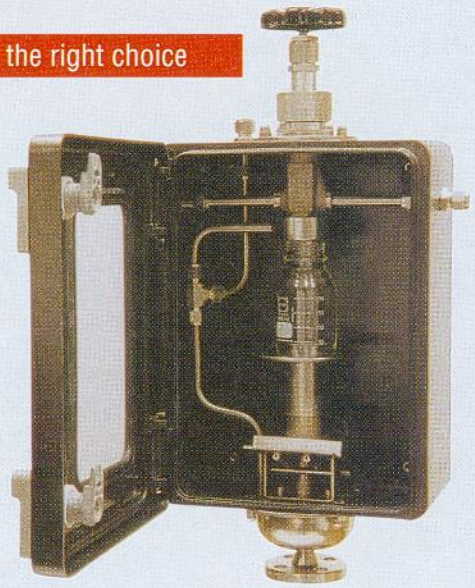
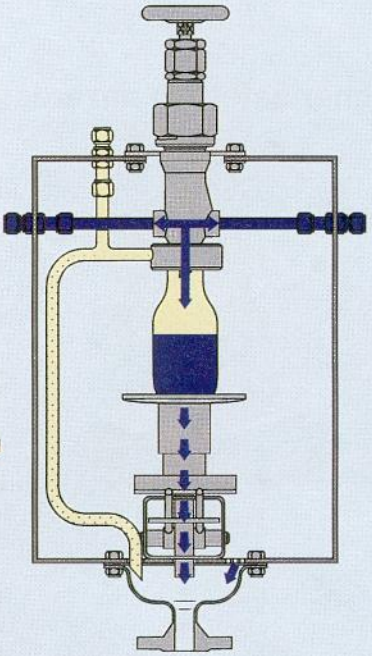
Getting it right from the start

Sampling systems: A question of making the right choice

Incorrect representative sampling can have dire consequences in the sensitive area of quality evaluation, where enormous production runs are assessed on the basis of tiny samples. It is vital to get things right from the start, i.e. when the sample is taken, and not only when it comes to analyzing the actual sample.

ROBERT SCHOLZ, JOACHIM SCHOLZ





The BR 2000 basic sampling system is currently in widespread use, as it fulfills all the main requirements regarding safe and reliable sampling.

Pictures: Fritz Barthel Armaturen

The first step in a quality evaluation chain is always the taking of a sample from the production process. It lies in the very nature of a quality evaluation system that its overall precision is based on the law of error propagation, i.e. the errors made during the sampling process cannot be corrected at the analysis stage, no matter how sophisticated the technology used there. In other words, it makes no sense whatsoever to invest huge amounts of time and money in the analysis stage if the previous steps – the obtaining of samples in particular – are neglected. If the sampling involves hazardous substances, the safety aspect will need careful examination. Similarly, account will have to be taken at the planning stage of the physical properties of the material to be sampled, the conditions at the point of extraction, and any structural restrictions. The search for an ideal sampling system can thus turn out to be a difficult undertaking. Following a description of a basic liquid sampling system it will become clear how product characteristics can make it necessary to resort to a wider range of functional sampling setups.

Case examples

The BR 2000 basic sampling system is currently in widespread use, as it fulfills all the main requirements regarding safe and reliable sampling: Samples are taken by representative means, free of dead space; the outlet is kept as short as possible to eliminate the risk of any error caused by waste sticking to the sides; a regulating cone allows optimum dosing of the samples during the filling process; and a protective cabinet provides spatial separation between the filling process and the actuating element. All the components are guaranteed to be fully interchangeable. The system incorporates overflow prevention, a vent system for both the inside of the cabinet and the flask (via the head element), plus a common drainage system for the flask overflow, the set-down surface of the spring loaded anti-splash table and the cabinet-bottom outlet. The system can be fitted with a dead-man's lever and bellows assembly as an option.

R. Scholz, EMAIL-COVER R. Scholz GmbH, Weilerswist; J. Scholz, Fritz Barthel Armaturen GmbH & Co. KG, Hamburg.

Sampling aggressive liquids

Sampling equipment with contact surfaces made of a material that is highly resistant to chemicals is required for the handling of corrosive substances, especially when such handling takes place in the presence of elevated operating temperatures. Steel/enamel is the preferred material for providing high acid-resistance to apparatus and pipework. The body and stem of the EC ACRS 50 acid-resistant sampling valve have a high-grade chemical-enamel finish, which is pore-free and high-stress tested to DIN ISO 2746 standards. The smoothness of the enamel finish also helps to prevent any product from sticking to the surface. With a constant flow of fresh, representative medium, the sample can be extracted free of fore-runnings – with separate purge of the discharge. The range of applications can be widened if a valve fitted with a heating jacket is used. These systems should also preferably be equipped with a protection cabinet, in which the sampling flask can be filled in full view and uncontrolled product leakage can be avoided.

Sampling under pressure

The extraction of liquid from system components (tubes and containers) that are under pressure must be carried out in such a way as to prevent spraying or uninten-

The body and stem of the EC ACRS 50 acid-resistant sampling valve have a high-grade chemical-enamel finish.

www.process-worldwide.com

More about fittings and sampling systems

tional vapor leaks. The sampling area must be blocked off for this purpose. The product can be left in this blocked-off area to drop to normal pressure and – if required – to cool off, before a sample of a fixed volume is extracted. This is the configuration used in the EC INS S sample-extraction valve. The substance is separated in the 100 ml pre-chamber of the valve. The extraction inlet protrudes into the product-flow area (e.g. located in the center of the flow tube when installed in pipework), thus canceling out the effect of dead volumes. The blocked-off area can be filled by turning the lever of the filler valve to "Open" (i.e. "Fill"), thus allowing the sample liquid to flow in. A simple 180° turn of the operating lever separates the area once more. The filling inlet of the valve is then shut, hermetically sealing the sample from the main product-flow. In the same operation, a further turn causes the liquid to flow into the sample collection bottle, which cannot be overfilled. All operations are mutually exclusive, so it is impossible to turn the lever to an incorrect position. The EC INS S sample-extraction valve is easy to fit to container outlets, or – via a T-piece and flange – to the actual pipework.

Analysis of solids

One highly-relevant area that often fails to receive the attention it deserves in this respect is the quality evaluation of solid substances. The analysis of particle-size distribution is often based merely on partial random sampling. However, if the evaluation of the overall production run is to be meaningful, it is recommendable to take the entire flow quantity and sample a representative cross-section of it. The cross-cut sampler for downpipes is ideal for this purpose. This device, which uses a mobile swiveling funnel with exit chute to collect the solid particles, takes samples across the entire cross-section of the tube for each sampling cycle. The cross-section of the funnel opening is in the form of a segment of a circle, so that the solid particles – at their varying distances with respect to the axis of rotation – are extracted independently of the slew rate. The sample amount being collected can be varied according to the speed of the swiveling motion. The solids sampler can also be automated for proportional operation over a longer period.

For further information in connection with this article, mark code number **321**

B 30375

www.process-worldwide.com

PROCESS WORLDWIDE

Chemical and Pharmaceutical Engineering

1

Plants and Processing

Safety and Environment

Market and Management

March 2002
Volume 5
Vogel Life Science Media