HYPRO®

Hydraulic Test Kit Instructions

3430-0650

Hypro's Hydraulic Test Kit is designed as an invaluable tool for obtaining critical information when attempting to diagnose insufficient spray performance at the boom of your sprayer.

Kit consists of:

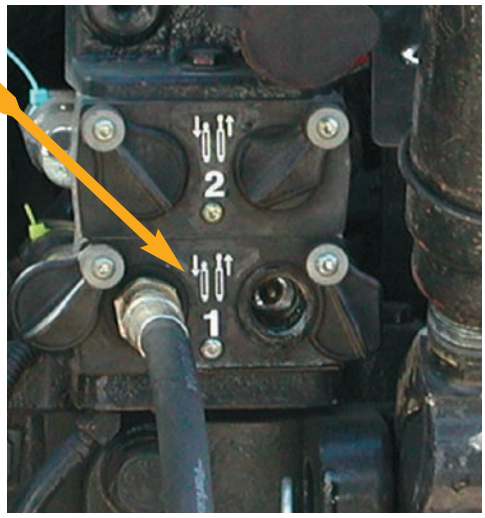


1. One Pressure Test Fixture with a 3000 PSI pressure gauge, 20 GPM in-line flowmeter and 1/2" Pioneer Quick Disconnect Couplers.
2. One Return Test Fixture with 3000 PSI pressure gauge and 1/2" Pioneer Quick Disconnect Couplers.



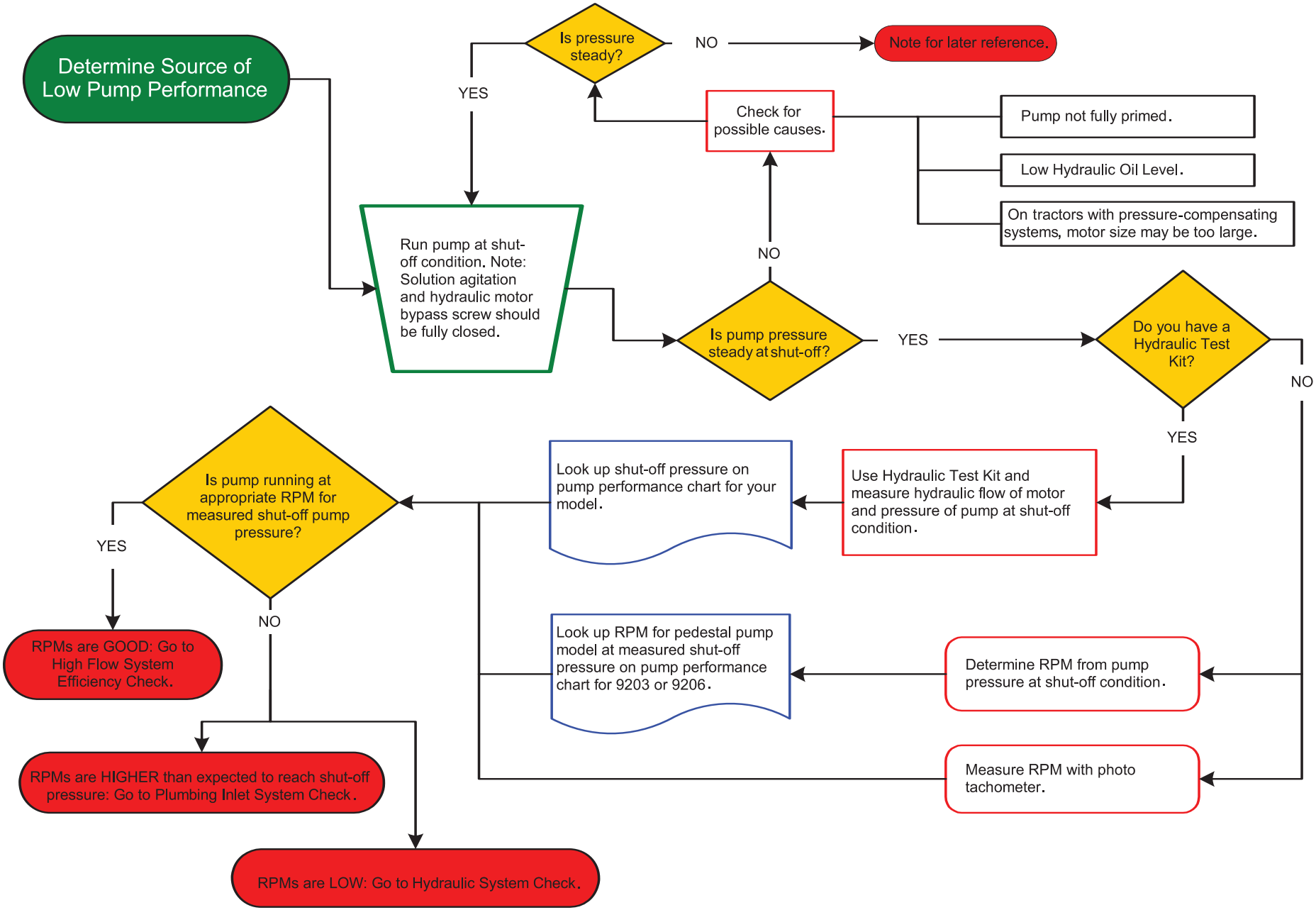
Installation and Operation:

1. Prepare tractor and sprayer for testing by idling tractor for 10 to 15 minutes to warm up hydraulic oil and filling sprayer with enough water to run the pump safely.
2. Run the pump for several minutes to warm up hydraulic motor. This will give you a more true reading of how the pump will perform in the field.
3. Insert Pressure Test Fixture into pressure line on the tractor. The tractor port to be used is noted by cylinder in *retracted position.* Using this port allows the operator to turn the hydraulic-driven pump off by going to the **float** position instead of the neutral position. This is very important so that trapped pressure doesn't occur within the hydraulic motor and damage hydraulic motor oil seal.
4. Insert Return Test fixture in return line on tractor to measure back pressure. High back pressure is detrimental to the performance of the pump. High back pressure robs the hydraulic motor of the potential energy to do work.

