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PROCESS

PNEUMATIC TRANSPORT

Description

Pneumatic transport conveys powders through pipes by compressed air. In most cases this is done by blowing, where a blower provides the necessary air pressure (and speed) and the product to be transported is brought into the transport pipe after the blower, mostly through a rotary valve. In some cases suction transport is used. Especially with milling systems it is not unusual that, instead of catching the product in a bunker under the mill, it is, together with the milling air, immediately inserted into a pneumatic (suction) transport. The disadvantage of suction transport is the limited capacity (the maximum pressure difference obtainable is always less than 1 bar) and the necessity to use heavy equipment: the majority of (in most cases round) process equipment can much better resist overpressure than underpressure.

Mixtures

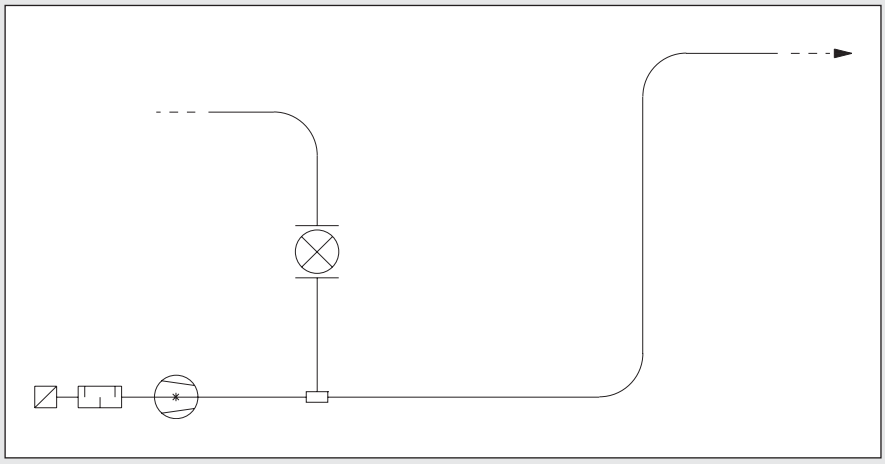
In principle, in a pneumatic transport, an explosive mixture can nearly continuously be present. Due to the very high turbulences it is however very difficult to ignite, which makes the probability of a direct ignition in a pneumatic transport line is in most cases very small. Ignition might, of course, occur in the separator (filter/cyclone) at the end of the transport.

Ignition sources

The disadvantage of a pneumatic transport by blowing is, that possibly sparks or hot parts from the blower could be introduced in the air/dust system. This is not the case with suction transport. Obviously also ignition sources in the form of smouldering product could be imported.

A problem often underestimated, which consequently has led to various heavy explosions, is the development of propagating brush discharges: mainly in synthetic or rubber hoses, equipped with a metal thread, these discharges may occur, even if the steel wire is well earthed. Due to the very high energy capacity of such discharges, and to the fact that these are continuously repeated, they can lead to an ignition in the conduit, in spite of the very high turbulence.

The powder itself can become heavily charged by the pneumatic transport and as such cause problems in the receiving bin (spark discharges, corona discharges or possibly also propagating brush discharges, e.g. in a coated bin).



Protection

The best way to prevent propagating brush discharges in pneumatic transport is to use solid metal ducting only. If this is not possible, the hoses used must be antistatic. When in doubt, always ask for a test certificate.

To avoid problems with static electricity in the receiving bin, the classical rules of making everything conductive and to earth apply.

Mechanical problems with the blower can often be detected on time using vibration or temperature detection on the blower.
If there is a chance that smouldering product could be imported with the product, the best solution is to install ignition source detection, combined with a fast shutting valve.

In spite of all that it is generally necessary to protect the receiving bin (with filter). An important question in this matter is: Is it also necessary to provide isolation on the pneumatic transport? Can an explosion propagate in counterflow to the transporting air? Here, besides the products own properties, mainly the duct diameter is important. In a lot of systems this diameter is such that there is still a small chance of explosion propagation in the duct, but that no flame accelerations are to be expected. If the product supply is done through an explosion safe rotary valve and the air transport is done by means of e.g. a roots blower (no fan), in many cases no supplementary isolation measures are necessary.