NEW HEATED SAMPLE LINE ENABLES TROUBLE FREE AIR SAMPLING IN THE MOST EXTREME CONDITIONS

Continues Emission Monitoring (CEM) and Process Analysis Technology (PAT): are extractive analysis technologies which underpin a rapidly growing, global market segment. However, of equal importance to the analyser itself, is the probe sampling system, which is an imperative component if you are to achieve an overall accurate result, as are the transportation and conditioning of the sample.

Extruded Heated Sample Line

Extruded Flex in Cable Tray and Analyser Container

One of the most overlooked elements in this process chain is the unglamourous, heated sample or analyser line. Whilst this part of the operation is very short and seemingly uncomplicated, the heated sample line can often be overlooked as a major priority. As other components like the analyser are installed in a protected environment, the analyser line is often installed outside and has to operate with high temperature fluctuations and other challenges such as sun radiation, so this part of the process has plenty of potential complications to overcome. Depending on the distance between the sampling point and the analyser, the length of the lines can be very long, in extreme cases up to 200 meters. The majority of heated sample lines are installed in different areas of the plant and so they need to cater for often significant differences in the ambient temperatures (ambient in analyser shelter / house 20°C, but outside when installation at the chimney ambient can be from -40° to + 60 °C).

For the installation and operation of the line the outside jacket is essential – a more flexible jacket reduces the product lifetime and has a higher risk of irreparable damage during installation – a more rigid jacket results in a higher bending radius which means more space, which is always very limited, is required. This dilemma is now solved due to the latest development from Germany based AGT-PSG, which has managed to add another solution to the more than 2500 lines the company is already producing. They listened to what their customers really wanted and decided that it was possible to mix all strength of flexible and extruded heated sample lines and create the "dream" heated sample line.

In the past the user had to choose between a flexible Ringwell jacket (often produced from a polyamide with a very thin thickness) and extruded but rigid heated sample lines (made from PVC or TPU). So, in the past a trade-off between high flexibility Ringwell jackets with limited resistance against sun radiation or other environmental factors and extruded lines with a higher bending radius has to be decided.

Flexible heated sample lines are typically hand manufactured, all components such as the PTFE / PFA tube, heating cable, insulation and outer jackets are pre-assembled for the final length and are twisted around. As heating cable, the majority of these lines have a fixed resistance heater with power output up to 90 w/m. The components within the line are relatively soft together, so the stability is limited and the most common outside jacket is a corrugated or braided hose which

is made of Polyamide. Whilst these lines offer high flexibility and low bending radius they cannot be cut to length, they use higher power consumption due to their hand made insulation, the jacket offers limited resistance against environmental influences and the small jacket thickness can cause damage in the installation phase. The alternative is a more robust extruded heated sample line.

These consist exclusively of machine manufactured components, include a parallel heating cable which can be cut to length, up to 300 meters in one piece can be produced and more robust jackets made from PVC or TPU are extruded on the insulation of the bundle. However, until AGT-PSG's development, there was a real lack of flexibility and the ability to bend the line was very limited. AGT-PSG started work on this new line in 2014. With their sample line you can cut to the ideal length onsite, its precise machine manufactured materials ensure that these lines can be used in the most extreme conditions and its extremely resistant jacket is approximately 2 mms thick and has a plain surface to avoid damage on sharp edges during installation.

With PSG-AGT's newest development the dilemma of the sample line is solved: due to a new production technology, the PSG Extruded Flex line is manufactured with a PVC jacket but,

Extruded Standard vs. Extruded Flex

Heated Sample Lines PSG Overview

due to the inside spiral, the bending radius has been reduced by approximately 50%. Even cut to length technology is available which enables shortening this line onside to the ideal length accurately. The PSG Extended Flex Line can operate within temperature ranges from below freezing to up to 200°C and includes various ATEX approved solutions. This allows end users to enjoy the benefits of combining the pliability of a flexible heated sample line with the toughness of an extruded heated sample line.

The installation of the sample line can be a very critical event and comes with several issues. The bending radius can cause problems due to the installation on cable trays, the shortfall of the bending radius can cause damage and obstruct the passage within the line. The length of the line, if it cannot be shortened, might be longer than required – so the additional length of sample line somehow has to be homed without hindering the flow of sample

Heated Sample Line in Probe

gases. Operating the sample lines has traditionally also given rise to problems. The holding temperature of 180°C / 200°C with ambient up to -40 °C is not easy to reach, solar radiation can cause damage to the outside jacket and result in leakages which eventually allows water to enter the sample line and, depending on the application and plant, heated sample lines often have to comply to ATEX regulations.

In addition, when transferring gas from the sampling point to the analyser, the probe cannot be changed otherwise this affects the measurement results or can cause additional problems in the sample handling system. The AGT-PSG probe's capability to transfer is summed up by the company's slogan for PSG: Perfect Sample Gas.

AGT and PSG, whose products have been renowned for over 40 years as a hallmark for reliability and longevity, merged in 2016. This combined over 90 years of experience in gas sampling, gas conditioning, compressed air drying and compressed air distribution in one company.

AGT-PSG is now the only company to manufacture an entire range of products for continuous extractive gas analysis in-house for the global market. This enables their customers to obtain gas sampling probes, heated sample lines, sample gas coolers and sample gas conditioning systems from a single source.

Extruded Flex

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