

# Successful submersible pump operation

AS DEFINED IN THE STATE WATER CODE CHAPTER 36, WELLS INCAPABLE OF PRODUCING MORE THAN 25,000 GALLONS PER DAY AND ARE USED FOR DOMESTIC AND LIVESTOCK SUPPLY ARE EXEMPT. APPLICATION OF THIS RULE NORMALLY USES 17 GPM MAXIMUM PUMPING RATE. THE USUAL PUMP SELECTION FOR THIS APPLICATION IS A SUBMERSIBLE PUMP.

THE SELECTION OF THE APPROPRIATE SIZED PUMP IS IMPORTANT AND FAILURE TO DO THIS CAN LEAD TO INEFFICIENT OPERATION, EQUIPMENT FAILURE, FAILURE TO DO THE INTENDED JOB, AND CONFLICT. PUMP MANUFACTURERS HAVE DESIGNED PUMP STYLES TO OPTIMIZE PERFORMANCE TAKING INTO CONSIDERATION PUMPING WATER LEVEL, DISCHARGE PRESSURE, AND VOLUME. TO GRAB A PUMP OFF THE SHELF OR TO PURCHASE THE CHEAPEST PUMP OFTEN LEADS TO DISAPPOINTMENT. ANOTHER MISUNDERSTANDING IS TO THINK THAT AUTOMATICALLY THE GREATER THE HORSEPOWER, THE MORE IT WILL PUMP.

SUCCESSFUL SUBMERSIBLE PUMP OPERATION STARTS WITH THE WELL. IF A NEW WELL IS TO BE DRILLED, THE PLANNED AND POTENTIAL PRODUCTION OF THE WELL DETERMINES THE WELL CONSTRUCTION INCLUDING EVALUATION OF THE THICKNESS AND CONFIRMATION OF THE WATER BEARING SAND TO PROVIDE THE DESIRED YIELD AND SUFFICIENT SCREENING LENGTH TO ALLOW ADEQUATE WATER FLOW TO ENTER THE CASING WITH MINIMAL DRAWDOWN. IF THESE CONDITIONS ARE NOT MET, PUMPING AT LONG INTERVALS MAY CONTINUE DRAWDOWN TO THE POINT WHERE THE WELL WILL SUCK AIR AND BURN UP THE MOTOR. IF THE WELL IS EXISTING, THE PUMP SELECTION SHOULD BE BASED ON THE CAPABILITY OF THE WELL.

THE CORRECT STYLE PUMP SELECTION SHOULD OPERATE AT AN EFFICIENCY OF 65-70 PERCENT WHEN PROVIDING A STEADY FLOW. SUBMERSIBLE PUMPS HAVE CENTRIFUGAL IMPELLERS SO EFFICIENCY VARIES AS FLOW CHANGES. EFFICIENCY TRANSLATES TO ELECTRIC POWER USE AND COST. ONE HORSEPOWER EQUALS 746 WATTS. IF THE STYLE PUMP INSTALLED IS NOT OPERATING IN THE RANGE FOR WHICH IT IS DESIGNED, POWER COST CAN INCREASE SUBSTANTIALLY FOR A GIVEN PUMPED VOLUME OF WATER AND PUMP LIFE MAY BE AFFECTED. BRAKE HORSEPOWER =  $\text{GPM} \times \text{HEAD IN FEET} \times \text{SG (WHICH IS 1 FOR WATER)} / 3960 \times \text{EFFICIENCY}$ . FOR A GIVEN HP AND PUMPING HEAD, GALLONS PER MINUTE PUMPED IS DIRECTLY PROPORTIONAL TO PUMP EFFICIENCY.

MANUFACTURERS PROVIDE PERFORMANCE CURVES FOR THE VARIOUS STYLES THAT THEY OFFER. AS AN EXAMPLE OF SELECTION OF THE PROPER PUMP, GOULDS PROVIDES EXCELLENT WATER TECHNOLOGY INFORMATION. PUMP INSTALLATIONS NORMALLY ARE EQUIPPED WITH A 30-50 PSI PRESSURE CONTROL OR A 40-60 PSI PRESSURE CONTROL. ASSUME A INSTALLATION WITH A 40-60 PSI PRESSURE CONTROL PUMPING WATER FROM A 140 FOOT DEPTH. THIS APPLICATION REQUIRES A TOTAL PUMPING HEAD OF  $140' + (40 \text{ PSI} \times 2.31) = 233'$  AT STARTING PRESSURE. A GOULDS 13GS10 (1 HP) WILL PUMP 14 GPM. A GOULDS 13GS15 (1.5 HP) WILL PUMP 16 GPM. A GOULDS 13GS20 (2 HP) WILL PUMP 19 GPM. THE GOULDS 13GS STYLE IS RECOMMENDED FOR A RANGE OF 4-20 GPM. COMPARE THIS WITH A GOULDS 35GS10 (1 HP) AND A GOULDS 35GS15 (1.5 HP), NEITHER OF WHICH CAN ACHIEVE THE 233' PUMPING HEAD. THE 35GS STYLE PUMP IS MORE EFFICIENT OPERATING AT A HIGHER VOLUME WITH A LOWER DISCHARGE PRESSURE REQUIREMENT.

OPERATING AT THE 30-50 PSI PRESSURE CONTROL SETTING CAN PROVIDE ADDITIONAL PUMPING CAPACITY. WITH A 30 PSI STARTING PRESSURE, THE 13GS10 CAN NOW PUMP 15 GPM, THE 13GS15 CAN NOW PUMP 17 GPM AND THE 13GS20 WILL NOW PUMP 20 GPM. VARYING WATER LEVELS WILL HAVE THE SAME EFFECT ON PUMPING RATES. AT A WATER LEVEL OF 100 FEET, 13GS07 (3/4 HP) PUMPS 13 GPM, 13GS10 PUMPS 17 GPM, 13GS15 PUMPS 19 GPM AND 13GS20 IS NOT RECOMMENDED.