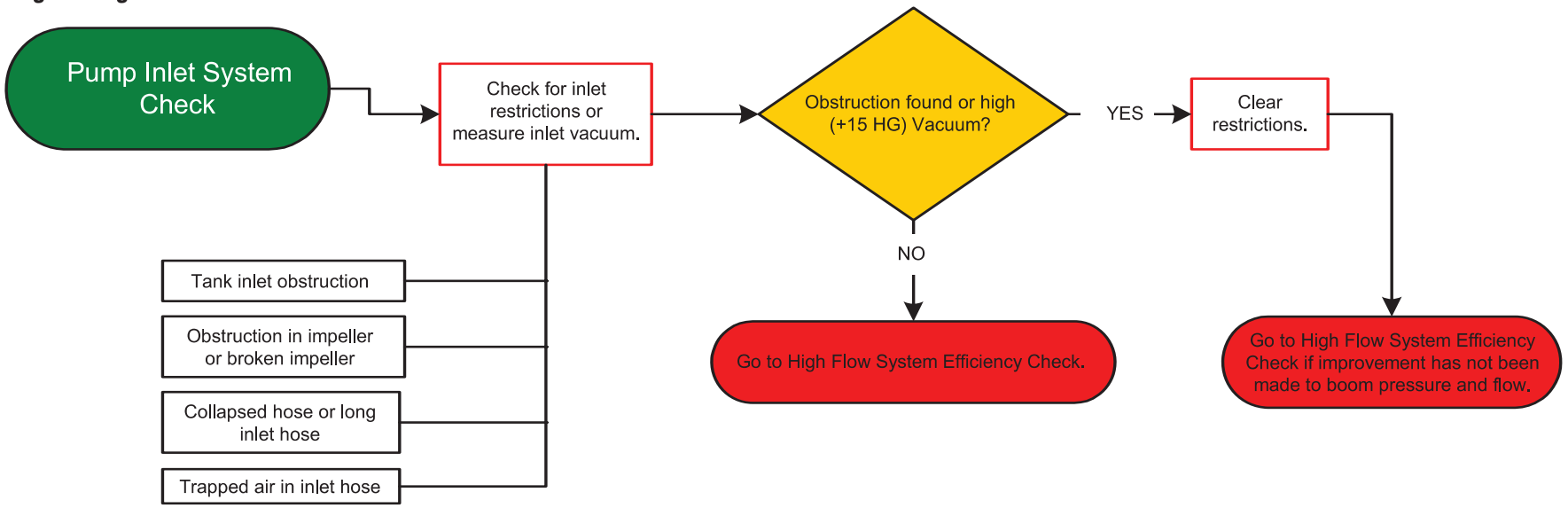


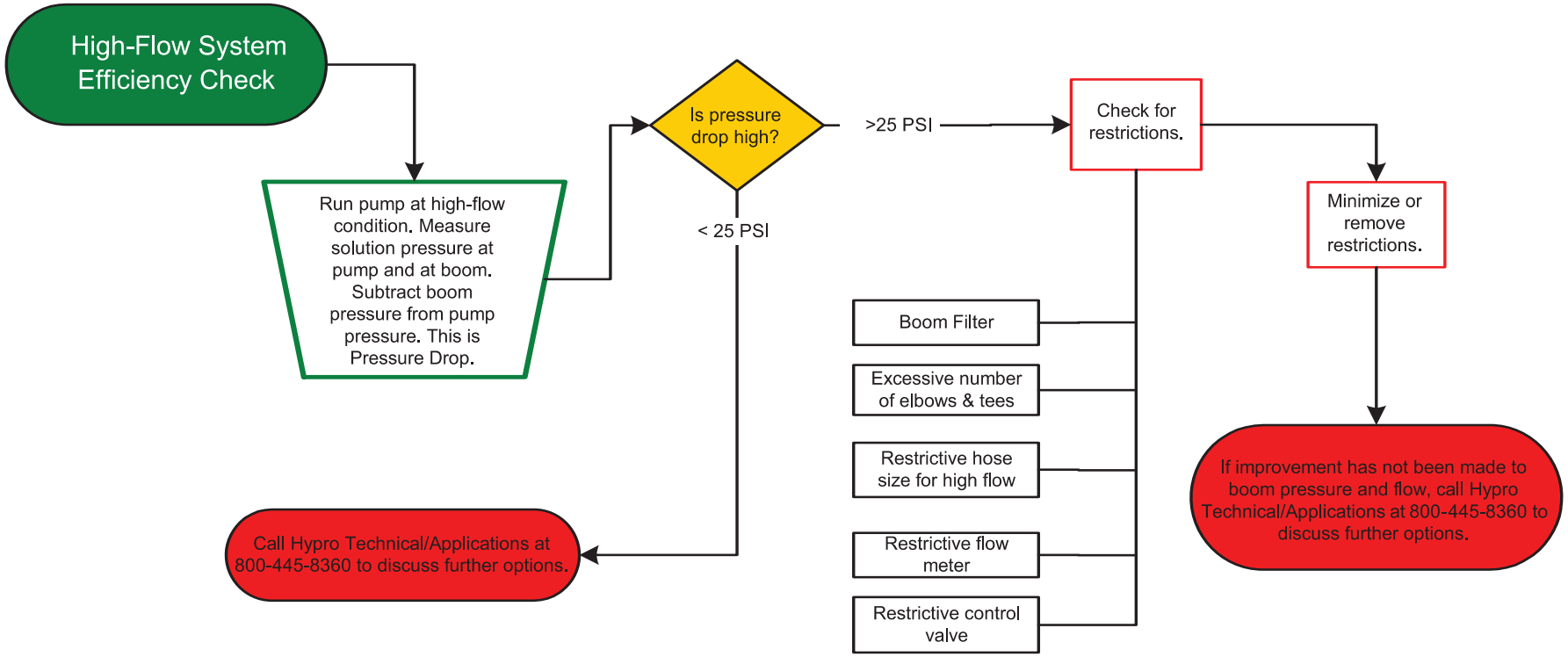
Follow the Centrifugal Diagnostic Flow Chart to determine course for corrective action to improve pump performance. If you have any questions, call the Hypro Technical/Applications Dept. at 800-445-8360.

