

Petroleum Hydraulic Fluids Recommendations

Industrial Hydraulics

Petroleum Hydraulic Fluids

Recommendations

The attached list of industrial hydraulic oils has been tabulated for use as a reference in assisting Bosch Rexroth customers with an oil selection. The list is comprised of oils which meet or exceed the lubrication requirements of our componentry.

Viscosity Selection

Hydraulic componentry will operate efficiently only within a specific viscosity range. A fluid which is too viscous may prompt cavitation. Conversely, a fluid which is too thin may allow an accelerated rate of wear and additional slip losses. Consequently, it is necessary to establish viscosity limitations.

The following table can be used as a guide in determining the recommended viscosity range for all pumps of our manufacture. If your application dictates the use of fluids whose viscosities are outside of these recommendations, please consult a Bosch Rexroth Sales Engineer.

	Viscosity Temperature Chart	Minimum Operating Viscosity	Optimum Operating Viscosity	Maximum Operating Viscosity	Maximum Start-up Viscosity
FA; Ra; K	#1	80 SUS 15 cSt	125-250 SUS 26-54 cSt	1000 SUS 216 cSt	4000 SUS 864 cSt
Q; Q-6 SV-10, 15, 20, 25 VPV 16, 25, 32	#2	100 SUS 21 cSt	150-250 SUS 32-54 cSt	1000 SUS 216 cSt	4000 SUS 864 cSt
SV-40; 80 & 100 VPV 45, 63, 80, 100, 130 & 164	#3	150 SUS 32 cSt	200-300 SUS 43-65 cSt	1000 SUS 216 cSt	4000 SUS 864 cSt
Radial Piston (Seco)	#4	60 SUS 10 cSt	100-250 SUS 21-54 cSt	300 SUS 65 cSt	750 SUS 162 cSt
Gear Pumps	#5	65 SUS 12 cSt	103-460 SUS 20-100 cSt	3800 SUS 800 cSt	9500 SUS 2000 cSt
Valves & Boosters		In general, an oil which matches the viscosity requirements of the pump, will also be satisfactory for valves and boosters.			

Viscosity vs Leakage

In selecting a hydraulic media, keep in mind that leakage is almost proportional to the kinematic (cSt) viscosity of the fluid. The use of a lighter fluid other than required results in increased leakage and decreased efficiencies. For example, using an oil with a viscosity of 80 SUS (15 cSt) will result in approximately 200% of the leakage obtained with an oil having a viscosity of 140 SUS (30 cSt). Leakage with an oil of 300 SUS (65 cSt) will be less than half of the leakage obtained with the 140 SUS (30 cSt) oil.

Filtration

The ultimate life of hydraulic componentry is contingent upon system cleanliness. The use of micronic filtration that has been matched to system requirements will reduce component malfunctions as well as extending the life of the componentry and the hydraulic media.

Inlet Conditions

Any restrictions in the suction line decrease the allowable maximum viscosity. In general, pressure drop in the suction line between the tank and pump inlet should not exceed 6" mercury with vane pumps, when pumping full volume at sea level under start-up conditions.

Some radial piston pumps are not self priming, and dictate the use of overhead reservoirs. In this instance the intake line must be unrestricted and sized to allow gravity to supply an adequate volume of oil to the pump.

At altitudes above 5000 feet, the use of overhead reservoirs is recommended for all Bosch Rexroth systems.

Use of Viscosity/Temperature Charts

Under the heading "Viscosity Selection" please note that there are five classes of pumps. For each of these classes there is a mating Viscosity/Temperature chart which can be found on pages 5 through 7 of this publication.

Before referring to these charts, however, it is necessary to look at the listing of approved oils to determine if your intended hydraulic media is ISO viscosity grade 32, 46 or 68. In general, a viscosity grade 32 oil has a viscosity of about 150 SUS (32 cSt) @ 100 °F, grade 46 - 200 SUS (43 cSt) @ 100 °F, and grade 68 - 300 SUS (65 cSt) @ 100 °F.

After noting the viscosity grade, refer to the Viscosity/Temperature Chart which matches the type of pump that is used in your system.

