priming.

These are used to pump slurries. Impellers may be of cast iron or bronzes or steel or special alloys as required by the application. In order to maintain constant radial velocity, the width of the impeller will be wider at entrance and narrower at the exit. The blades are generally cast integral with the disc. Recently even plastic material is used for the impeller. To start delivery of the fluid the casing and impeller should be filled with the fluid without any air pockets. This is called priming.

Cavitation

If the vacuum into the pump is too high, the water may boil and vaporize. That the temperature of vaporization pressure dependent can easily be illus-trated with a pressure boiler, where the boiling temperature of the water is increased; similarly, below normal atmospheric pressure, the boiling temperature will decrease (see below). When a mixture of liquid and gas goes through a pump the boiling point will increase because the pressure around the water molecules increases from vacuum upwards. In changing from gas to liquid the bubbles undergo violent compression (implosion) and collapse creating very high local shock, i.e. a sharp rise and fall in the local pressure; the phenomenon is called cav-itation. If this happens in connections to a pump or in the impeller, small metal parts can be dislodged. Multiple indentations or dimples in the material can result. The same may occur on boat propellers where worm like holes may be observed in the material of the propeller.

Cavitation reduces the effectiveness of pumps and will also shorten pump life. A characteristic ‘hammer’ noise is produced inside the pump when it cavitates. Cavitation may also occur if there are leakages in the pipe or pipe connection on the suction side of the pump. If air leaks in here (known as ‘false air’), it will create air bubbles that enter the pump chamber with the water where they implode.

Net positive suction head (NPSH)

If the pump is not self suctioning, the water level must be higher than the level of the pump. This means that the impeller needs a certain pressure to function optimally. The net positive suction head (NPSH) gives the absolute lowest pressure the water must have when flowing into the pump chamber, or (more easily) the actual height of water over the impeller. If the water pressure is lower than the NPSH the pump will cavitate. NPSH
depends on the water flow and increases with increasing flow; it can be described as follows:

NPSH =hb−hv−hf+hh

where:

hb=barometric pressure

hv=vapour pressure of the liquid at the operatingtemperature

hf=frictional losses due to fluid moving throughthe inlet pipe including bends