



Mahr Metering Systems | Technical Information

Work Tool Steel as Pump Material

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High Speed Steel

Material F16

Tungsten, vanadium and chromium alloyed superior high speed steel (SHSS), which is produced exclusively for Mahr, is designated by its very high tungsten and vanadium content. These two basic alloys build in conjunction with carbon during heat treatment tungsten and vanadium carbide which guarantee an extremely high wear resistance of the steel. On basis of the specific steel properties the pumps do have an exceptional long service lifetime in comparison to pumps out of standard materials. After intensive development work together with steel suppliers a decision in favour of F16 was made. Spinning pumps with capacities up to 50 cc/rev are made of this high speed steel.

- permissible cleaning temperature: max. 550°C / 1020°F
- permissible operating temperature: max. 450°C / 840°F

Material F24

Molybdenum, tungsten, vanadium, and chromium-alloyed super high speed steel (SHSS). This material is not as wear resistant as F16 and is used primarily in conditions which do not place very high demands on the pumps. In reference to the machinability, due to tungsten carbide, it is more costly to manufacture parts out of the material F16. Also, the raw steel F16 is more expensive due to higher percentage of tungsten. As a result, F24 is a cost-favourable alternative when the material quality is sufficient for the application. Usually, this high speed steel is used as standard material by all competitors of Mahr Metering Systems.

- permissible cleaning temperature: max. 550°C / 1020°F
- permissible operating temperature: max. 450°C / 840°F

Cold Work Steel

Material E20

Highly chromium-alloyed high grade tool steel with additions of vanadium and molybdenum. It will be used primarily for spinning pumps with larger dimensions (flow rate more than 30 cc/rev). The thermal expansion coefficient is almost the same as for our SHS steel. Therefore this work steel is partially used in combination with other SHS-steels.

- permissible cleaning temperature: max. 500°C / 930°F
- permissible operating temperature: max. 400°C / 750°F

Stainless Steel as Pump Material

Material N19

High chromium alloyed stainless steel with additions of molybdenum and vanadium which guarantees stability and wear resistance when operating with corrosive media. The production of polyacrylonitrile fibers and the metering of aggressive chemicals are predominant fields of application.

- permissible cleaning temperature: max. 200°C / 392°F
- permissible operating temperature: max. 180°C / 356°F

Material N33

Nitrogen and high chromium alloyed stainless steel with additions of molybdenum, manganese, and nickel. Due to its high hardness and good impact bending this steel is an outstanding material for high duty service components. N33 is extremely inert and suitable for operating with highly corrosive media. This stainless steel meets the specific requirements of the pharmaceutical and food industry. In comparison to the stainless steel N19 the hardness of both materials is similar but the superior N33 offers a higher toughness.

- permissible cleaning temperature: max. 220°C / 428°F
- permissible operating temperature: max. 200°C / 392°F

Material N17

An austenitic chrome-nickel steel with very good corrosion resistance properties. The material has good weldability. Parts made of N17 are subjected to a special surface hardening process. N17 is used in combination with N31 and Stellite. This combination results in a pump that is suitable for highest demands in terms of corrosion and mechanical wear.

- permissible cleaning temperature:
max. 300°C / 570°F (uncoated)
- permissible operating temperature:
max. 250°C / 480°F (uncoated)

Material N33-4

By means of a different tempering process the stainless steel N33 is also suitable for higher operating temperatures. Thereby the N33-4 is applicable in temperature ranges for which usually our high speed steels F16 and F24 are used. The corrosion resistance of N33-4 is in between the one of the stainless steels N19 and N33. The hardness is higher than the one of N19, but the toughness decreases and is just good.

- permissible cleaning temperature: max. 450°C / 840°F
- permissible operating temperature: max. 350°C / 665°F

Material N31

A low-carbon austenitic steel highly chromium and molybdenum alloyed. It is characterized by excellent resistance to gap and pitting corrosion. To increase the wear resistance the pump components are subjected to a special surface hardening process. N31 pump components (mainly gear pump plates) will be combined with components made out of Stellite. This combination results in a pump that is suitable for highest demands in terms of corrosion and mechanical wear.

- permissible cleaning temperature: max. 300°C / 570°F
- permissible operating temperature: max. 250°C / 480°F

Additional Material

Material Hastelloy (HC1, HC2, HC3)

A nickel-chromium-molybdenum alloy, which is characterized by excellent resistance in oxidizing and reducing media even at elevated temperatures. The high resistance to gap-, hole- and stress corrosion refers to e.g. sulfuric acid, phosphoric acid, nitric acid, acid mixtures of sulfuric acid and oxidizing acids with chloride ions.

- Permissible cleaning temperature: max. 300°C / 570°F
- Permissible operating temperature: max. 250°C / 480°F

Material Stellite (S1, S2)

A cobalt-based alloy with high chromium content, known for its high resistance against corrosion and mechanical abrasion at elevated temperatures (up to 800°C/1.470°F). The raw material is usually produced by powder metallurgy and is characterized by a pure uniform microstructure. Stellite is used for rotating parts such as gears, axels and drive shafts. The associated pump plates and accessories are made of highly corrosion resistant materials such as N31/N17. This combination results in a pump that is suitable for the most demanding requirements in terms of corrosion and mechanical wear.

- Permissible cleaning temperature:
depending on the material combination
- Permissible operating temperature:
depending on the material combination