Centrifugal Diagnostic Flow Chart

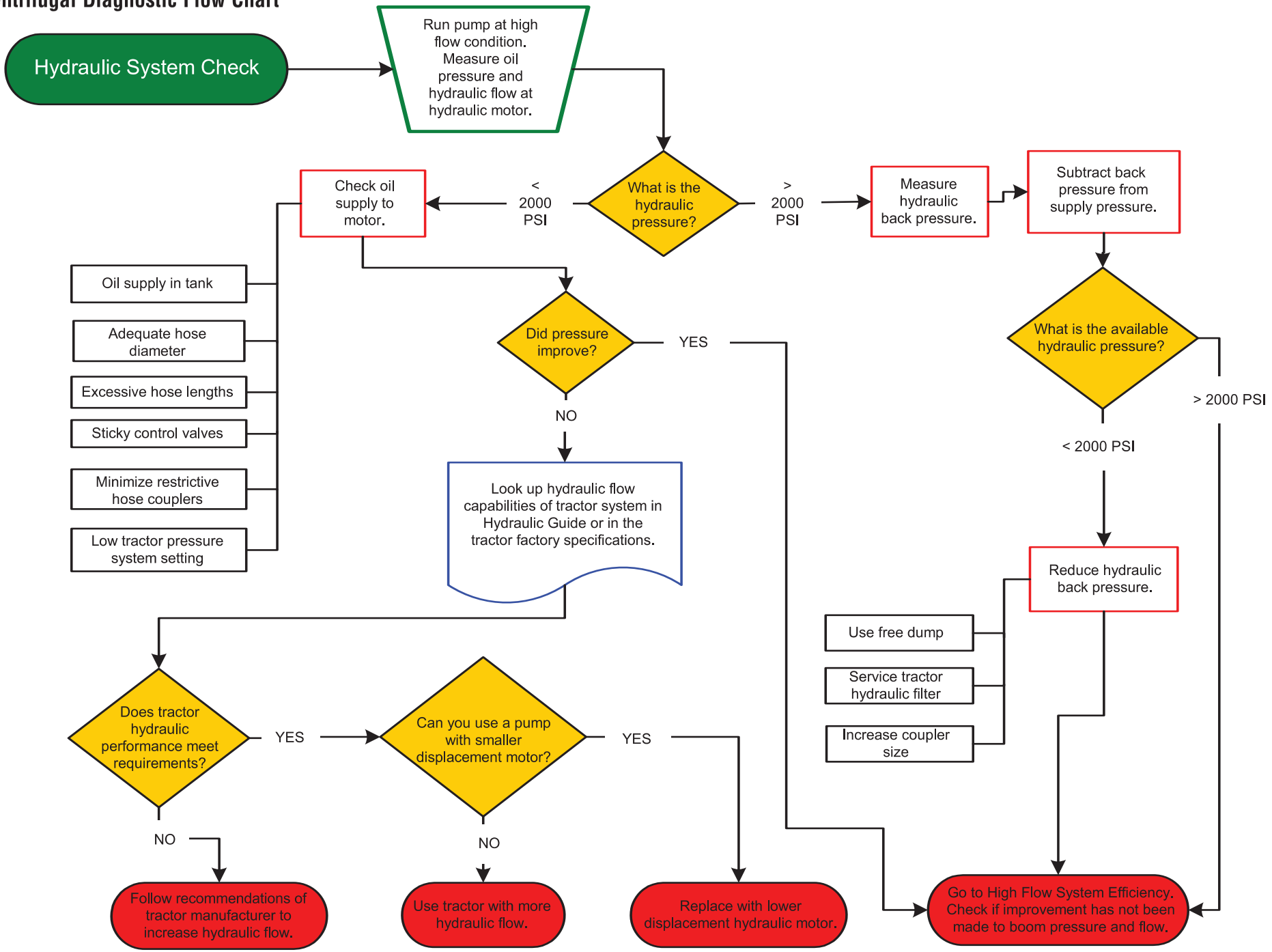


Centrifugal Diagnostic Flow Chart

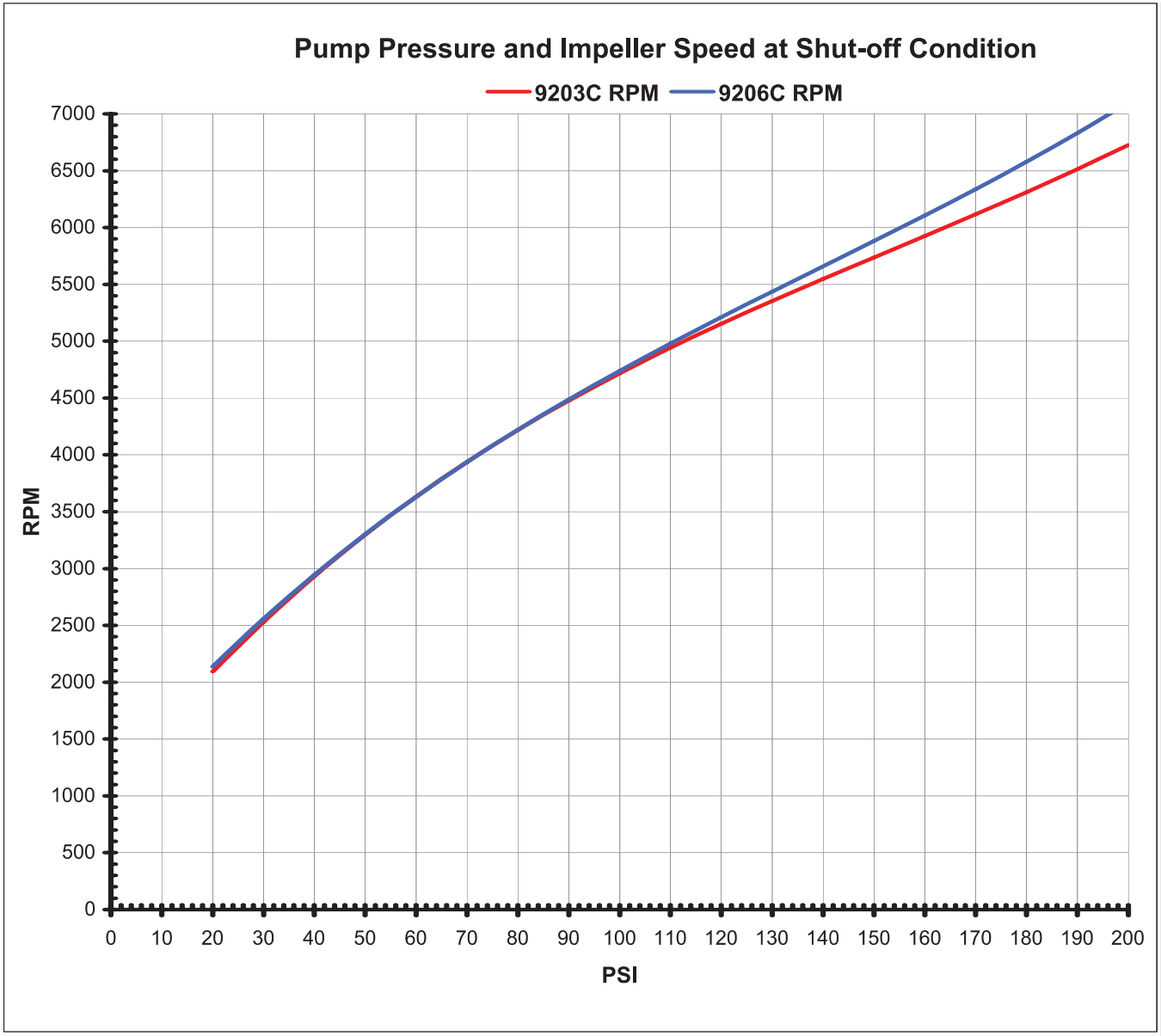




Centrifugal Diagnostic Flow Chart

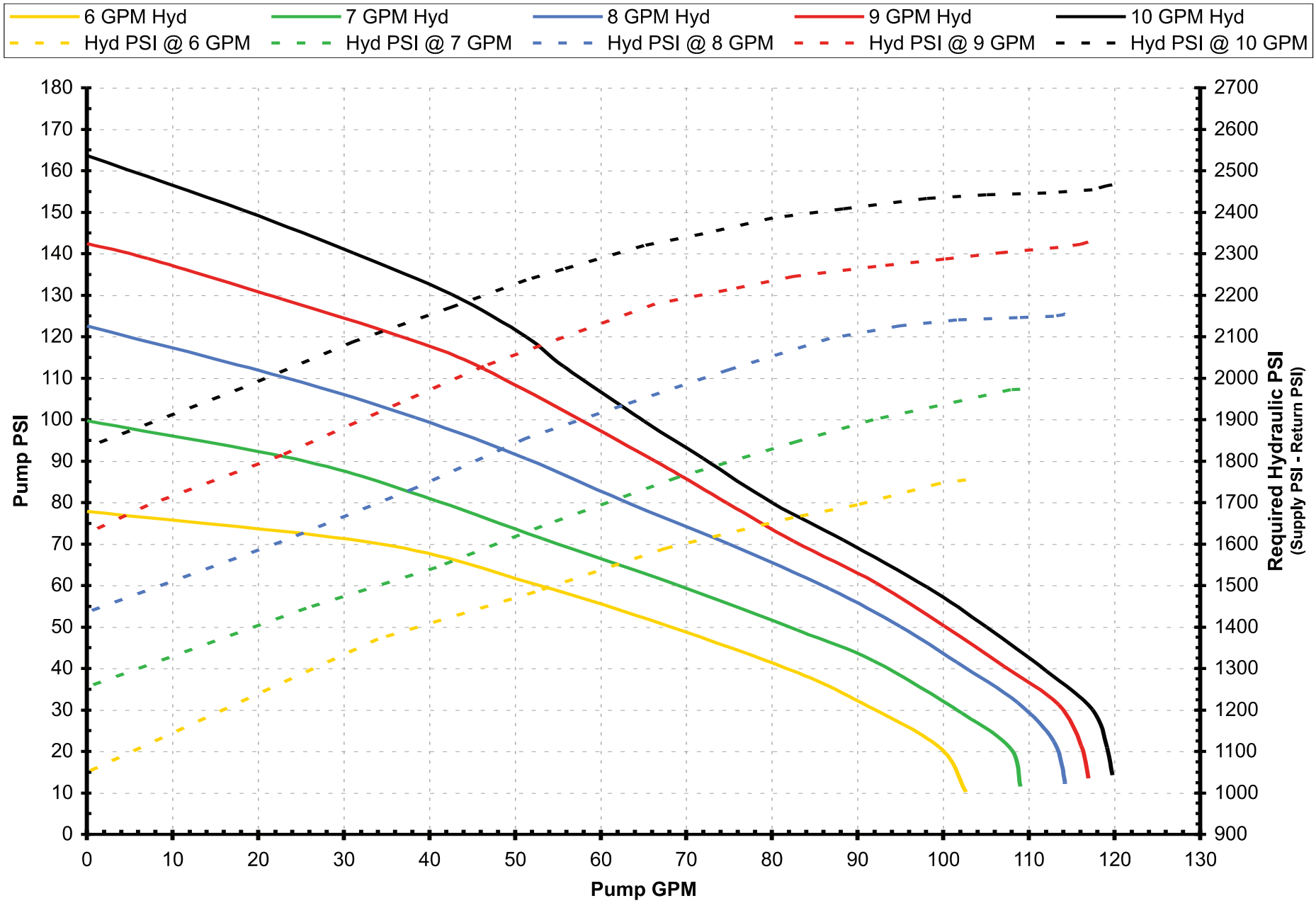


Centrifugal Diagnostic Flow Chart



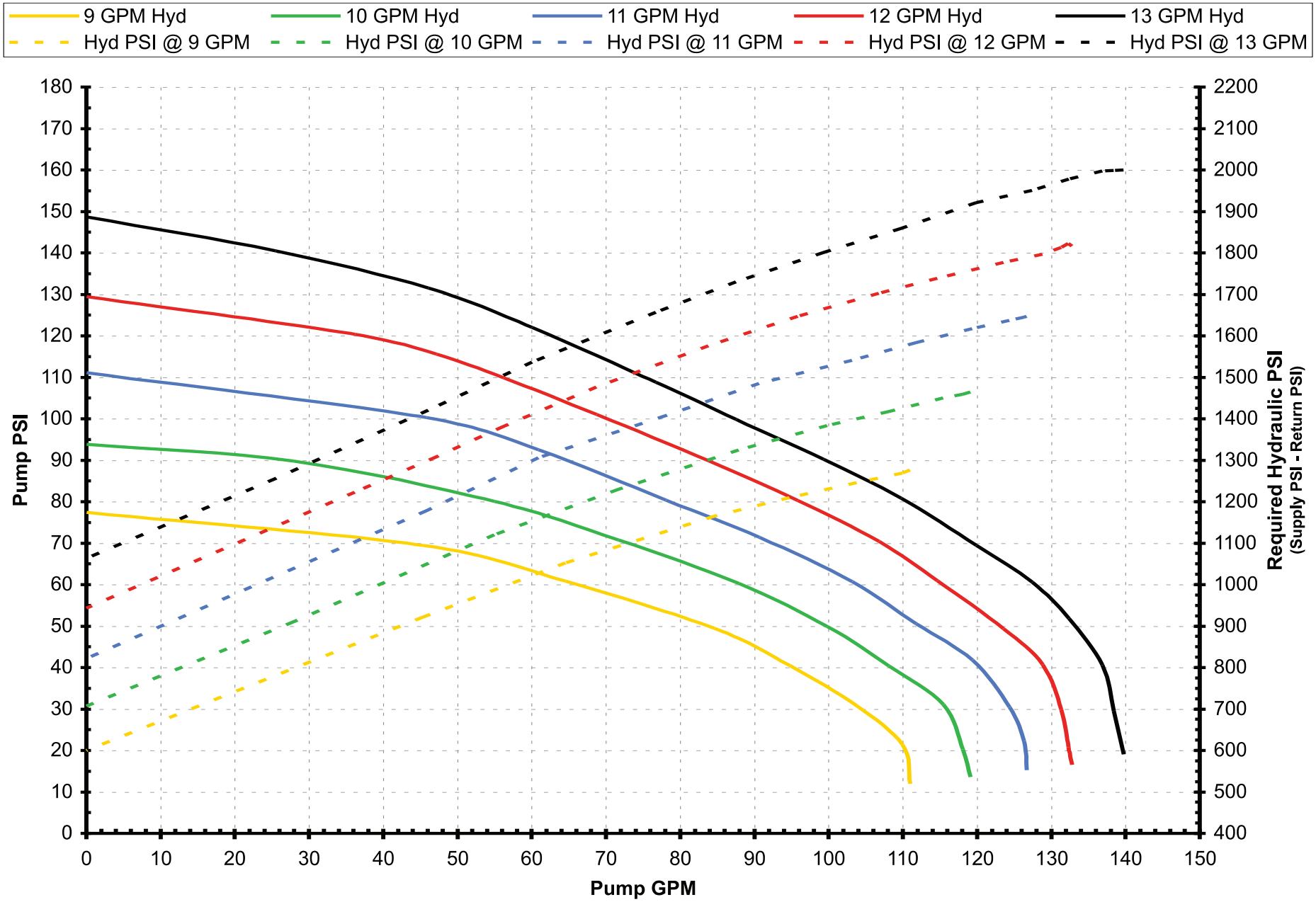
RPM @ Shut-off Condition (No Flow)		
PSI @ Shut-off	9203C RPM	9206C RPM
20	2094	2138
30	2531	2558
40	2931	2944
50	3296	3301
60	3631	3630
70	3938	3936
80	4219	4221
90	4478	4488
100	4719	4740
110	4942	4980
120	5153	5211
130	5354	5436
140	5548	5658
150	5737	5881
160	5925	6106
170	6115	6338
180	6311	6578
190	6513	6831
200	6727	7099

