How to Read Family Pump Curves

In our last article, we discussed 'How to read pump curves.' Now we will take this concept a bit further and explore how to read 'family curves' with multiple impeller curves and how to use these curves for sizing impellers.

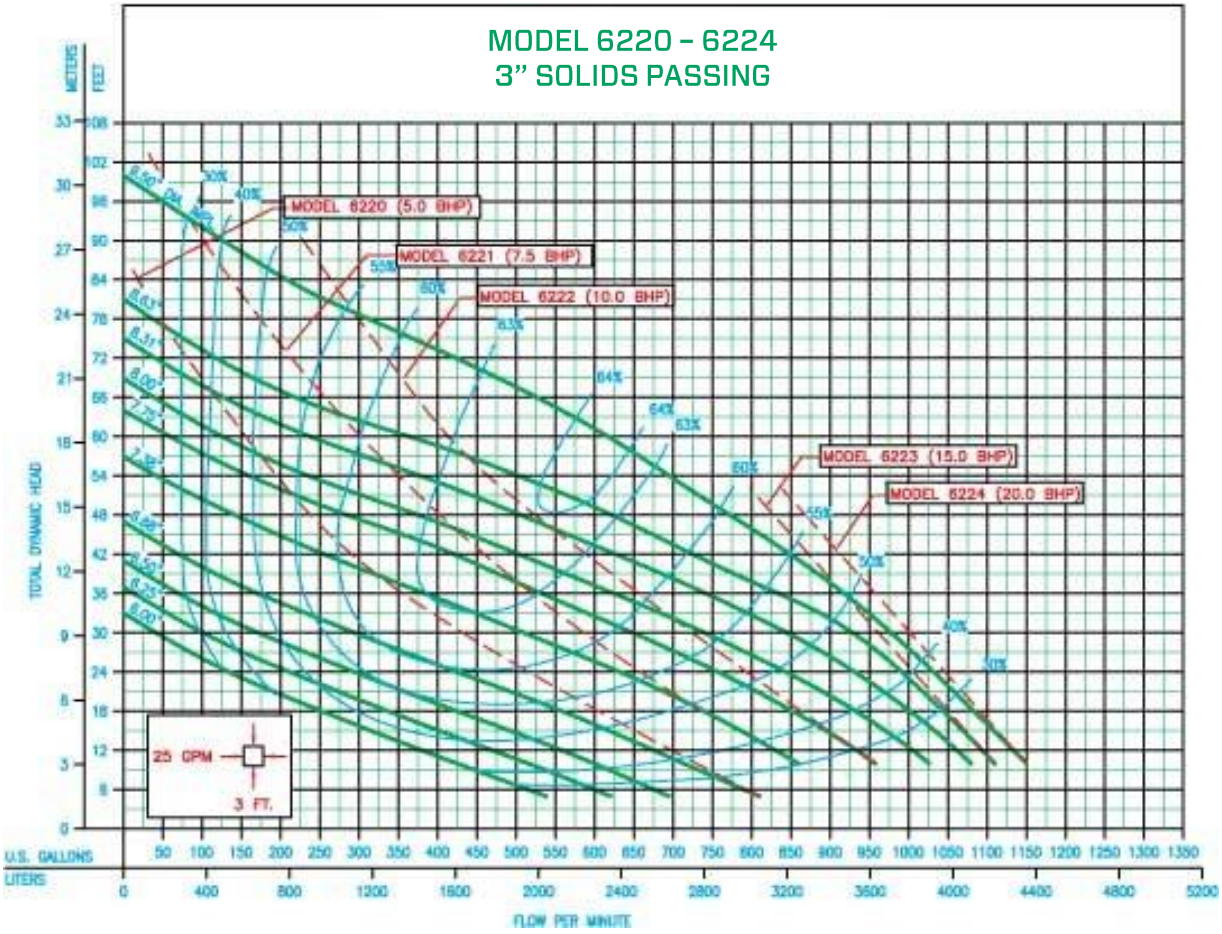
STEP 1: The basic pump curves are no different than reading any other head – flow curve. For a known head value, follow the head over to the pump curve, then drop down to the capacity axis, and this will be the flow rate. What we are trying to figure out here is the necessary diameter of the impeller to yield the required head and capacity.

STEP 2: Next, we will need to figure out which motor is needed to drive this impeller without overloading. To do this, use the dashed horsepower lines. To the right of the horsepower line is overloading, and to the left is non-overloading. Selecting an impeller diameter where the line does not cross the dashed HP curve will yield a non-overloading pump.

STEP 3: Lastly, we'll determine the pump efficiency at which the pump will operate. Look at the U-shaped lines and interpolate to get the efficiency.

Now, let's try an example using ZM2349, Performance Data for Models 6620-6224 (5-20 BHP). As an example, we will size a pump for 225 GPM at 45 feet of total dynamic head.

