

Recommended Cleanliness Code Charts - ISO 4406			
PUMPS			
Pressure	<140 Bar	<210 Bar	>210 Bar
Fixed Gear	20/18/15	19/17/15	18/16/13
Fixed Vane	20/18/15	19/17/14	18/16/13
Fixed Piston	19/17/15	18/16/14	17/15/13
Variable Vane	19/17/15	18/16/14	17/15/13
Variable Piston	18/16/14	17/15/13	16/14/12
VALVES			
Pressure		<210 Bar	>210 Bar
Directional (solenoid)		20/18/15	19/17/14
Pressure (modulating)		19/17/14	19/17/14
Flow Controls (standard)		19/17/14	19/17/14
Check Valves		20/18/15	20/18/15
Cartridge Valves		20/18/15	19/17/14
Screw-in Valves		18/16/13	17/15/12
Prefill Valves		20/18/15	19/17/14
Load-sensing Directional Valves		18/16/14	17/15/13
Hydraulic Remote Controls		18/16/13	17/15/12
Proportional Directional (throttle)		18/16/13	17/15/12*
Proportional Pressure Controls		18/16/13	17/15/12*
Proportional Cartridge Valves		18/16/13	17/15/12*
Proportional Screw-in Valves		18/16/13	17/15/12
Servo Valves		16/14/11	15/13/10*
ACTUATORS			
Pressure	<140 BAR	<210 BAR	>210 BAR
Cylinders	20/18/15	20/18/15	20/18/15
Vane Motors	20/18/15	19/17/14	18/16/13
Axial Piston Motors	19/17/14	18/16/13	17/15/12
Gear Motors	21/19/17	20/18/15	19/17/14
Radial Piston Motors	20/18/14	19/17/15	18/16/13
Swashplate Design Motors	18/16/14	17/15/13	16/14/12
HYDROSTATIC TRANSMISSIONS			
Pressure	<140 Bar	<210 Bar	>210 Bar
Hydrostatic Transmissions	17/15/13	16/14/12*	16/14/11*
In-loop fluid			
COJINETES/RODAMIENTOS			
Ball Bearing Systems	15/13/11*		
Roller Bearing Systems	16/14/12*		

Pump & Valve Tolerance

Component	Clearance Location	Microns	Inches
Gear Pump	Gear to side plate	1/2 - 5	.00002 - .0002
	Gear tip to case	1/2 - 5	.00002 - .0002
Piston Pump	Piston to bore	5 - 40	.0002 - .0015
	Valve plate to cylinder	1/2 - 5	.00002 - .0002
Control Valve	Orifice	130-10,000	.005 - .4
	Spool sleeve	1 - 23	.00005 - .0009
	Disk type	1/2 - 1	.00002 - .00004
	Poppet type	13 - 40	.0005 - .0015