

EQUIPMENT GUIDE / FLUID TRANSFER

Pump Selection by Chemistry Guide

Which pump architecture holds up against your actual chemical, at your actual concentration and temperature — not the generic catalog answer.

THE PROBLEM THIS GUIDE SOLVES

Most pump failures are chemistry failures, not pump failures

A pump rated for "chemical service" is not a specification. Concentration, temperature, and duty cycle change which wetted material survives – and the difference between a material that's *compatible* and one that's *excellent* at the exact conditions in your process is usually where the failure actually starts.

This guide organizes real, vendor-documented compatibility data by pump architecture, not by brand. Every material call-out below is sourced to a named vendor document or a LibertyCES field record – nothing here is a generic "resists most chemicals" claim.

ARCHITECTURE SELECTION, AT A GLANCE

Nine pump families, by what they're actually built to move

Architecture	Built for	Watch for
Metering Pump	Precise, low-flow dosing of disinfectants, acids, caustics into a process stream	Wetted-part material must match the exact oxidizer or acid, not just "chemical duty" generically
Diaphragm Pump (AODD/EODD)	General chemical transfer, drum unloading, corrosive/abrasive service	Housing material (PP vs. PVDF vs. metal) is the real spec axis, not just diaphragm elastomer
Peristaltic Pump	Abrasive slurries, crystallizing chemistry, anything that should never touch a valve or seal	Hose/tube material is the entire wetted path – there is no separate seal to fail
Sealless / Magnetic-Drive Pump	Zero-leak transfer of hazardous or high-value chemicals, continuous duty	Liner material (PFA/PTFE/ETFE) must hold at full temperature, not just at ambient
Drum / Barrel Pump	Intermittent transfer directly from source containers	Tube material is usually the only wetted part – verify it against the specific chemical, not the drum label
Chemical Injection Pump	Wellhead and pipeline injection – methanol, corrosion inhibitors, scale inhibitors	Seal ladder (FFKM vs. FKM-ETP vs. HNBR) is the real differentiator between models
Sanitary AODD Pump	Food, beverage, and biological process fluids requiring 3-A certification	Surface finish (32 Ra vs. 125 Ra) and certification status, not just port size
Low-Shear Circulating Pump	Viscous or shear-sensitive product an AODD or centrifugal pump would damage	A genuinely different requirement from general transfer – don't default to AODD here
High-Temp Water-Powered Dosing	CIP/sanitation dosing where hot water and hand-mixed chemistry meet	Electricity-free operation matters as much as material compatibility in wet washdown areas

METERING PUMP — EVIDENCE: STRONG

Oxidizers & disinfectants



Blue-White CHEM-FEED CD / MD Series

Also confirmed: Graco Mongoose PVDF (A21008) · Hayward Z Series solenoid diaphragm · ProMinent DULCODOS

Sodium Hypochlorite

Chlorine Dioxide

Hydrogen Peroxide

Peracetic Acid

Ozone

PVDF wetted parts are independently confirmed by four separate vendor documents for sodium hypochlorite service — this is one of the best-corroborated compatibility calls in this entire dataset. PTFE and ceramic (ProMinent electrode bodies) are the secondary confirmed materials.

METERING PUMP — EVIDENCE: MODERATE

Acids (phosphoric, nitric, sulfuric, citric CIP) — Dosatron D14T / D132 / D400 explicitly markets phosphoric and nitric acid injection. PVDF, Halar/ECTFE, and PTFE are the confirmed wetted materials; Alloy 20 shows up at the accessory level (Griffco injection valves/quills) only.

Caustics/bases (sodium hydroxide, ammonia) — Dosatron D14T names NaOH explicitly for CIP service. ProMinent runs a dedicated ammonia-handling metering system with vapor corrosion control — ammonia's off-gas behavior is a real reason to spec a purpose-built system rather than a generic caustic-rated pump.

DIAPHRAGM PUMP (AODD/EODD) — EVIDENCE: STRONG

Acids, caustics & oxidizers



Graco Husky AODD (205 - 3300 series)

Also: [Graco QUANTM i30/i80/i120 EODD](#) · [Graco ChemSafe 1590/515/307/1040](#) · [FTI Air FT025-FT30P](#)

Sulfuric Acid

Phosphoric Acid

Potassium Hydroxide

Sodium Hydroxide

Sodium Hypochlorite

Material flag, sulfuric acid: Noryl housing fails above 98.3% w/w concentrated sulfuric acid, the point where free SO_3 appears in solution — a Griffco material bulletin (TIB2010-001) quantifies this threshold directly. Above that concentration, spec PVDF, Halar/ECTFE, or one-piece flanged PTFE instead.

