



Application Note to the Field

Gear Pump Models H1, 31 & 41

Application Note Number: 0105-1

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Liquiflo Models H1, 31 and 41 are low-flow external gear pumps with a maximum capacity of ~ 0.5 GPM. They have been some of our best sellers and are good pumps. Occasionally, there have been a few questions about them in general, their performance, and what are the best materials of construction.

Models H1/31/41 thru H5/35/45 have the same lateral and radial clearances (i.e. about the same “slip”) and so as the pump gets smaller, slip becomes a higher percentage of total displacement (see Diagram on next page). For this reason, there have sometimes been difficulties with H1/31/41 pumps running on fluids with very low viscosities (less than 10 cP) at moderate to high differential pressures (greater than 50 PSI or 3.5 bar). The standard O-ring material was changed to Viton a few years ago to help alleviate this problem, and to a large degree it did. Viton “crushes” more easily than Teflon, as the latter is not an elastomer and in a semi-captive O-ring groove, this can prevent the housings from seating that tiny bit extra that can mean a difference in performance.

In order to ensure that the pump will perform per the published curves and the IPS program, it is best to use the H1/31/41 on fluids over 10 cP. For fluids that have a lower viscosity than this, use a H3/33/43. Note that an existing H1/31/41 pump can be easily converted to a H3/33/43 by changing the gears and wear plates. (A repair kit or individual parts can be used to make the conversion.) If it is absolutely necessary to use a H1/31/41 pump on a fluid that is less than 10 cP, it should not be specified for more than 0.25 GPM at 50 PSI (3.5 bar) and 1750 RPM.

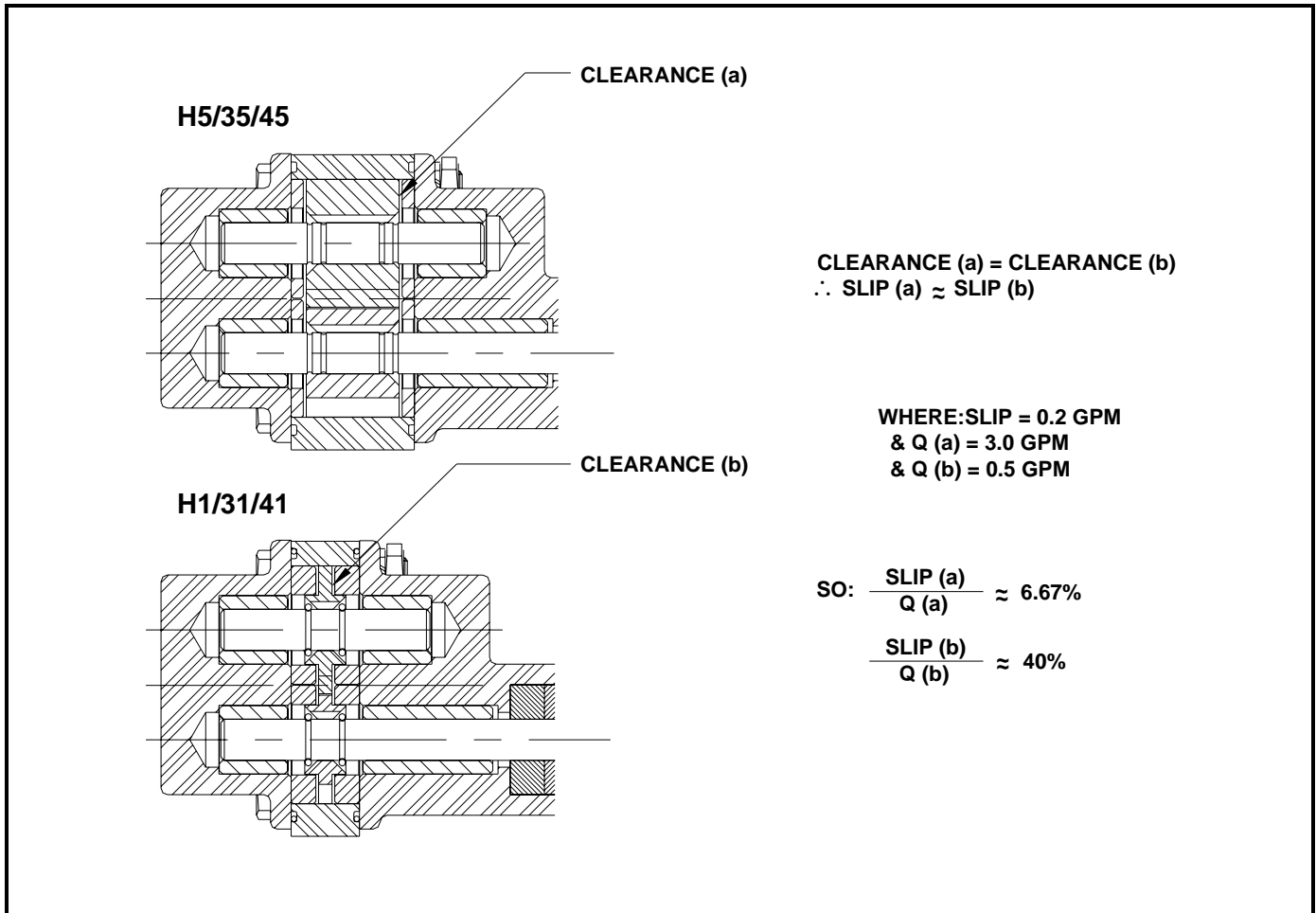
As always, try to use carbon bearings and wear plates if compatible. Carbon is inexpensive, hard, relatively self-lubricating and forgiving. A bearing grade (BG) PEEK idler gear is also a good idea if this material can be used in the application. BG PEEK is very strong, smooth and inert to many fluids. If this is not possible, consider two metal gears (either Alloy-C vs. Alloy-C or Alloy-C vs. 316 SS). While this is not perfect, with such small gears it is not usually a problem at over 10 cP. Teflon and carbon are not available for gears in this pump size due to the very small teeth and the likelihood of breaking them at start-up. Ryton, while a very good choice for many fluids in the larger pumps, can experience brittle fractures in such a small gear.

It is a highly unusual case where coated shafts are required due to forces imparted (force = pressure x area, where there is very little area on the gear teeth of this pump). One of the few times it might be necessary is when Teflon bearings are used (they are available at the same price as carbon). This is because the glass that is used to reinforce the PTFE can be abrasive to a plain metal shaft.

The MCU magnet (which has replaced the MCS and MCA) can transmit up to 75 in-lbs of torque at room temperature. This is adequate for all applications involving models H1/31 and H3/33. The MCN magnet (20 in-lbs) is sufficient for most applications of models 41/43 under 250°F; the MCR magnet (30 in-lbs) is used for high-temperature applications at 250-500°F and/or high-viscosity applications.

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Diagram: Slip of Models H1/31/41 vs. Models H5/35/45



The following chart gives the standard available materials for Models H1, 31 and 41:

HOUSINGS	GEARS	SHAFTS	BEARINGS	WEAR PLATES
316 SS Alloy-C Titanium ¹	316 SS Alloy-C Titanium ¹ BG PEEK ² Ryton	Uncoated 316 SS/Alloy-C Chrome Oxide-Coated Tungsten Carbide-Coated Titanium Oxide-Coated Ti ¹	Carbon 60 Silicon Carbide BG PEEK ² Teflon ³	Ceramic Silicon Carbide BG PEEK ² Teflon ³

- 1 - Available for Model 41 only
- 2 - 30% carbon fiber, PTFE, graphite
- 3 - 25% glass-filled PTFE