TARGET ISO CODES

When setting target ISO fluid cleanliness codes for hydraulic and lubrication systems it is important to keep in mind the objectives to be achieved. Maximizing equipment reliability and safety, minimizing repair and replacement costs, extending useful fluid life, satisfying warranty requirements, and minimizing production down-time are attainable goals. Once a target ISO cleanliness code is set following a progression of steps to achieve that target, monitor it, and maintain it will yield justifiable rewards for your efforts. Make an impact on reliability by controlling contamination.

Set the Target.
The first step in identifying a target ISO code for a system is to identify the most sensitive component on an individual system, or the most sensitive component supplied by a central reservoir. If a central reservoir supplies several systems the overall cleanliness must be maintained, or the most sensitive component must be protected by filtration that cleans the fluid to the target before reaching that component.

Other Considerations.
Table 1 recommends conservative target ISO cleanliness codes based on several component manufacturers guidelines and extensive field studies for standard industrial operating conditions in systems using petroleum based fluids. If a non-petroleum based fluid is used (i.e. water glycol) the target ISO code should be set one value lower for each size ($4\mu_{[c]}/6\mu_{[c]}/14\mu_{[c]}$). If a combination of the following conditions exists in the system the target ISO code should also be set one value lower:

- Component is critical to safety or overall system reliability.
- Frequent cold start.
- Excessive shock or vibration.
- Other severe operation conditions.

Recommended* Target ISO Cleanliness Codes and media selection for systems using petroleum based fluids per ISO4406:1999 for particle sizes $4\mu_{[c]}$ / $6\mu_{[c]}$ / $14\mu_{[c]}$

	Pressure < 138 bar < 2000 psi	Media $\beta x_{[c]} = 1000$ ($\beta x = 200$)	Pressure 138-207 bar 2000 - 3000 psi	Media $\beta x_{[c]} = 1000$ ($\beta x = 200$)	Pressure > 207 bar > 3000 psi	Media $\beta x_{[c]} = 1000$ ($\beta x = 200$)
Pumps						
Fixed Gear	20/18/15	$22\mu_{[c]}$ (25μ)	19/17/15	$12\mu_{[c]}$ (12μ)	-	-
Fixed Piston	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)	17/15/12	$7\mu_{[c]}$ (6μ)
Fixed Vane	20/18/15	$22\mu_{[c]}$ (25μ)	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)
Variable Piston	18/16/13	$7\mu_{[c]}$ (6μ)	17/15/13	$7\mu_{[c]}$ (6μ)	16/14/12	$5\mu_{[c]}$ (3μ)
Variable Vane	18/16/13	$7\mu_{[c]}$ (6μ)	17/15/12	$5\mu_{[c]}$ (3μ)	-	-
Valves						
Cartridge	18/16/13	$12\mu_{[c]}$ (12μ)	17/15/12	$7\mu_{[c]}$ (6μ)	17/15/12	$7\mu_{[c]}$ (6μ)
Check Valve	20/18/15	$22\mu_{[c]}$ (25μ)	20/18/15	$22\mu_{[c]}$ (25μ)	19/17/14	$12\mu_{[c]}$ (12μ)
Directional (solenoid)	20/18/15	$22\mu_{[c]}$ (25μ)	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)
Flow Control	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)
Pressure Control (modulating)	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)	17/15/12	$7\mu_{[c]}$ (6μ)
Proportional Cartridge Valve	17/15/12	$7\mu_{[c]}$ (6μ)	17/15/12	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)
Proportional Directional	17/15/12	$7\mu_{[c]}$ (6μ)	17/15/12	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)
Proportional Flow Control	17/15/12	$7\mu_{[c]}$ (6μ)	17/15/12	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)
Proportional Pressure Control	17/15/12	$7\mu_{[c]}$ (6μ)	17/15/12	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)
Servo Valve	16/14/11	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)	15/13/10	$5\mu_{[c]}$ (3μ)
Bearings						
Ball Bearing	15/13/10	$5\mu_{[c]}$ (3μ)	-	-	-	-
Gearbox (industrial)	17/16/13	$12\mu_{[c]}$ (12μ)	-	-	-	-
Journal Bearing (high speed)	17/15/12	$7\mu_{[c]}$ (6μ)	-	-	-	-
Journal Bearing (low speed)	17/15/12	$7\mu_{[c]}$ (6μ)	-	-	-	-
Roller Bearing	16/14/11	$7\mu_{[c]}$ (6μ)	-	-	-	-
Actuators						
Cylinders	17/15/12	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)	15/13/10	$5\mu_{[c]}$ (3μ)
Vane Motors	20/18/15	$22\mu_{[c]}$ (25μ)	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)
Axial Piston Motors	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)	17/15/12	$7\mu_{[c]}$ (6μ)
Gear Motors	20/18/14	$22\mu_{[c]}$ (25μ)	19/17/13	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)
Radial Piston Motors	20/18/15	$22\mu_{[c]}$ (25μ)	19/17/14	$12\mu_{[c]}$ (12μ)	18/16/13	$12\mu_{[c]}$ (12μ)
Test Stands, Hydrostatic						
Test Stands	15/13/10	$5\mu_{[c]}$ (3μ)	15/13/10	$5\mu_{[c]}$ (3μ)	15/13/10	$5\mu_{[c]}$ (3μ)
Hydrostatic Transmissions	17/15/13	$7\mu_{[c]}$ (6μ)	16/14/11	$5\mu_{[c]}$ (3μ)	16/14/11	$5\mu_{[c]}$ (3μ)

*Depending upon system volume and severity of operating conditions a combination of filters with varying degrees of filtration efficiency might be required (I.e. pressure, return, and off-line filters) to achieve and maintain the desired fluid cleanliness.

Example		ISO Code	Comments
Operating Pressure	156 bar, 2200 psi		
Most Sensitive Component	Directional Solenoid	19/17/14	Recommended Baseline ISO Code
Fluid Type	Water Glycol	18/16/13	Adjust Down One Class
Operating Conditions	Remote Location, Repair Difficult, High Ingression Rate	17/15/12	Adjust Down One Class, Combination of Critical Nature, Severe Conditions

HY-PRO FILTRATION