9303C-HM4C Performance at Hydraulic Flows 6 to 10 GPM



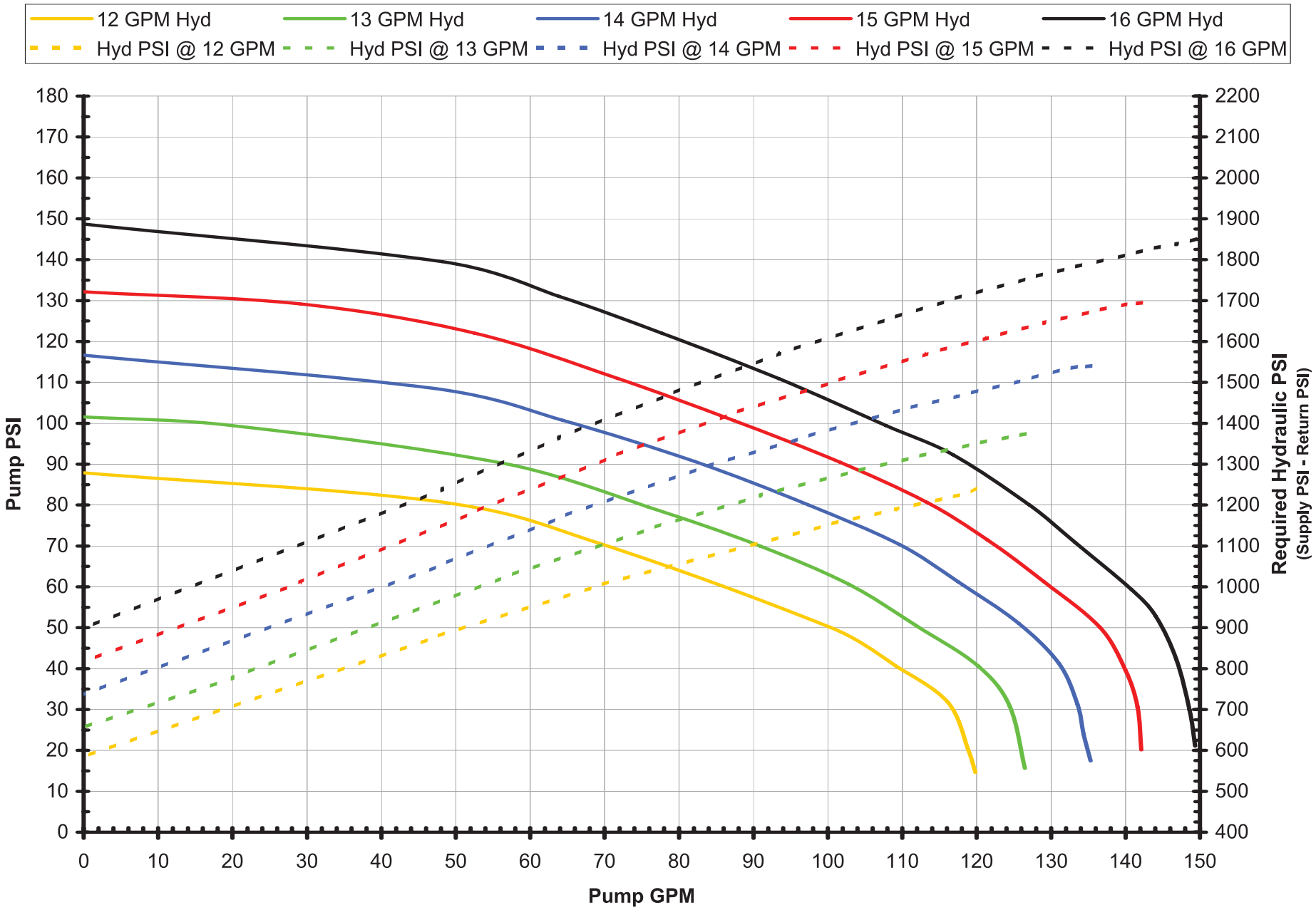
Centrifugal Diagnostic Flow Chart

9303C-HM1C Performance at Hydraulic Flows 9 to 13 GPM



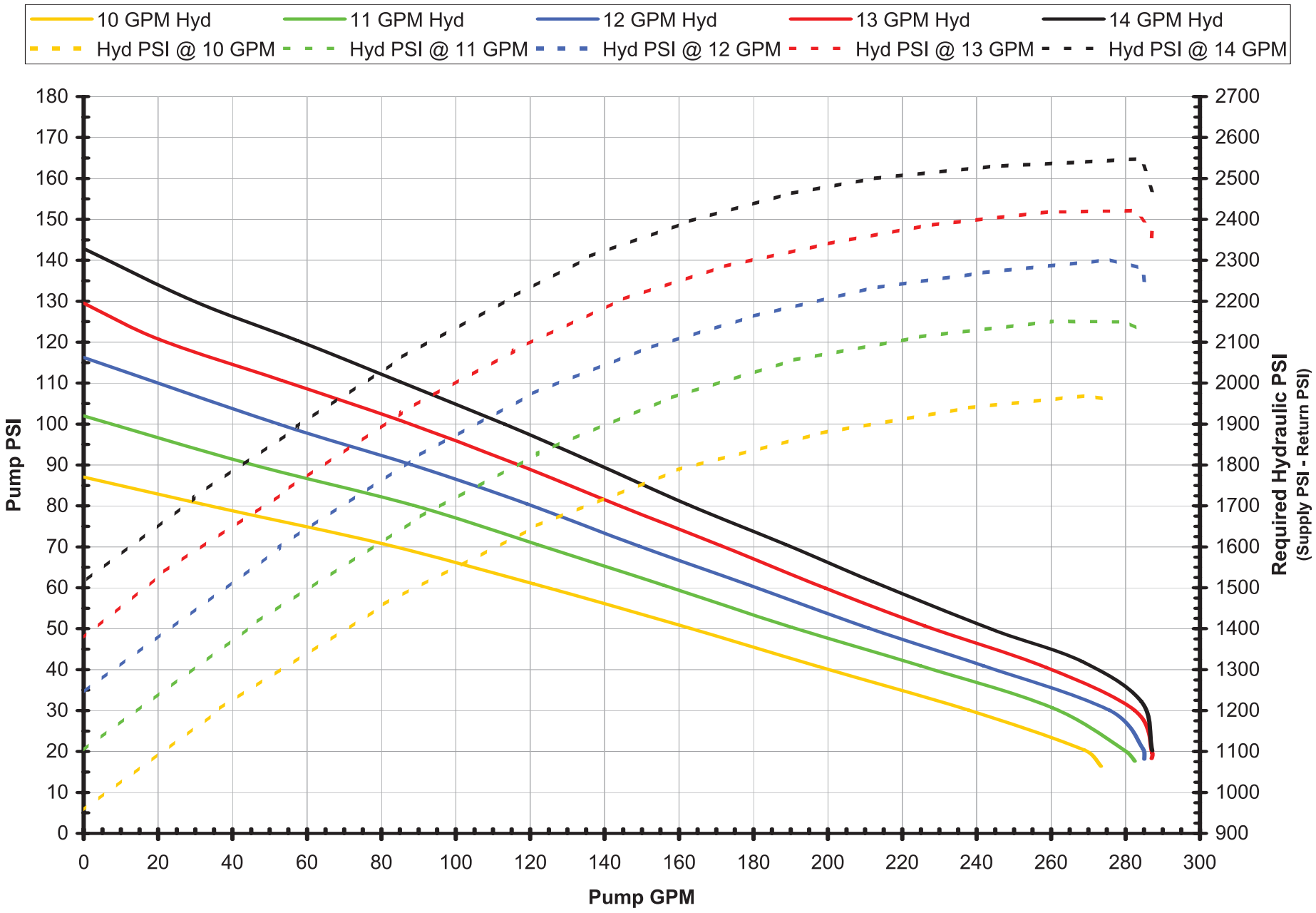
Centrifugal Diagnostic Flow Chart

9303C-HM5C Performance at Hydraulic Flows 12 to 16 GPM



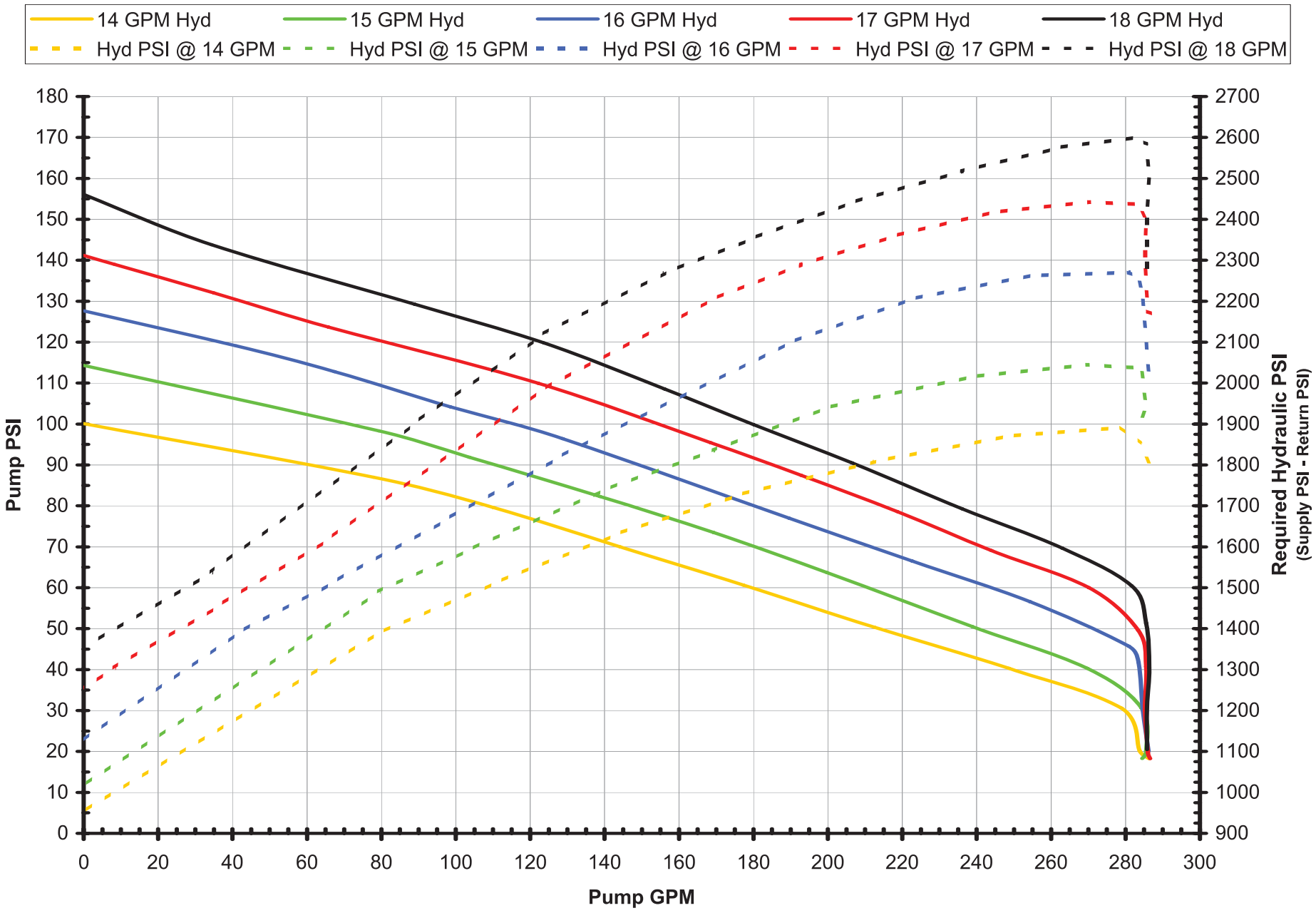
Centrifugal Diagnostic Flow Chart

9306C-HM1C Performance at Hydraulic Flows 10 to 14 GPM



Centrifugal Diagnostic Flow Chart

9306C-HM5C Performance at Hydraulic Flows 14 to 18 GPM



Tips for Better Performance

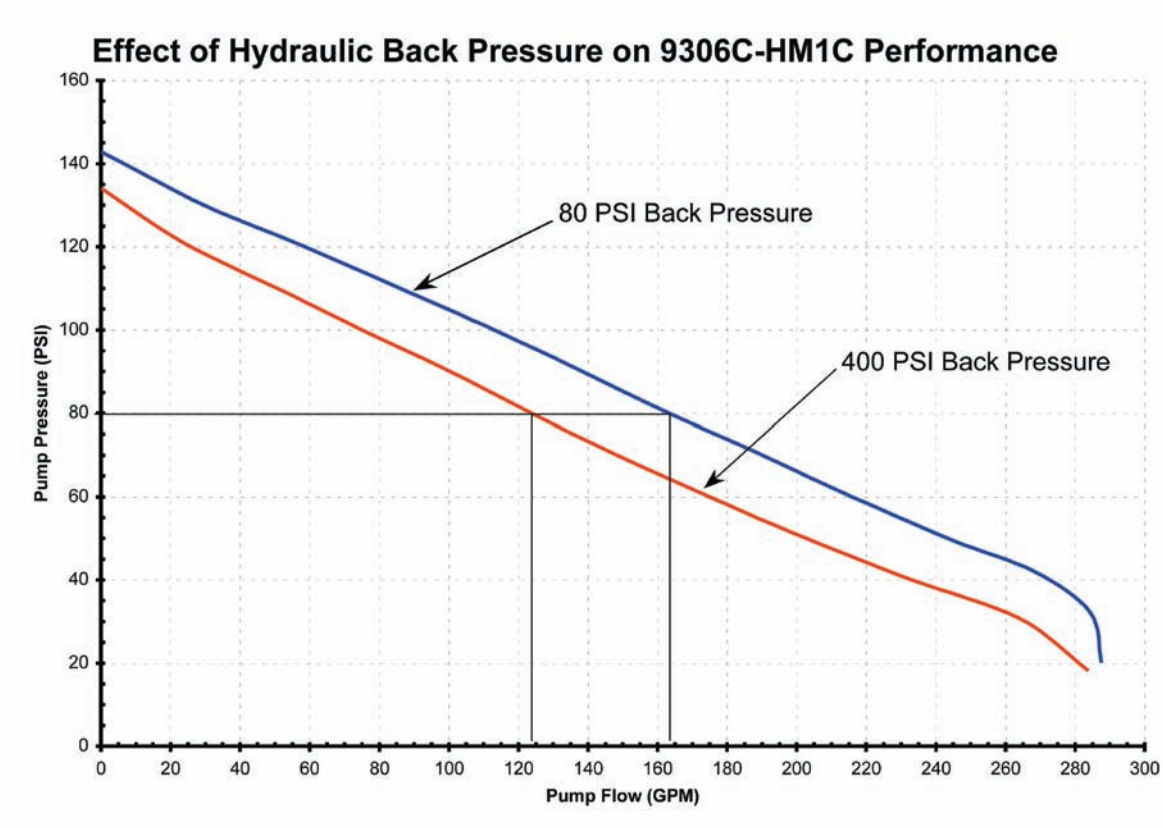
Best Practices for Tractor Hydraulics



