

No Chance for Killer Paints

Use of seals and engineered parts made of high-resistance plastics in painting technology



Painting process in the automotive industry
Picture: Dürr Systems

Painting technology offers many opportunities and applications for seals and engineered parts made of high-grade plastics such as PTFE and PE. Examples include seals for valve needles, pilot pistons and scraper systems; diaphragms in control units and pumps; paint-feeder hoses and housing components. These plastic components are used whenever aggressive media are present or minimum friction in dry operating conditions is required.

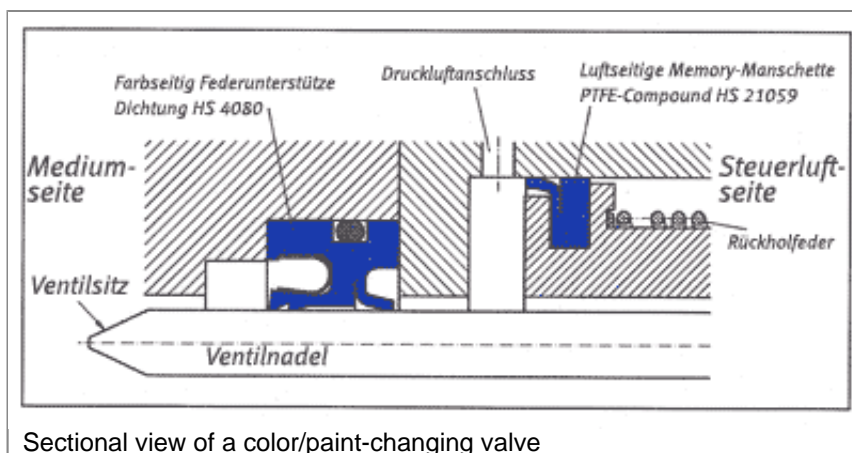
The uses for seals and engineered parts made of high-resistance thermoplastics, such as polyethylene, PE, and

polytetrafluoroethylene, PTFE, are manifold. A special area of application is painting technology in the automotive and general manufacturing industries. The use of extremely critical, abrasive paints, lacquers and varnishes requires special sealing materials as well as special component designs. Industry uses various versions of water- and solvents-borne paints as well as powder dry paints.

Needle and Valve Seals

In painting system control valves various sealing systems are used, differentiating between the seals operating on the paint or media side and those on the air or control side. On the paint side various geometries based on the modified polyethylene material, HS 4080, are used. This PE material offers particularly high wear resistance in applications involving water and abrasive media. Its consistency results in better wiping performance of critical paint particles than that of a PTFE compound, for example. In addition, it provides very good chemical resistance to solvents used for cleaning and flushing. The various seal geometries span the range from standard designs of spring-energized seals all the way through to complete solutions.

Unlike on the paint side, on the air/control side low-friction sealing systems based on PTFE are used. Special compounds with low dynamic coefficients of friction allow the use of memory packings and complete pistons even in dry operating conditions. These seals result in short valve opening and closing times. To be highlighted in this context are compounds HS 21059 and HS 21029, which assure perfect performance even on soft metallic – and even plastic – surfaces. This yields cost benefits because, for high volumes, injection-molded plastic cylinders may be used as a mating surface.



Sectional view of a color/paint-changing valve

Diaphragms in Pressure Control Systems

To perform painting processes at a constant paint pressure level of app. 20 bar control valves use diaphragms made of polytetrafluoroethylene, PIPE, and – in the latest applications – of polyethylene, PE, as well. The diaphragms serve to separate the paint and control air and to keep the paint pressure at a constant level in order to assure flawless painting. For these applications, pure PTFE diaphragms made of HS 17022 and HS 17004 are used. These two materials are characterized by particularly high flexibility, reverse bending strength, the chemical resistance of PTFE and high pressure stability.

Geometrically, such diaphragms can be fabricated as flat or beaded diaphragms, depending on the design of the pressure control unit. Latest applications have shown that as a diaphragm material the polyethylene material, HS 4080, gives very good pressure stability and reverse bending strength as well.

In view of today's environmental requirements and price increases for paints it is necessary that with state-of-the-art painting systems and robots provisions be made for recovering any excess paint from the hose lines. For this purpose, specific sealing solutions, so-called hose scraper systems, have been developed. They serve to push back the paint in the plastic hoses, thus allowing this paint to be recovered and used.

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