Material flag, caustic: a LibertyCES case study (cheese-plant wastewater, 50% H_2SO_4 / 45% KOH dosing) confirms 316 stainless is *not suitable* for this service — PP and PVDF are the correct call. The QUANTM i30 electric diaphragm pump on that job delivered a 24% chemical-consumption reduction from more precise dosing control, not from a stronger pump.

ChemSafe (515/307/1040/1590) is purpose-built for corrosive/oxidizing service with zero exposed metal in the fluid path — PTFE and UHMWPE wetted, confirmed for sodium hypochlorite and hydrogen peroxide.

PERISTALTIC PUMP — EVIDENCE: STRONG

Crystallizing slurries & abrasive chemistry

**Graco SoloTech Peristaltic (10 / 23 / 26 / 30)**

Also: Blue-White FLEXFLO A/M Series

Lime Slurry

Calcium Hydroxide

Calcium Carbonate

Sodium Hypochlorite

FIELD RECORD — CALIFORNIA MUNICIPAL WATER TREATMENT PLANT

A SoloTech 30 replaced a metal-wetted lime-slurry pump that was clogging on crystallized calcium hydroxide roughly 10 times a year, 4–6 hours of downtime each. The fix wasn't a stronger pump — it was fewer places for the chemical to sit, dry, and crystallize. A single roller compresses an engineered hose through 360°, with no valves, seals, or glands in the fluid path, and the pump reverses to clear blockages without disassembly.

0 clog shutdowns/year

down from ~10/year · hose life 12+ months · \$3,900–\$6,500/year in avoided labor

Independent chemical-compatibility chart data corroborates the mechanical case: at saturation and 40°C, 316 stainless steel rates only "Good" on calcium hydroxide and calcium carbonate while every thermoplastic in the same chart (PVC, PP, PVDF, PFA, PTFE) rates "Excellent." A metal-wetted pump is the weaker material choice here before the crystallization mechanics are even considered.

The hose is the entire wetted path on a peristaltic pump, and it's the real spec point: Flex-A-Prene and Flex-A-Chem tube materials are independently rated Good-to-Excellent for sodium hypochlorite, alongside PVDF at the fittings. Blue-White's own compatibility scale corroborates PVDF as "Excellent" for sodium hypochlorite in the FLEXFLO peristaltic line separately — a second, unrelated vendor confirming the same material call made for metering pumps on page 2.

Acids — evidence: light. The SoloTech 10/23/26/30 page cross-references Graco's broader Chemical Compatibility Guide rather than naming a specific acid directly, with Hastelloy hose barbs available as an option. Treat acid service on this family as a spec-review item, not a self-service catalog pick.

Zero-leak transfer, continuous duty



Richter MNK / RM / QMD Series

Also: [Finish Thompson UCR/UCP ANSI sealless](#) · [Finish Thompson AK/AV/VKC/MSVVC vertical mag-drive](#) · [Finish Thompson DB Series](#) · [Filter Pump MTD](#)

Sodium Hypochlorite

Peracetic Acid

Bromine

Caustic Soda

Chloralkali Brine

MDI / TDI

Richter's own process-chemistry documentation is the widest single-vendor chemical range in this dataset — explicitly naming bromine production, sodium hypochlorite, peracetic acid (F&B CIP), caustic soda, chloralkali brine, and MDI/TDI isocyanate production, all against a PFA/PTFE liner. Finish Thompson independently confirms sodium hypochlorite compatibility for its vertical mag-drive line — a second vendor corroborating the same chemistry, different pump family. For oxidizer service specifically, the AK/AV/VKC/MSVVC line also offers titanium and Hastelloy C as a premium wetted-material tier above PP/PVDF.

For acid service (phosphoric, nitric), Richter's MNK/RM/QMD and Finish Thompson's UCR/UCP/DB Series overlap directly — PFA, PTFE, ETFE, and FEP (QMD's economy tier) liners confirmed across the family, alongside Filter Pump's MTD as a fourth independent vendor in the same acid-transfer space.