By noting the points at which the viscosity plots intersect the vertical temperature lines, one can quickly determine the temperatures at which the oil reaches: the maximum start-up viscosity; the maximum running viscosity; the optimum viscosity range; and the minimum operating viscosity.

As an example, let us assume that we wish to use Mobil DTE 26 in an SV-80 pump. From the list of approved products we note that DTE 26 is a Grade 68 oil. The correct Viscosity/Temperature Chart for an SV-80 is Chart #3.

Based on the plot for ISO grade 68 oil we then determine that the minimum start-up temperature could be 30 °F (-1 °C) without exceeding the 4000 SUS start-up viscosity; the maximum viscosity for continuous operation is reached at 63 °F (17 °C); the optimum operating viscosity is attained between the temperatures of 100 °F (38 °C) and 118 °F (48 °C); and, at temperatures above 130 °F (54 °C), the minimum operating viscosity will have been exceeded.

Recommended Oils

The following list of industrial hydraulic oils are recommended for use in Bosch Rexroth hydraulic componentry.

Oils sold by listed suppliers under other trade names, or oils which are sold by unlisted suppliers may not be considered to be a satisfactory hydraulic media. Many formulations are being offered which lack certain additives or are formulated for special reasons, such as lower cost, high detergency, leakage control, etc. Some of these specialty fluids can be used successfully, however, others may prompt malfunctions and high rates of wear.

When employing fire resistant fluids, please consult our publication 9 535 233 457 "Fire Resistant Fluids".

Manufacturer	Fluid Name	ISO Viscosity Grade	Manufacturer	Fluid Name	ISO Viscosity Grade
Amalie	Ama-Oil 100 AW	32	Houghton	Hydro-Drive HP 150	32
	Ama-Oil 200 AW	46		Hydro-Drive HP 200	46
	Ama-Oil 300 AW	68		Hydro-Drive HP 300	68
Amoco	Amoco AW 32	32	Kendall	Kenoil R&O AW 32	32
	Amoco AW 46	46		Kenoil R&O AW 32	46
	Amoco AW 68	68		Kenoil R&O AW 32	68
Ashland	Ultramax AW-15	32	Lubrication Engineers	Monolec 6110A	46
	Ultramax AW-20	46		Monolec 6120A	68
	Ultramax AW-30	68			
Bel-Ray	Raylene 0	32	Lubriplate	HO-0	32
	Raylene 1	46		HO-1	46
	Raylene 2	68		HO-2	68
Benz	Petraulic 32	32	Lyondell	Duro AW 32	32
	Petraulic 46	46		Duro AW 46	46
	Petraulic 68	68		Duro AW 68	68
BP Oil Inc.	Energol HLP 32	32	Mobil	DTE 24	32
	Energol HLP 46	46		DTE 25	46
	Energol HLP 68	68		DTE 26	68
	Canvis AW 32	32	Petro-Canada	Hydroflo HLP32	32
	Canvis AW 46	46		Hydroflo HLP46	46
	Canvis AW 68	68		Hydroflo HLP68	68
Champlin	Hydrol 150	32	Phillips	Magnus A 150	32
	Hydrol 215	46		Magnus A 215	46
	Hydrol 315	68		Magnus A 315	68
Chevron	Chevron HYD 32	32	Rock Valley	Trojan AW 32	32
	Chevron HYD 46	46		Trojan AW 46	46
	Chevron HYD 68	68		Trojan AW 68	68
Cities Service	Pacemaker XD-32	32	Shell	Tellus 32	32
	Pacemaker XD-46	46		Tellus 46	46
	Pacemaker XD-68	68		Tellus 68	68
	Citgo AW 32	32	Steelco	7410 Hydraulic Oil	32
	Citgo AW 46	46		7420 Hydraulic Oil	46
	Citgo AW 68	68		7430 Hydraulic Oil	68
Conoco	Super Hydraulic 32	32	Sun	Sunvis 816 WR	32
	Super Hydraulic 46	46		Sunvis 821 WR	46
	Super Hydraulic 68	68		Sunvis 831 WR	68
Dryden	Drydene Blue 32	32	Texaco	Rando HD 32	32
	Drydene Blue 46	46		Rando HD 46	46
	Drydene Blue 68	68		Rando HD 68	68
Exxon	Nuto H 32	32	Tower	Hydroil AW-3	32
	Nuto H 46	46		Hydroil AW-4	46
	Nuto H 68	68		Hydroil AW-5	68
Fiske	Lubriplate HO-0	32	Union	Unax AW 150	32
	Lubriplate HO-1	46		Unax AW 215	46
	Lubriplate HO-2	68		Unax AW 315	68
Gulf	Harmony 32 AW	32	Withrow	Withrolube 655	32
	Harmony 46 AW	46		Withrolube 656	46
	Harmony 68 AW	68		Withrolube 657	68