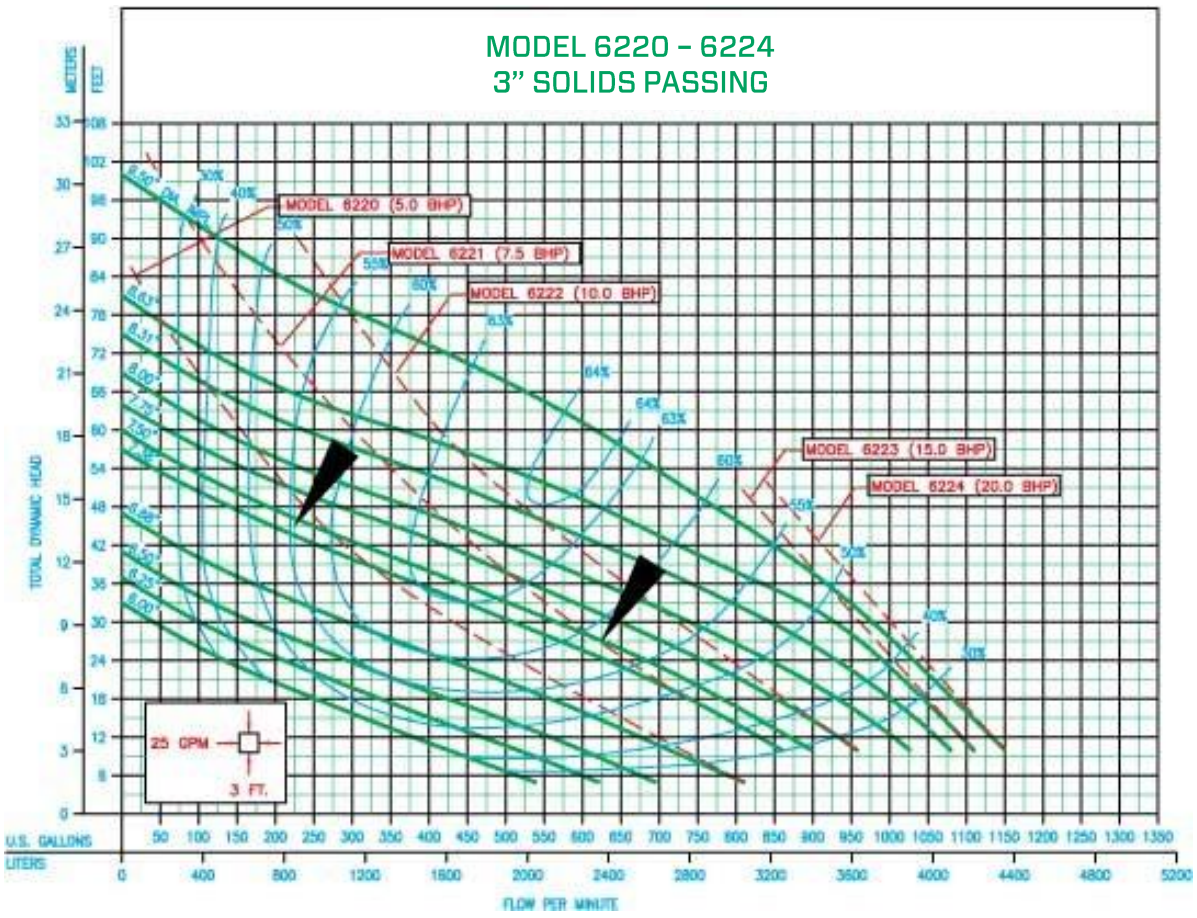
Continued on next page...



STEP 1: Locate the point of 225 GPM at 45' on the pump curve. This point is slightly above the 7½ HP's 7-3/8" impeller, but below the 10 HP's 7-3/4" impeller.

STEP 2: Next, draw a new pump curve that passes through the duty point and is parallel to the existing pump curves, or utilize the Pump Selector Sizing program available on our website. Pump Selector tells us that a 7½" impeller will do 225 GPM at 45 ft TDH. Look to see where this curve crosses the horsepower line to the right of the design point. In this example, the pump curve crosses the 7½ BHP curve at about 27 ft. We will not oversize an impeller on a pump if the overload point on the pump curve is greater than the static head for the system. So, for this example, if the static head is greater than 27 ft, we can use the 7½ BHP unit. If the static head is less than 27 ft, use the 10 BHP motor. Or, to be certain, select the 10 HP model 6222 with a 7½" trimmed impeller, which will guarantee a non-overloading pump has been selected.

STEP 3: Now, let's figure the expected pump efficiency. The design point is between the efficiency lines of 55% and 60%. So, for the design point of 225 GPM at 45 ft, we would expect about 56% pump efficiency.



As you can tell from the above example, we would consider oversizing an impeller on a unit to avoid overloading the unit to engineer the right pump for the system. If this were the case, we would also be able to provide a more competitively priced unit since pricing is based on motor size (i.e. smaller motors cost less). The only exception to this rule is for a single-phase unit. ZOELLER COMPANY DOES NOT SELL SINGLE-PHASE UNITS WITH OVERSIZED IMPELLERS because we feel this will compromise the service life of a single-phase unit.