningen Seaports, supervisor of the industrial area Oosterhorn in Delfzijl (province of Groningen, in the northern part of the Netherlands) has been doing research into such a central supply and studied the project together with the company Hoek Loos in Schiedam. Hoek Loos is a well-known company which distributes industrial gases and has been building installations for the local production of gases for about 100 years. Hoek Loos has constructed several factories producing gases such as oxygen, nitrogen, hydrogen etc. from the environmental air. In Ijmuiden, a factory has been constructed which is capable of producing gases such as krypton and xenon in a cost-effective way.

For the realization of the Delfzijl project, Hoek Loos decided to include the use of compressed air for the production of nitrogen. To ensure the supply of nitrogen, even in the case of a failure in the installation, two storage tanks were built.

Compressed air station

A nitrogen and a compressed air station

Nitrogen is used in particular for cleaning ships and tanks.

A central supply of compressed air and nitrogen is only cost-effective when the requirements of all companies are identical. The quality has to be related to the supplier with the highest quality standards, the highest pressure and the lowest dew point.

The supervisor of the industrial area, Groningen Seaports, has constructed a pipeline system that is rented by Hoek Loos to keep the project under one roof. The main pipeline starts with a diameter of 250 mm and reduces to 200 mm. The length of the main pipeline is 5 km. The inlet pressure is 8.5 bar. The pressure loss across the total length is only 0.15 bar.

For the project in Delfzijl, 18 IGA metering and regulating stations were required: 8 stations for compressed air, 9 stations for nitrogen and 1 back-up station for the nitrogen storage tanks. The layout is the same as in regular gas distribution stations and consists of a main line and a by-pass line. The stations for compressed air are designed for flow rates at base conditions from 750 up to 15000 m³/h. The inlet pressure is 8 – 8.5 bar and the outlet pressure varies from 6.5 – 7.5 bar. The installations for nitrogen have flow rates at base conditions from 100 up to 3500 m³/h. The inlet pressure varies from 5 – 15 bar. Up to flow rates at base conditions of 400 m³/h, rotary meters were used, above this capacity turbine meters. For the stations with big capacities, F1 gas-net flow computers were used. These customers applied for an electrical signal of 4 – 20 mA in order to be able to use the information from the flow computer.

In general, the installations consist of: inlet section; filtering unit, Axial Flow Valve with ZSC100 pilot (with a low-pressure differential sleeve), rotary or turbine meter, EK 230 volume corrector, FE 230 function extension unit, orifice plate for limiting the gas flow, check valve for the protection of a pressure build up downstream from the meter and the outlet section. The by-pass line consists of an Axial Flow Valve and a Y-filter.

The stations are installed outdoors with only a small roof for the volume corrector and the interface box. Via the GSM modem in the FE230 function extension unit, the data communication is carried out by the control room of Hoek Loos in IJmuiden with the aid of the WinCOMS readout software. The WinVIEW data management software is used for the evaluation of the consumption data as well as to provide the meter readings for billing purposes.

For Hoek Loos, the Delfzijl project is not the first big project for compressed air and nitrogen. Back in 1997, a project was undertaken in the Botlek area (Rotterdam). In 2001, IGA supplied some oxygen stations for this project. The inlet pressure varied from 18 – 25 bar and the outlet pressure from 4 – 8 bar. The flow rates at base conditions varied from 600 up to 1700 m³/h. The significant difference with the compressed air and nitrogen stations is that all components are made of stainless steel or have to be degreased to avoid the danger of explosion.

Hoek Loos invoices the customers for the supply of the industrial gases. It may be expected that the expenses of compressed air and nitrogen will be 20% lower compared with the individual supplies.

The environmental consequences of this central supply are considerable. The expectation is that the savings in energy will be 4,380,000 kWh and that the emission of CO_2 will be reduced by 1621 tons. The local production of nitrogen will avoid heavy road transportation, which also involves a high emission of CO_2. In total, 3577 tons of CO_2 will be saved.

This proves the multi-functionality of the IGA stations for more than only natural gas applications, resulting in an important contribution to the improvement of the environment.

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