Chart #1
FA, RA & K Vane Pumps

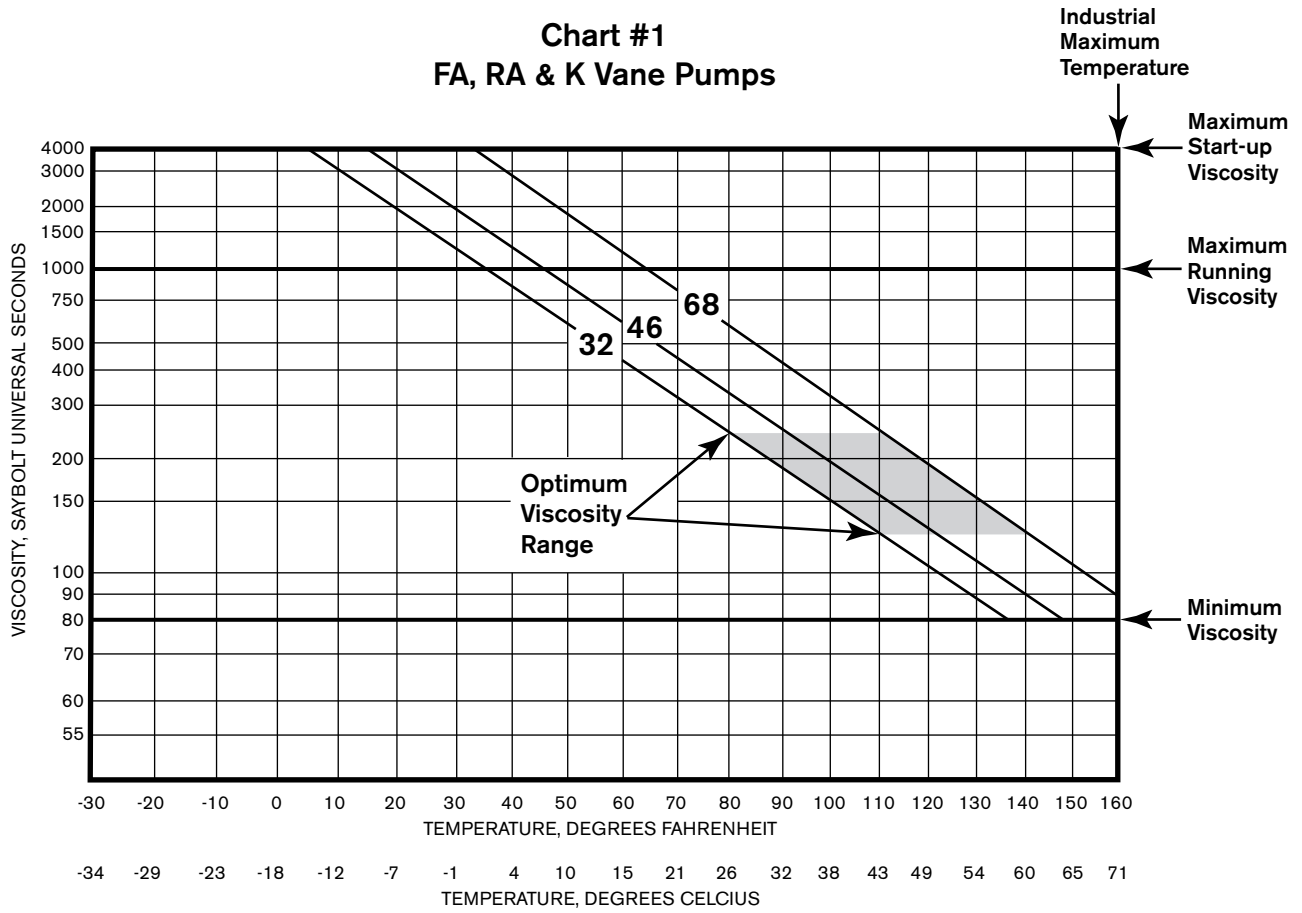


Chart #2
Q, Q-6, SV-10, SV-15, SV-20, SV-25 Vane Pumps
VPV 16, 25, & 32 Vane Pumps