DRUM / BARREL PUMP — EVIDENCE: LIGHT

Intermittent transfer from source containers



Finish Thompson EF / PF / SF / TT / TB / HVDP / BT

Accessory-level: FTI Air Drum Pump Kit

Acids & Bases

Plating Solutions

The base drum-pump family publishes a generic material list (polypropylene, PVDF, 316SS, CPVC) without naming a specific chemical — treat this family as needing a spec review before assuming compatibility, not a self-service catalog pick.

CHEMICAL INJECTION PUMP — EVIDENCE: STRONG

Wellhead & pipeline injection



Graco G-JR · Python · Wolverine

Controllers: Harrier EZ-JR · Harrier+ AC/DC · KRAKN MPI manifold

Methanol

Corrosion Inhibitors

Scale Inhibitors

The seal ladder is the real compatibility axis in this family: FFKM, FKM-ETP, and HNBR, in roughly that order of chemical resistance, is why Wolverine gets specified when G-JR or Python's fixed configurations don't fit an aggressive inhibitor package. Python is genuinely distinctive — it runs on regulated natural gas or compressed air as its motive fluid, so no electricity is required in a classified hazardous area.

SANITARY AODD PUMP — EVIDENCE: STRONG

Food, beverage & biological process fluids



Graco SaniForce 515 / 1040 / 1590 / 2150 / 3150

3-A certified: 1590 HS · 3150 standard

Milk

Beer

Wine

Juice

Glucose

Olive Oil

Material flag: 316 stainless rates "Excellent" on milk, beer, tomato juice, and glucose at room temperature — but at 80°C/176°F it drops to **"Corroded"** on vinegar, wine, and white liquor, and to "Fair" on olive oil. A sanitary stainless pump is not automatically the right call for a hot acidic product stream; verify against temperature, not just the product category.

The real specification axis here is surface finish and certification, not port size: 32 Ra vs. 125 Ra finish, 3-A certified or not. The Bin Evacuation System handles product up to 500,000 cps; the Meat & Poultry Flapper Pump passes 2.5" solids.

LOW-SHEAR CIRCULATING / VISCOUS TRANSFER PUMP — EVIDENCE: MODERATE

Shear-sensitive product an AODD pump would damage**Graco Triton 1:1 150 Series · 3:1 350 Series**

Gelatin

Glue

Starch

Glucose

Beet Sugar Liquors

Low-shear circulation is a genuinely distinct requirement from general transfer — emulsions, cultures, and gelatin degrade under the mechanical action of an AODD or centrifugal pump in ways a low-shear architecture avoids. Vendor documentation on wetted materials and flow rates is thinner here than elsewhere in this guide; a spec review is the right next step before finalizing this family for a specific product.

HIGH-TEMPERATURE WATER-POWERED DOSING PUMP — EVIDENCE: STRONG

CIP and sanitation dosing**Dosatron D14T High-Temperature Family**Also: [D132 Mega-Flo](#) · [D400](#) · [D128 flat-top medicator](#) · [DM11](#)

Caustic CIP (NaOH)

Acid CIP

Peracetic Acid

Chlorine Dioxide

The real failure mode this family addresses isn't a material failure — it's concentration drift. Caustic CIP runs at 1–2% NaOH and 160–180°F to saponify fats and hydrolyze proteins; acid CIP runs at 0.5–1.5% phosphoric or nitric acid and 140–160°F to dissolve milkstone and beerstone scale. When hot water meets hand-mixed chemistry, temperature and contact time can be right while concentration drifts anyway. Key D14T versions run a metal-free wetted path specifically for NaOH and PAA service, and every model in the family is water-powered — no electricity required in a wet washdown environment.

NEXT STEP

Send LibertyCES the process data, not a part number.

Nine pump architectures, real vendor compatibility data, one guide — but your actual application still has a specific chemical, concentration, temperature, and duty cycle that determines which material is correct. A spec review checks the exact conditions against the exact material, before equipment gets ordered.

Fluid, chemistry, concentration, temperature, flow, pressure, suction conditions, current equipment, and drawings if you have them — that's what a real spec review needs to start.

Request a spec review

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