There are many tractors with a variety of hydraulic capabilities. How you get the most use of your tractor's power depends on your skill as a good operator and manager. Here are some tips to follow that will lead you to greater pump performance, and in the long run, will add to your success.

Rule #1
Minimize hydraulic motor back pressure in the return line hydraulic hose.

High hydraulic motor back pressure can rob performance from your Hypro pump. As you can see in the chart below, for the same spray pressure, there is a 40 gallon per minute loss in performance due to excessively high hydraulic back pressure in the return line of the spray pump's hydraulic hose. Those 40 gallons could be used to spray at faster ground speed, increase flow to agitation, or to reduce the required hydraulic flow necessary to do the job. Whatever your need is, reducing hydraulic back pressure saves you money!

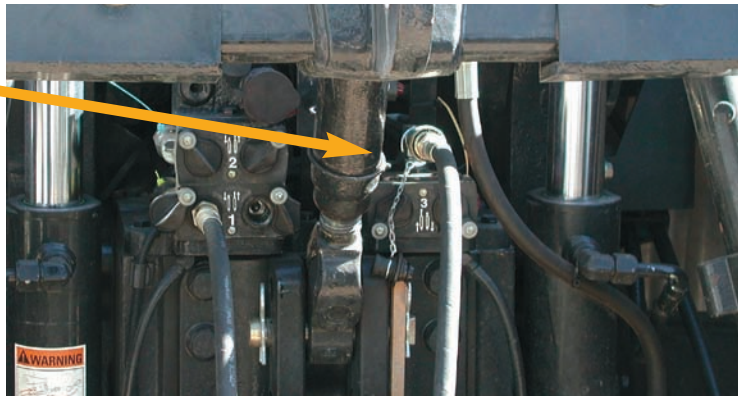


By reducing your motor's hydraulic back pressure, the amount of available energy to the hydraulic motor increases and that energy can be used for work. Here are some of the most common sources to high hydraulic motor back pressure.

Tips for Better Performance

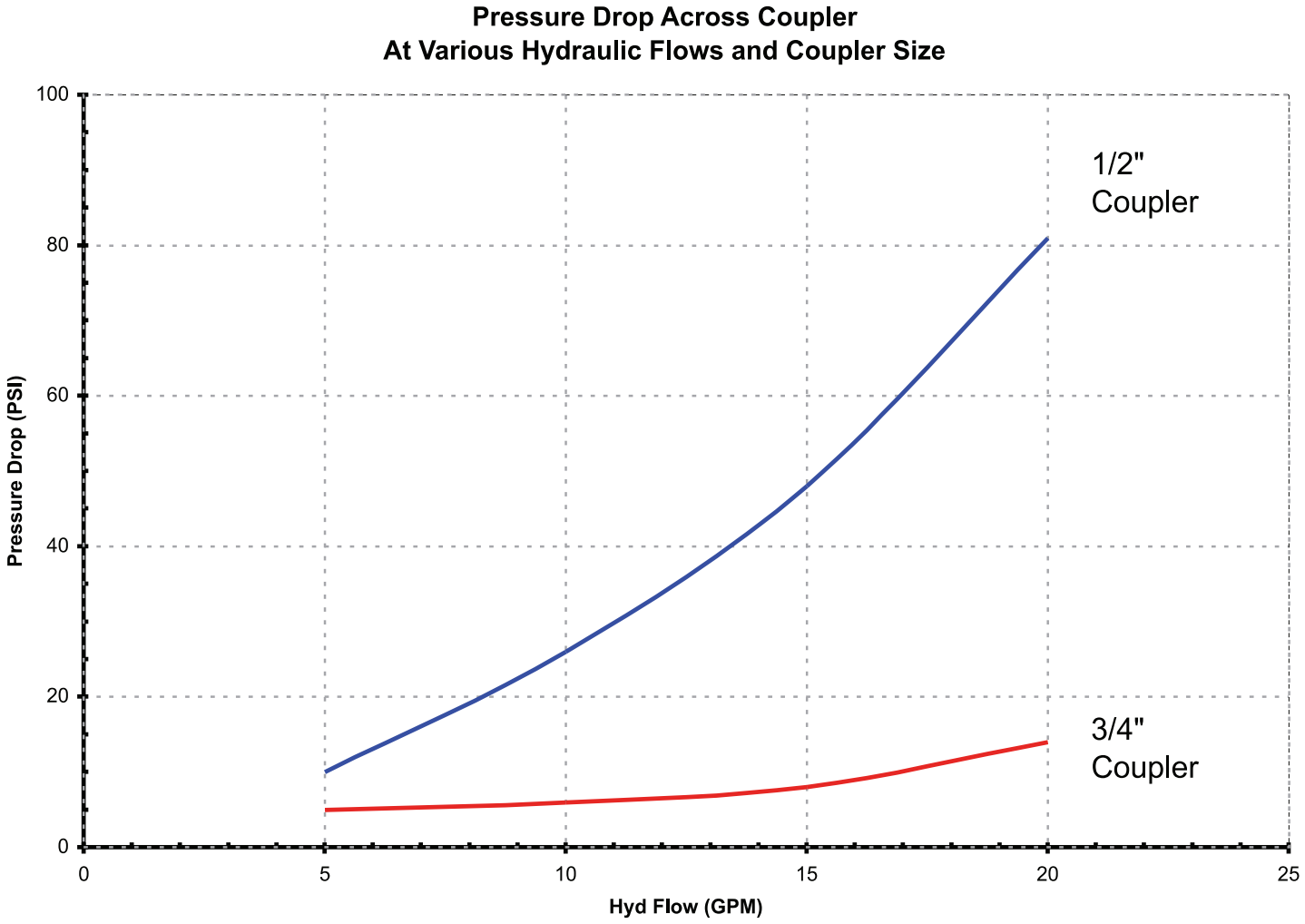
1. Tractor Return Valve Block

A *free dump* return port is the best way to minimize return back pressure. This *free dump* return, bypasses the tractor valve block spool and greatly reduces hydraulic back pressure. *Free dump* return ports help to reduce the back pressure but can vary for tractor models. A realistic back pressure goal is 50 – 150 PSI.