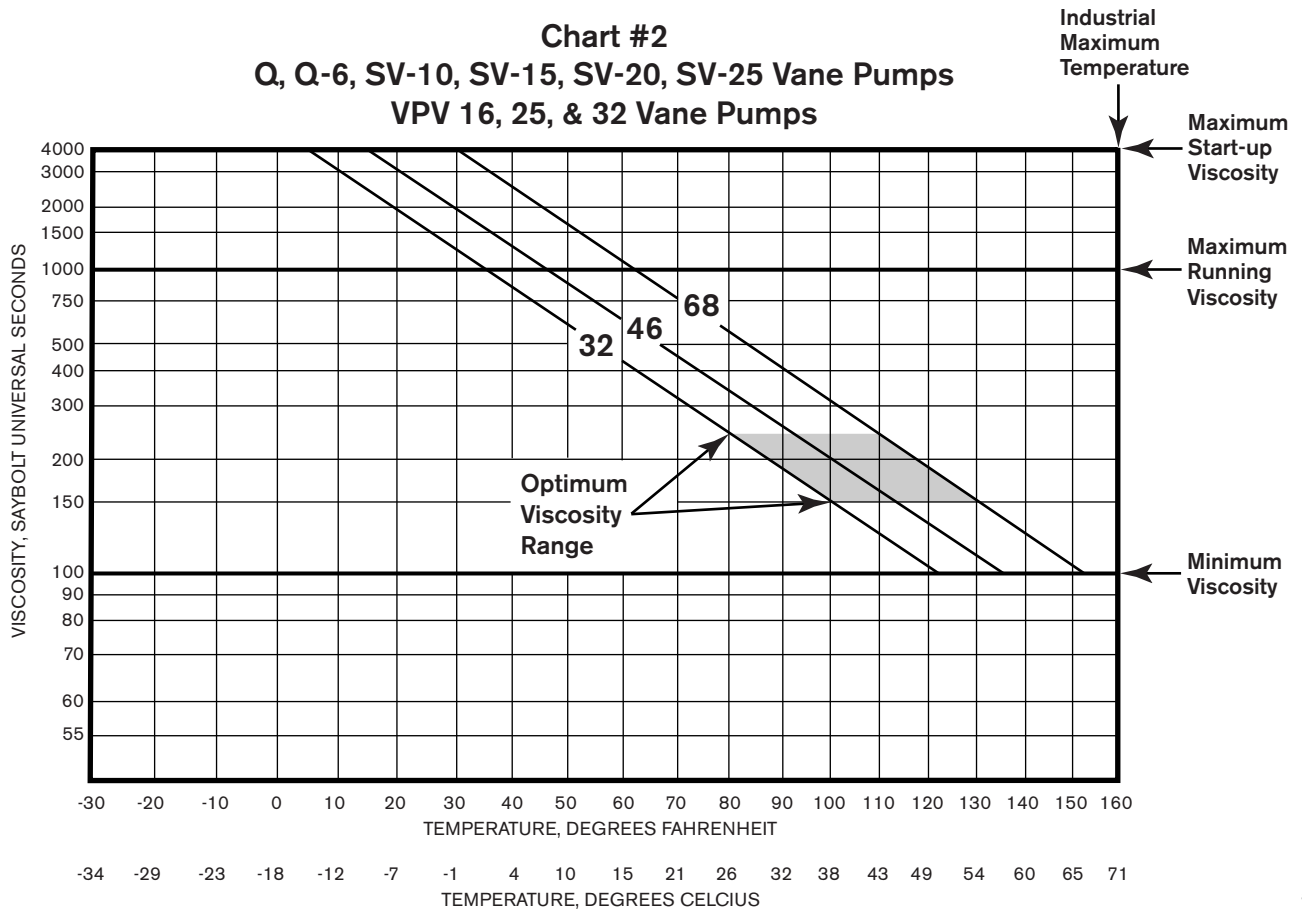


Chart #3
SV-40, SV-80 & SV-100 Vane Pumps
VPV 45, 63, 80, 100, 130 & 164 Vane Pumps

