THE

MINING PUMP TECHNOLOGY SELECTION FIELD GUIDE

Peristaltic vs. Electric Diaphragm vs. Mag-Drive Pumps for Abrasive Slurries, Reagent Dosing and Corrosive Chemical Transfer

Prepared by LibertyCES

A practical pre-selection guide for mining and mineral-processing applications.

FOREWORD

A pump can be chemically compatible and still be wrong for the service.

This field guide is built for the point before a pump model is selected: when the process team knows the fluid, the failure or the operating problem, but still needs to determine which pump technology deserves a closer review. Use the decision tree to identify the likely technology category, complete the application worksheet with normal and worst-case conditions, then use the comparison matrix and failure-mode table to challenge the initial choice. The guide intentionally separates manufacturer-stated mining evidence from engineering inferences. Finish Thompson publishes mining-specific evidence for its sealless mag-drive pumps. The Graco SoloTech and QUANTM mining paths are plausible applications inferred from documented product capabilities and must be verified for the exact duty.

HOW TO USE THIS GUIDE

Start with the process, not the product. Complete Section 3 before requesting a model. Use Sections 6-8 only after the decision tree points toward the technology. Stop at Section 9 whenever a red flag applies.

Evidence key

Evidence status	Meaning in this guide
MANUFACTURER-STATED	The manufacturer explicitly identifies mining use or publishes mining-specific evidence.
PLAUSIBLE-FIT INFERENCE	The product capabilities may fit a mining duty, but the manufacturer does not currently present mining as a stated application.
SPECIALIST REVIEW	The duty exceeds the product limits, lacks critical data or requires a different pump category.

Guide structure

Sections 1-2 establish the selection logic.

Section 3 collects the application data required for technical review.

Sections 4-5 compare the technologies and diagnose common failure patterns.

Sections 6-8 explain the three technology paths in full.

Section 9 identifies duties that should not be forced into these products.

Sections 10-11 prepare the procurement handoff and document the evidence limits.

01 THE FAILURE OFTEN STARTS BEFORE THE PUMP IS PURCHASED

A reliable pump selection begins by separating chemistry, hydraulics, solids, power, controls and maintenance instead of treating them as one question.

A pump can be built from chemically compatible materials and still be wrong for the service.

It can handle the required flow but fail on the solids.

It can tolerate the solids but consume too much energy.

It can eliminate a mechanical seal but introduce a hose, diaphragm or containment limitation that was never considered.

The pump fails later. The selection error happens first.

Mining and mineral-processing applications force several operating conditions into the same duty. A fluid may be corrosive, abrasive, viscous, shear-sensitive and hazardous at the same time. Its solids concentration may change during the shift. Its specific gravity may increase as the process moves away from the design point. Its temperature may rise during cleaning, recirculation or seasonal operation.

No single pump technology is automatically correct for all of those conditions.

1. What is actually moving through the pump?

The fluid name is not enough.

“Sulfuric acid” does not establish the concentration, temperature, contamination level or solids content.

“Lime slurry” does not establish particle size, percent solids, settling behavior or viscosity.

“Flocculant” does not establish whether the polymer is fully activated, partially mixed or sensitive to shear.

The complete process description matters more than the general chemical name.

2. What hydraulic duty must the pump meet?

Every selection needs a normal operating point.

That includes minimum, normal and maximum flow; total dynamic head; discharge pressure; suction pressure or lift; pipe length and diameter; elevation change; required turndown; operating hours; and continuous or intermittent duty.

A pump selected only from maximum flow may spend most of its life operating far away from its best working range. A pump selected only from connection size may never produce the required duty.

3. What do the solids do?

Solids are not one specification.

Selection changes with percent solids by weight and volume, maximum and typical particle size, hardness, shape, abrasiveness, settling tendency, fibrous content and the tendency to crystallize, precipitate, pack or bridge.

A fluid containing a small amount of soft suspended material behaves differently from a dense slurry containing sharp mineral particles. Both may be called slurry. They do not belong in the same pump automatically.

