

BIG NEWS IN INTELLIGENT SAMPLE LINES

In high and sometimes extremely tough altitudes - heated tubes are often devalued as a commodity or just a normal utility item. However, they can do significantly more than just protecting liquids or gases from freezing or keeping them at a certain temperature. The latest invention from AGT-PSG shows how much intelligence can be integrated into a "simple" line for extreme cases - much to the delight of plant manufacturers and operators.

The idea for the development of the PSG hybrid line came straight from the field. It was caused by a problem (as usual): a desperate call from an operator, who described problems in his flue gas measurement, got the ball rolling. Once again, the formation of condensate in the area of the primary sample preparation (i.e. the gas sampling probe) and the transition to the heated line apparently caused problems. After a comprehensive analysis, it became clear that the problem was more likely to be the non-preheated back-purge air, which was given up regularly to remove dust particles. It would have been possible to change this later by heating it on top of the stack, but it would also have been extremely expensive at the same time. That is when the idea came up: why don't we use the heated sample line to preheat the purge air accordingly? A new approach was born.

This approach was the starting point for a development project, by considering which additional components could be brought into the line to minimize installation and interface work at the top of the stack or sampling site.



Template from the Automotive Industry

For customers in the automotive industry, sensor- or supply-lines have been "looped into" in addition to the actual sample line for many years. The advantage of this technology is that the additional elements are protected by the robust outer sheath and, in addition, it is possible to quickly and easily disconnect and connect several contacts and signals via standardised plugs. A major difference between the rather short lines for exhaust gas test stands in the automotive industry and the application areas in chemical or power plants is the fact that the cables do not have to be shortened on-site, but are prefabricated in a defined length, a procedure that would be accepted only partially on construction sites.

Intelligent Sample Line

The development specification, to enable the complete supply of the gas sampling probe from analysis cabinet via heated sample line, was awarded after successfully piloting the name PSG Hybrid



Plus. It consists of:

1. Sample line in PTFE or PFA
2. Power supply of the gas sampling probe
3. Connection cable for temperature sensor of the gas sampling probe
4. Calibration gas line for test and calibration gas feeding at the gas sampling probe

5. Back-purge line in PTFE for back purging the gas sampling probe
6. Connection cable for control of back purge valves mounted at the gas sampling probe

The overall concept of the sample line had changed. As the name PSG Hybrid Plus may already reveal, some customers soon came up with the requirement to flexibly and modularly set up the basic concept. In the meantime a flexible adaptation of the components is possible via a configurator.

Shortenable due to Special Shrinking Technique

An essential success factor for the new development was seen from the beginning in the shortening of the lines. In particular, with long line lengths, as they may occur in environmental or process measurements, precise length measurements are almost impossible. Thus, if handling with an excess length is to be avoided, the concept of a shortenable line is clearly superior to the pre-assembled one. Raychem heating tape technology, which has been used for AGT-PSG products for more than 30 years, offers the opportunity to cut back on almost all product lines. Still, the bigger problem was identified by the number of different integrated components, to be cut gas - and waterproof on site. Thanks to the ingenuity of the production staff, the PSG Hybrid Plus line can be easily shrunk with a hot-air blower via an intelligent arrangement of different dividing caps, a technology with which many assembly companies in the field of cold cables have had many years of experience.

Hard Shell - to Protect the Special Core



What advantages can a high-tech line provide with a variety of components, if not even the appropriate protection is guaranteed? By extruding the outer shell of PVC or TPU, it is ensured in any circumstances that the line can withstand the harshest environmental conditions. This is a significant difference to the use of flexible polyamide hoses, the UV resistance of the jacket materials used should be emphasized in particular. In addition, the smooth surface ensures an easy installation. Damage at sharp edges or even a "snagging" sometimes happening to corrugated tubing is almost impossible. Another advantage of the mechanical "stranding" of the analysis line is the strength that the outer jacket shares with all other components of the line. The often problematic vertical laying at the stack (strain relief) of other cables can be implemented with the PSG Hybrid line without additional fastening measures - the "sagging" of the cable core is effectively prevented by the tight stranding and extrusion of the outer jacket.

The Heating Tape Technology: the Engine in a Heated Pipe

The packaging is good. The components are held together tightly by the unique stranding technique without torsion. Now the power must be applied properly. As for a car, the central part (analogue to the engine) is the heating cable, which keeps the set temperature and regulates it depending on external factors (such as the ambient temperature). For more than 25 years and

countless kilometers of heated lines, Raychem brand heaters have been used; the unique quality is not only reflected in the 0% complaint rate, but is further underpinned by the 10-year warranty. Whether as self-regulating version (from temperature ranges frost protection up to approx. 150° C) or a parallel heating cable with constant heating power for temperatures up to 200°C, the precisely fitting product is available for almost every application.



The Condensate Devil Hides in the Detail



Although the topic of heat and heat transfer is well resolved in the analysis line, this is only half the battle: in particular, the transition from heated line to, for example: the gas sampling probe, is almost perfectly suitable for a cold spot. Even the smallest unheated part can already lead to condensate formation and thus become a problem for the entire measurement. To avoid this, there are two things to keep in mind:

1. On the sample side the heating tape should be carried out as far as possible to the very end of the heated line and also has to perform with full heat output to the very end.
2. The connection at the gas sampling probe has to be carried out seamlessly and also heated as well as insulated.

The two gas sampling probes, PSG Basic and PSG Plus, can be used as models for this purpose. In order to ensure optimal heat development within the probe, an actively operated heating sleeve fits seamlessly and in perfect symmetry to the probe surface. In addition, an insulating hood, which also includes the connection to the analysis line, guarantees a correlative heat distribution. All these measures contribute to the fact that the temperature maintenance of 180 °C to 315 °C can be obtained, even at extreme ambient temperatures.

Bottom Line: the Whole Thing Has to Pay Off

Added technical value is always a good thing, but in the end, the use of a PSG hybrid line must also be commercially viable. Of course, combining several components into one line increases the one-time purchase price. In addition, the PSG hybrid line is thicker than a conventional line due to the large number of components, resulting in increased bending radius and a more complex installation.

However, the actual cost-technical comparison must relate to the installation costs of the individual components at the stack or the measuring point. If cold cables for electricity, signal cables for temperature and back purge control or even a compressed air supply for back purge have to be installed, the hybrid concept can clearly demonstrate its advantages. In addition, a multitude of coordination interfaces are eliminated - the line comes with almost everything.

Only a Single Concept of Many

AGT-PSG is one of the leading manufacturers with more than 2500 different tube bundles and analysis lines. As the only supplier on the market, the medium-sized company produces gas sampling probes, heated sample lines, sample gas coolers and complete sample gas conditionings. This ensures sampling, transport and preparation of measuring gases from a single source - all according to the company's vision: Perfect Sample Gas.



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