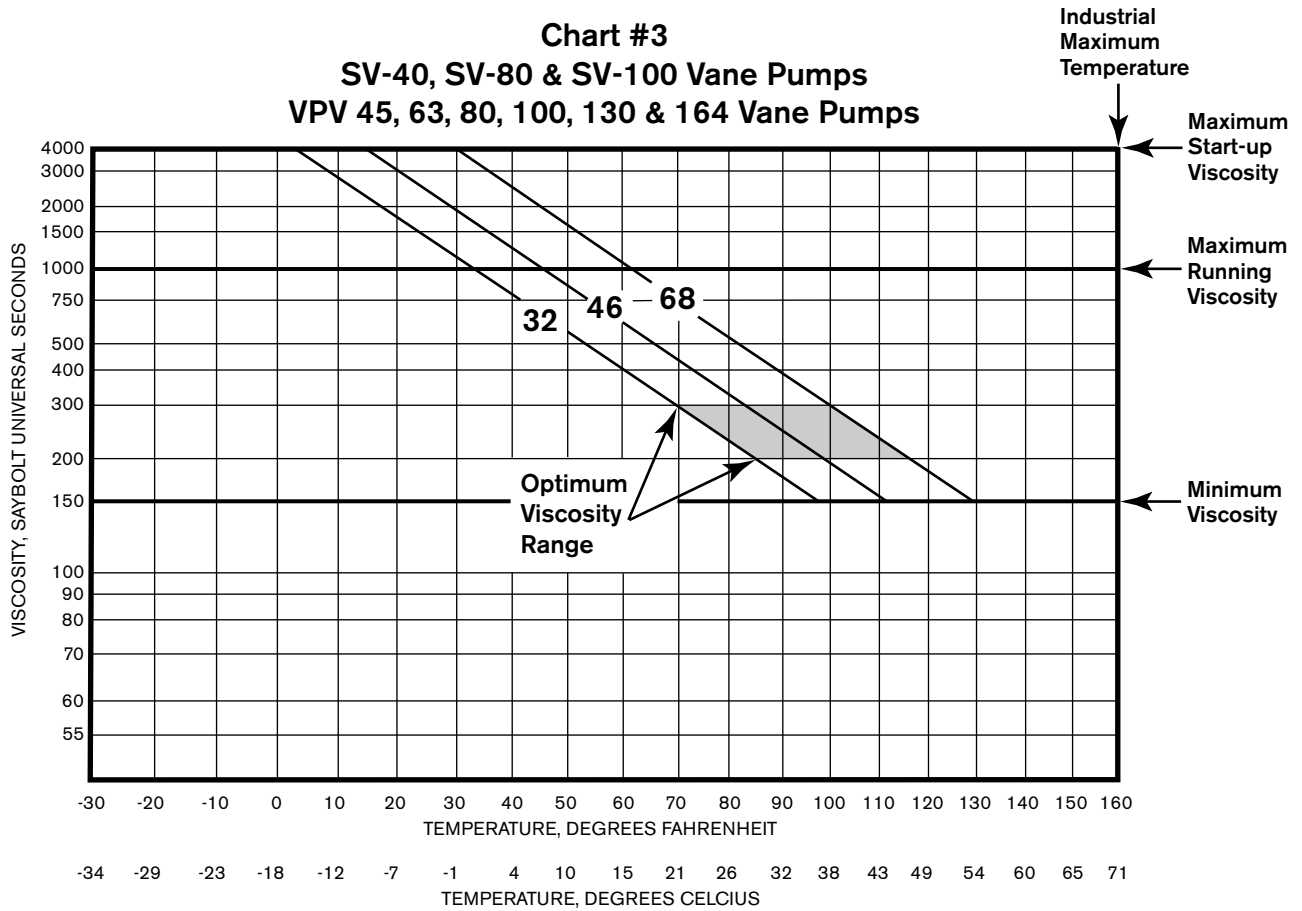
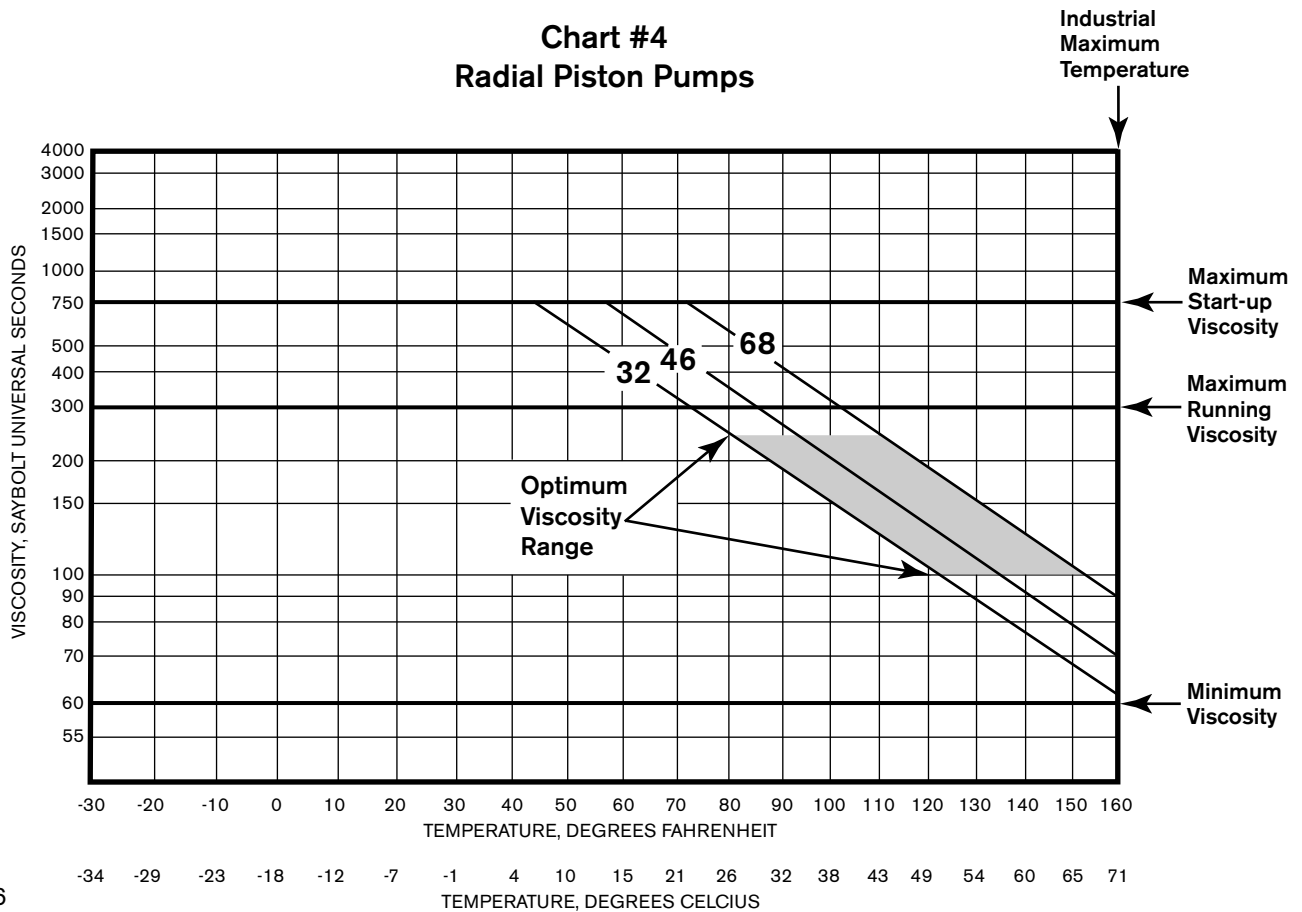
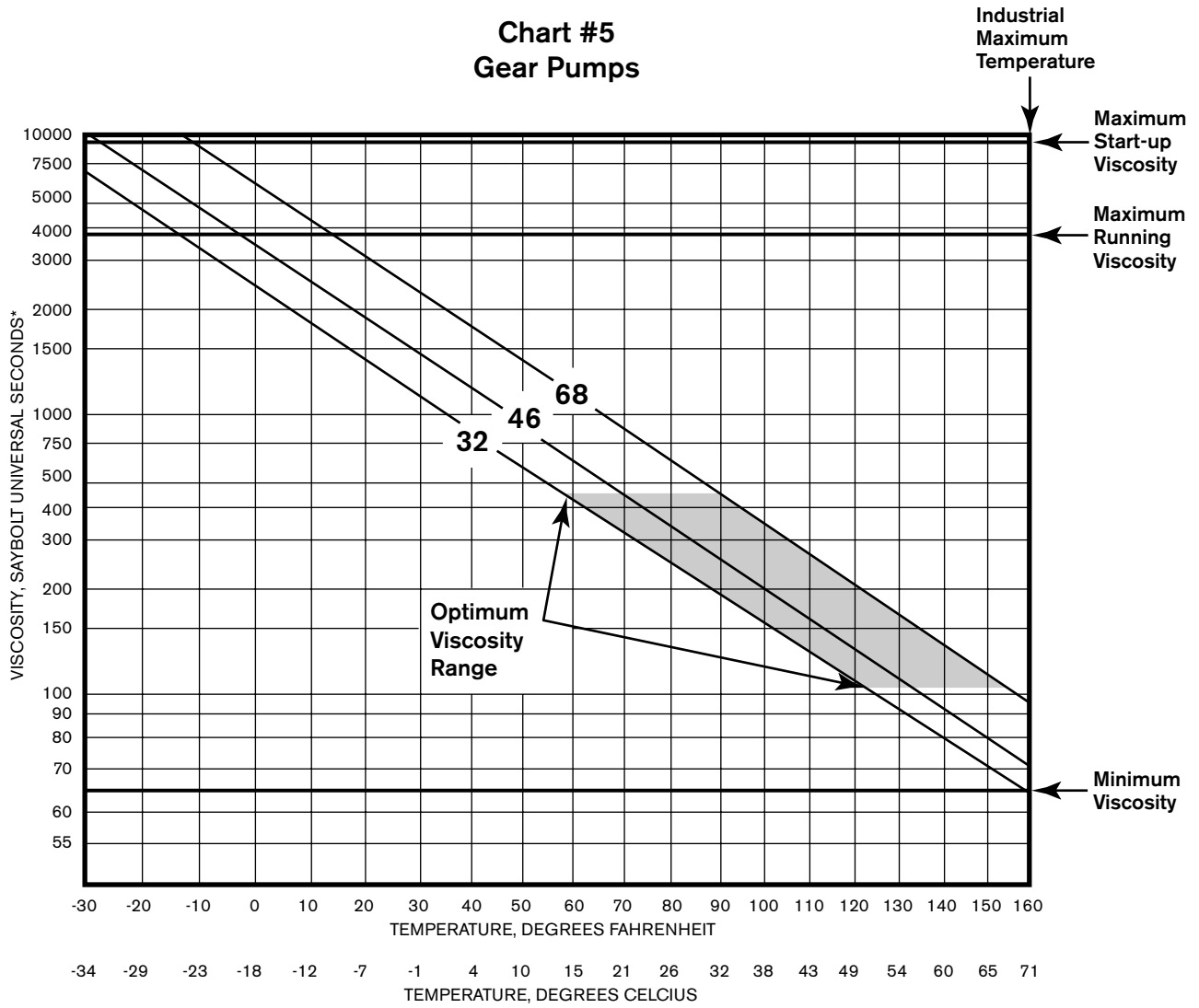


Chart #4
Radial Piston Pumps



**Chart #5
Gear Pumps**



* Viscosity values extrapolated at low temperatures may not be accurate. Confirm viscosity values prior to using Bosch Rexroth hydraulic equipment.

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