4. What is attacking the current pump?

The failed component usually points toward the missing selection factor.

Repeated mechanical-seal leakage suggests a different problem from repeated check-valve plugging. Rapid impeller wear suggests a different problem from excessive compressed-air consumption. Loss of prime suggests a different problem from damaged flocculant.

The replacement pump should solve the actual failure. It should not simply be a newer version of the same mistake.

5. What material is exposed to the fluid?

The pump body is only part of the wetted path.

A complete compatibility review may include the pump body, hose, diaphragm, valve ball, valve seat, O-rings, gaskets, bushings, wear plates, shaft materials, containment shell, barbs, fittings and any fasteners exposed to leakage.

Compatibility changes with concentration and temperature. Material names are not blanket approvals.

6. How is the pump powered and controlled?

Available power affects both capital cost and operating cost.

The process may have compressed air, single- or three-phase AC power, 12- or 24-volt DC power, generator power, solar power with an inverter, variable-speed control, 4-20 mA control, discrete remote start and stop or PLC/SCADA integration.

A compressed-air pump can be simple at the point of use while placing a heavy load on the compressor system. An electric pump can remove the air demand but require electrical classification, wiring and control review.

7. What happens when the pump is wrong?

The consequence determines how conservative the selection must be.

A poor selection may cause maintenance inconvenience, lost reagent, excessive water use, unplanned shutdown, production loss, environmental release, personnel exposure, equipment damage or loss of process control.

Cyanide service does not carry the same leakage consequence as clean utility water. A high-consequence duty needs documented compatibility, documented sizing and clear operating limits.

The three technologies in this guide

PERISTALTIC HOSE PUMP

Represented by the Graco SoloTech. The mining fit is an engineering inference based on Graco's documented ability to handle abrasive, caustic and sensitive fluids, along with the pump's seal-less hose design and metering capability. Graco does not currently identify mining as a stated SoloTech industry application. Every mining application therefore requires verification.

ELECTRIC DOUBLE-DIAPHRAGM PUMP

Represented by the Graco QUANTM. The mining fit is an engineering inference based on the pump's electric diaphragm design, self-priming capability, dry-run capability, remote control, available hazardous-location configurations and ability to replace some compressed-air diaphragm duties. Graco does not currently identify mining as a stated QUANTM industry application. Every mining application therefore requires verification.

SEALLESS MAGNETIC-DRIVE CENTRIFUGAL PUMP

Represented by the Finish Thompson DB, SP and MSDB Series. Finish Thompson explicitly identifies mining as a served market and publishes mining-specific application information. This gives the Finish Thompson path the strongest manufacturer-stated mining footing of the three categories in this guide. Manufacturer-stated mining fit does not eliminate the need to verify chemical compatibility, solids content, hydraulic duty or installation conditions.

What this guide is designed to do

- Identify the most likely pump-technology category.
- Recognize obvious disqualifying conditions.
- Gather the information required for technical review.
- Compare the three technologies on the same basis.
- Prepare a more complete request for quotation.
- Avoid forcing one product into every mining duty.

FINAL SELECTION STILL REQUIRES

Complete process data, manufacturer materials review, hydraulic sizing, confirmation of operating limits, applicable electrical and hazardous-location review, and professional engineering approval where required.

The first decision is not the model number. The first decision is whether the technology fits the duty.

02 THE 60-SECOND MINING PUMP DECISION TREE

Begin with the material and duty. Do not begin with the brand, connection size or technology already installed.

START HERE

Use the normal condition and the worst credible condition. If those two conditions point to different technologies, the application needs a full review before any model is selected.

