

Shaft Seal of the Slurry Pump

The shaft seal is one of the most important mechanical elements in any centrifugal slurry pump and the correct type of seal must be carefully selected to suit each individual pump system. The three most commonly used seal types are as follows:

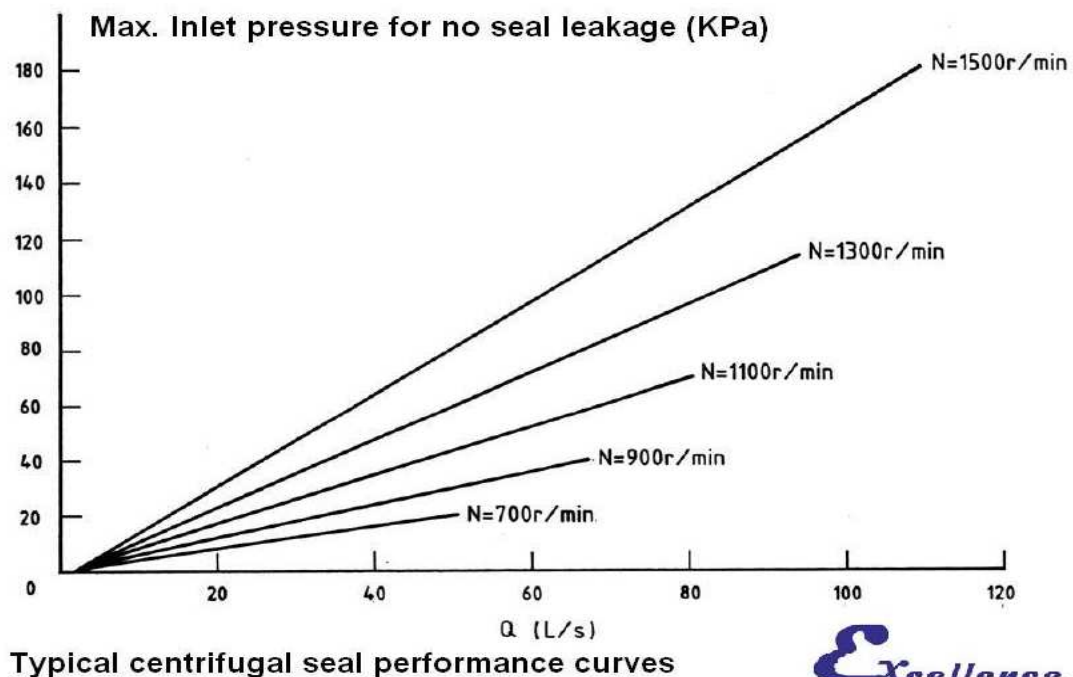
i) Centrifugal Seal

The centrifugal seal is a dynamic, dry seal that only operates when the pump is rotating and has no seal effect when the pump is stationary. A secondary seal maintains the liquid within the pump when it is stationary. The secondary seal can either be rubber lip seals or grease lubricated packing.

The centrifugal seal consists of expelling vanes on the back of the impeller and an expeller which rotates in unison with the impeller located in a separate chamber behind the impeller. The expeller acts as a turbine to reduce the pressure of the slurry attempting to escape around the back of the impeller. The expeller forms a pressure ring within the expeller chamber and prevents the slurry from passing into the secondary seal area.

The centrifugal seal is the most common seal used in slurry applications, due to its effectiveness and simplicity, but it is limited by the pump inlet pressure and the pump speed (rpm). Performance data is available for centrifugal seal limitations for specific pump sizes generally.

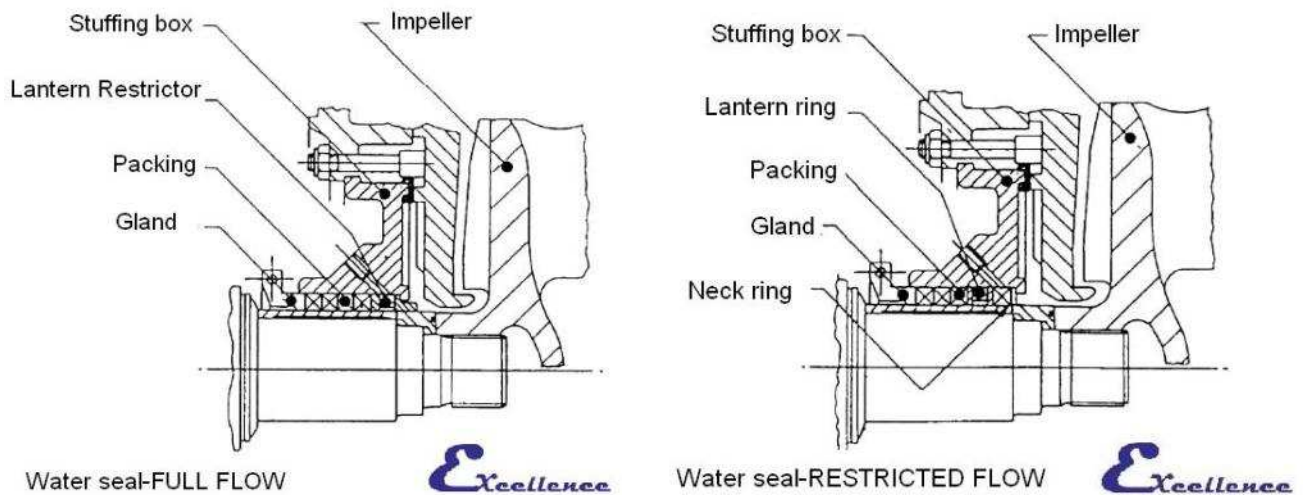
TYPICAL CENTRIFUGAL SEAL PERFORMANCE CURVE



ii) Gland

The soft packed gland seal is the second most commonly used seal in slurry applications. The gland seal comprises a number of soft packing rings, compressed in a chamber (stuffing box) against a protective wear sleeve which is fitted to the pump shaft. This type of seal requires continuous liquid lubrication and cooling between the rotating shaft sleeve and the compressed packing, to prevent over heating due to the friction.

The slurry is not a suitable liquid to provide this function, as the particles would very quickly wear through the protective shaft sleeve. A supplementary external supply of clean flushing water must be provided, to flush the slurry particles away from the seal area, whilst providing the necessary lubrication and cooling required by the packing. The quality, quantity and pressure of this gland sealing water is of prime importance and must be carefully matched to the duty required as shown below:



iii) Mechanical Seal

Mechanical seals are not widely used in slurry applications, but their use in special circumstances is increasing. The mechanical seal consists of a stationary and a rotating face pressed together under mechanical and hydraulic pressure, to prevent leakage.

Silicon carbide is the most common material used for manufacture of these seal faces.

The use of mechanical seals in slurry applications requires extreme care and attention due to the limited reliability common in this developing area. Seal costs are relatively high and require

substantial justification to warrant their use.

The mechanical seal with no flushing is not suitable for all the conditions. It has very strict usage requirements.

- a. the concentration of the slurry could not be too high. It is the best lower than 30%. It could work lower than 40%. If higher than 40%, it is not suggested.
- b. the temperature of the slurry could not be too high. It could not higher than 80 cent degree.
- c. the particle size could not be too big, which is easy to disturb the mechanical seal work.
- d. the slurry is better if it has no or a little crystal. The crystal will disturb the mechanical seal.
- e. When pump runs, the liquid should be full in the pump chamber.

In a word, to select the correct shaft sealing type is very important for the slurry pumps. The three kinds of seal types the above should be of selection professionally. Otherwise, it will affect the seal effect the parts service very seriously.