2. Quick Coupler Size

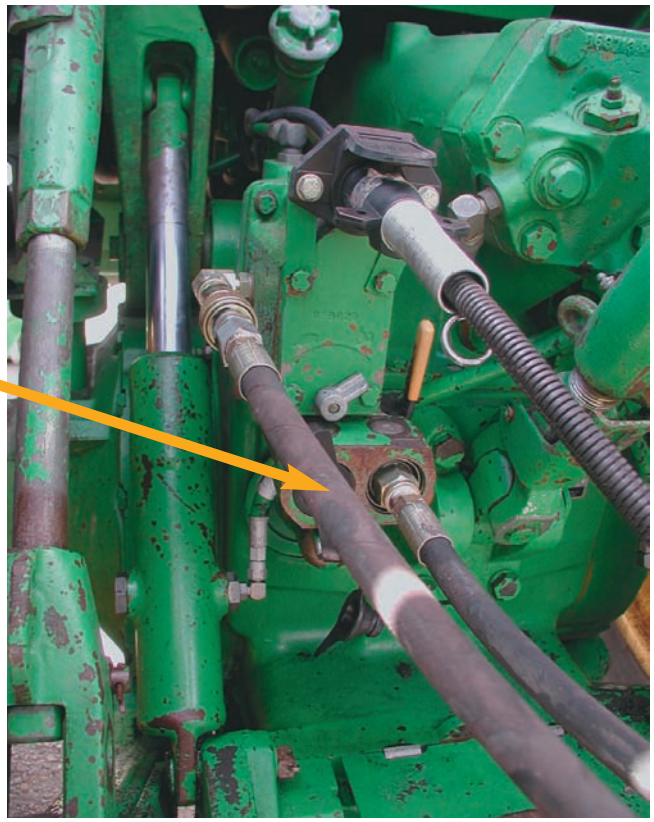
Modern tractors provide a free dump option, and because this option is designed to reduce back pressure for constant operating hydraulic equipment, they usually increase the coupler size. By increasing its size, a larger cross-sectional area is provided for the hydraulic oil to flow through the coupler without greatly increasing the back pressure. The chart below shows the decrease in pressure drop.



Tips for Better Performance

3. Return Hose Diameter

For hydraulic flows greater than 13 GPM, the standard 1/2” hose can be limiting in its capacity to carry higher hydraulic flows back to the tractor reservoir. Factors that create higher back pressures of a hose include hose diameter and hose length. If the pump is not located near the hitch, consider upsizing the *hydraulic hose* size to 3/4” to reduce motor hydraulic back pressure.



4. Tractor Hydraulic Filter Condition

Older tractors may feel the effect of neglect with their age. If you intend to get the most out of your tractor, check your maintenance records to be sure the hydraulic filter had been recently changed. The higher the hydraulic flow is the higher the pressure drop is across any restriction. This includes the filter. It is not uncommon to see a 200 PSI pressure drop across a dirty filter.

5. Second Circuits

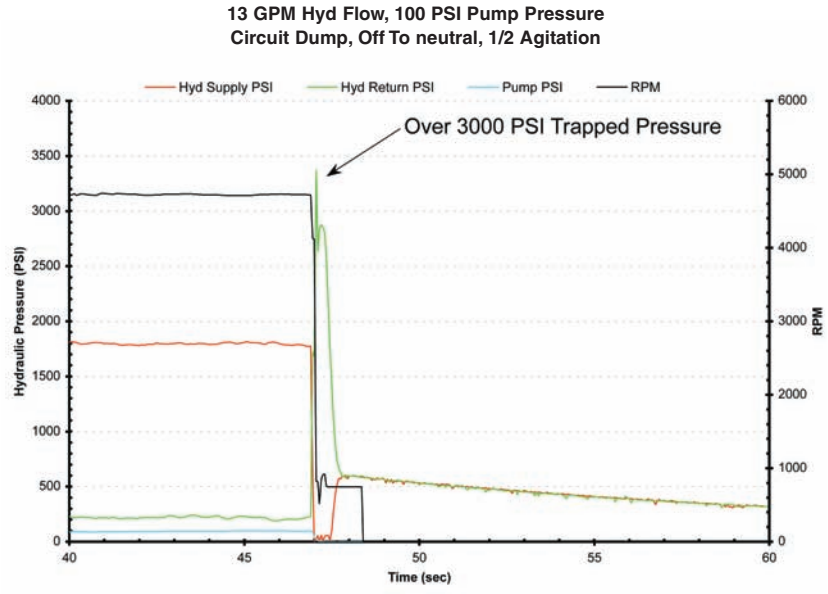
Secondary circuits can be used for the spray pump hydraulic pressure supply, but free dump returns should always be used with them. Standard tractor secondary return ports are even more restrictive than primary return ports.

Rule #2
Know Where to Set the Bypass Screw

This Hypro hydraulic motor feature is intended solely for Open Center hydraulic systems. Follow directions for bypass screw adjustments in the owner’s manual. Be sure bypass screw is turned in completely if your hydraulic system is a Closed Center pressure-compensating or load-sensing system.

Rule #3
On/Off Operation

Whenever possible, use the rate controller for On/Off control of your spray nozzles. Cycling the pump on and off does provide more opportunity to damage the hydraulic motor’s oil seal, especially if the hydraulic return line is through the circuit spool valve. In the graph to the right you can see over 3000 PSI pressure is trapped in the motor until it slowly seeps down to zero PSI.



Tips for Better Performance

That pressure is exerted directly against the hydraulic oil lip seal in the motor. Trapping high hydraulic oil pressure in the motor will lead to early seal failures.

Using a free dump will avoid hydraulic oil from having to go through the circuit spool valve and will alleviate the possibility of trapped pressure in the motor as well as lower the back pressure in the motor to increase its performance.

Glossary of Terms:

Shut-off condition: Operation of the pump at full hydraulic flow under normal spray conditions with all nozzles turned off and all flow to agitation turned off as well. At this condition, the pump will operate at maximum speed and develop its highest output pressure.
Shut-off pressure: Pressure measured in PSI when pump is running with all systems (booms and agitation) turned off.
Free Dump: Return line from the hydraulic motor is connected directly back to the reservoir of the hydraulic system via hydraulic cooler and filter, instead of routing through control spool valve. Bypassing the spool valve accomplishes two things: (1) Lowers back pressure which in turns increases available hydraulic pressure to do work, (2) Increases hydraulic motor's seal life and prevents accidental trapped pressure when stopping the pump by going to *neutral* position instead of *float* position.

Notes:

For fast, convenient and up-to-date information, call Hypro at:

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