Step	Question	Direction
1	Is the fluid predominantly clean, corrosive and free of meaningful abrasive solids?	YES -> Path A: Sealless mag-drive centrifugal. NO -> Continue to Question 2.
2	Does the service require accurate low-to-moderate-flow dosing or transfer of an abrasive, viscous or shear-sensitive material?	YES -> Path B: Peristaltic hose pump. NO -> Continue to Question 3.
3	Is the current duty performed by an AODD pump, or does the service require self-priming, dry-run capability, variable speed or remote control?	YES -> Path C: Electric double-diaphragm. NO -> Continue to Question 4.
4	Does the duty involve mainline slurry, large particles, high-volume thickener underflow, severe abrasion or solids beyond the stated limits of the pumps in this guide?	YES -> Stop. Specialist review or another technology is required. NO -> Complete the full application review; more than one path may fit.

Path A - Sealless mag-drive centrifugal

This path is strongest when the liquid is predominantly clean, corrosion resistance is required, mechanical-seal leakage is a recurring problem, smooth centrifugal flow is preferred, and the installation can maintain the required suction conditions.

Investigate Finish Thompson DB Series for flooded-suction service.
Investigate Finish Thompson SP Series for self-priming service.
Investigate Finish Thompson MSDB Series for lower-flow, higher-head or higher-specific-gravity service.

Confirm concentration, temperature, specific gravity, solids content, crystallization risk, minimum flow, suction condition, required head, construction material, dry-run exposure, flammability restrictions and certifications.

Path B - Peristaltic hose pump

This path is strongest when the required flow falls within the pump's practical range, the fluid is abrasive, viscous or shear-sensitive, accurate variable-speed dosing is required, check valves create maintenance problems, and the main wear component can be managed as a planned hose replacement.

Graco SoloTech campaign range: approximately 0.25-17.7 gpm.
Maximum pressure: up to approximately 125 psi, model dependent.
Published wet and dry suction lift: approximately 31-33 ft, depending on model and conditions.
Available hose materials include natural rubber, CSM, EPDM and nitrile.
Mining fit is inferred from product capability and requires verification.

Do not use the SoloTech range as a default mainline slurry pump. Its stated flow range places it more naturally in reagent dosing, pilot systems and smaller transfer duties.

Path C - Electric double-diaphragm

This path is strongest when an AODD pump is consuming excessive compressed air, electric operation is available, self-priming or dry-run capability is required, the process benefits from stall-under-pressure behavior, remote control is needed, and the solids remain within the allowable passage.

- QUANTM i30: up to approximately 30 gpm and 100 psi.
- QUANTM i80: up to approximately 80 gpm and 100 psi.
- QUANTM i120: up to approximately 120 gpm and 60 psi.
- Solids passage: up to approximately 1/8 in., depending on configuration.
- Available 4-20 mA control, discrete start/stop and selected hazardous-location configurations.
- Mining fit is inferred from product capability and requires verification.

Do not use QUANTM as a substitute for a heavy-duty mine-slurry pump when the solids exceed the fluid-section limits.

When two paths appear to fit

Some duties legitimately support more than one technology. A clean corrosive liquid may be handled by a mag-drive centrifugal pump or an electric diaphragm pump. A low-flow reagent may be handled by a peristaltic pump or a diaphragm pump. A self-priming chemical duty may point toward a self-priming mag-drive pump or an electric diaphragm pump.

- Flow quality
- Required turndown
- Pulsation
- Solids
- Shear
- Suction condition
- Dry-run exposure
- Energy source
- Control requirements
- Maintenance philosophy
- Leakage consequence
- Installed cost
- Expected operating cost

SELECTION RULE

The right technology is the one that satisfies the complete duty with the fewest unmanaged failure modes.

03

MINING PUMP APPLICATION WORKSHEET

Complete this worksheet before requesting a pump recommendation. Mark unknown values as unknown and provide both normal and worst-case conditions.

WORKSHEET RULE

Do not estimate critical process values without identifying them as estimates. When the process varies, record minimum, normal and maximum values.

A. PROJECT INFORMATION

Project or facility name: ____
Mine, mill or processing area: ____
Application name: ____
Equipment tag number: ____
Prepared by: ____
Company: ____
Phone: ______________________________
Email: ____
Date: ____________________________
Required quotation date: ______________________________________
Required equipment delivery date: _____________________________
Project type: [ ] New installation [ ] Replacement [ ] Temporary duty [ ] Pilot installation [ ] Capacity expansion [ ] Reliability upgrade [ ] Energy-reduction project

B. APPLICATION DESCRIPTION

Describe the source vessel, destination, reason for transfer and upstream/downstream equipment:

Normal operating purpose: [ ] Transfer [ ] Metering [ ] Recirculation [ ] Unloading [ ] Dewatering [ ] Sump service [ ] Filter feed [ ] Reagent dosing [ ] Polymer/flocculant dosing [ ] Slurry transfer [ ] Other
Operating mode: [ ] Continuous [ ] Intermittent [ ] Batch [ ] Standby [ ] Emergency [ ] Variable production demand
Expected operating hours per day: ______________________________________
Expected operating days per year: ___________________________________
Starts per hour or per shift: _____________________________________

C. PROCESS FLUID

Fluid or slurry name: ____
Chemical components: ____
Primary chemical concentration: ____________________________________
Secondary chemical concentration: _________________________________
pH: ___________________
Normal operating temperature: ____________________________________
Minimum temperature: ____
Maximum temperature: ____
Ambient temperature range: ____
Specific gravity: ____
Dynamic or apparent viscosity: ____________________________________

Does viscosity change with shear or temperature?: [ ] Yes [ ] No [ ] Unknown
Describe the change:

Is the fluid shear-sensitive?: [ ] Yes [ ] No [ ] Unknown
Is the fluid hazardous or toxic?: [ ] Yes [ ] No [ ] Unknown
Is the fluid flammable or combustible?: [ ] Yes [ ] No [ ] Unknown
Does the fluid crystallize, precipitate or harden when stagnant?: [ ] Yes [ ] No [ ] Unknown
Does the fluid contain dissolved gas or entrained air?: [ ] Yes [ ] No [ ] Unknown
Does the fluid foam easily?: [ ] Yes [ ] No [ ] Unknown
Are cleaning or upset conditions different from normal service?: [ ] Yes [ ] No [ ] Unknown
Describe cleaning and upset conditions:

D. SOLIDS INFORMATION

Are solids normally present?: [ ] Yes [ ] No [ ] Trace only [ ] Upset conditions only [ ] Unknown
Solids concentration by weight: ____
Solids concentration by volume: ______________________________________
Typical particle size: ____
Maximum particle size: ____
Particle-size distribution, if known: ____________________________________
Particle material: ____
Particle hardness: ____
Particle shape: [ ] Rounded [ ] Angular [ ] Sharp [ ] Fibrous [ ] Plate-like [ ] Mixed [ ] Unknown
Abrasiveness: [ ] Low [ ] Moderate [ ] High [ ] Severe [ ] Unknown
Do solids settle when flow stops?: [ ] Rapidly [ ] Slowly [ ] No significant settling [ ] Unknown
Can solids pack, bridge or compact?: [ ] Yes [ ] No [ ] Unknown
Can solids increase during normal operation?: [ ] Yes [ ] No [ ] Unknown
Worst-case solids condition:

E. REQUIRED HYDRAULIC DUTY

Duty point	Minimum	Normal	Maximum
Flow rate			
Total dynamic head			
Discharge pressure			
Suction pressure			
Fluid temperature			
Specific gravity			
Viscosity			
Percent solids			

Required flow units: [ ] gpm [ ] lpm [ ] m3/hr [ ] Other
Required pressure units: [ ] psi [ ] bar [ ] feet of head [ ] meters of head
Is discharge pressure measured at the pump or destination? Explain:

Required turndown ratio: ____
Required dosing accuracy or repeatability: _____________________________
Can the flow pulsate?: [ ] Yes [ ] Limited pulsation acceptable [ ] No [ ] Unknown
Is a pulsation dampener installed?: [ ] Yes [ ] No [ ] Unknown

F. SUCTION CONDITIONS

Source vessel or location: ____
Source vessel type: [ ] Open tank [ ] Closed tank [ ] Sump [ ] Pit [ ] Drum/tote [ ] Process line [ ] Thickener [ ] Other

Suction condition: [ ] Flooded suction [ ] Suction lift [ ] Pressurized suction [ ] Vacuum service [ ] Unknown
Vertical distance from minimum liquid level to pump centerline: ______________________
Horizontal suction-pipe length: ____
Suction-pipe diameter: ____
Number and type of suction fittings: ____
Minimum liquid level: ____
Maximum liquid level: ____
Available NPSH, if calculated: ____
Can the suction line drain between cycles?: [ ] Yes [ ] No [ ] Unknown
Must the pump re-prime automatically?: [ ] Yes [ ] No [ ] Unknown
Can the pump run dry?: [ ] Never expected [ ] Possible normally [ ] Possible during upset [ ] Frequently expected [ ] Unknown
Does the suction line contain settled solids at startup?: [ ] Yes [ ] No [ ] Unknown

G. DISCHARGE CONDITIONS

Destination: ____
Vertical elevation change: ____
Horizontal discharge-pipe length: ____
Discharge-pipe diameter: ____
Downstream equipment: [ ] Open tank [ ] Pressurized tank [ ] Filter [ ] Injection point [ ] Spray system [ ] Header [ ] Static mixer [ ] Heat exchanger [ ] Other
Can the discharge valve close while the pump is operating?: [ ] Yes [ ] No [ ] Unknown
Is a relief or bypass path installed?: [ ] Yes [ ] No [ ] Unknown
Can downstream pressure change during the shift?: [ ] Yes [ ] No [ ] Unknown
Describe the pressure range:

H. AVAILABLE POWER AND CONTROLS

Available electrical power: [ ] 120V 1-phase [ ] 208V 3-phase [ ] 230/240V 1-phase [ ] 230/240V 3-phase [ ] 460/480V 3-phase [ ] 575V 3-phase [ ] 12VDC [ ] 24VDC [ ] Generator [ ] Solar with inverter [ ] Other
Compressed air available: [ ] Yes [ ] No [ ] Limited [ ] Available but expensive [ ] Unknown
Available air pressure: ____
Available air volume: ____
Control requirement: [ ] Local manual [ ] Fixed speed [ ] Variable speed [ ] VFD [ ] 4-20 mA [ ] Discrete start/stop [ ] PLC [ ] SCADA [ ] Batch [ ] Flow-paced [ ] Level [ ] Pressure [ ] Other
Required feedback: [ ] Running status [ ] Fault status [ ] Speed [ ] Flow [ ] Pressure [ ] Leak detection [ ] Other

I. SITE AND INSTALLATION CONDITIONS

Installation: [ ] Indoor [ ] Outdoor [ ] Underground [ ] Mobile skid [ ] Remote location [ ] Washdown area [ ] Corrosive atmosphere [ ] Dusty environment
Hazardous-location classification: ____
Required certification: [ ] Class I Div 1 [ ] Class I Div 2 [ ] Zone 1 [ ] Zone 2 [ ] ATEX [ ] IECEx [ ] None known [ ] Other
Maximum available footprint: ____
Maximum available height: ____
Pump orientation restrictions: ____
Noise limitations: ____
Maintenance access limitations: ____
Can the pump be isolated and drained safely?: [ ] Yes [ ] No [ ] Unknown
Is secondary containment installed?: [ ] Yes [ ] No [ ] Unknown
Is leak detection required?: [ ] Yes [ ] No [ ] Unknown

J. CURRENT PUMP AND FAILURE HISTORY

Current pump manufacturer: ____
Current model: ____
Current pump technology: [ ] Mechanically sealed centrifugal [ ] Sealless mag-drive [ ] AODD [ ] EODD [ ] Peristaltic hose [ ] Progressive cavity [ ] Piston/plunger metering [ ] Gear [ ] Other
Current motor or air consumption: ____
Current operating speed: ____
Current actual flow: ____
Current actual discharge pressure: ____

Primary failure mode: [ ] Mechanical-seal leakage [ ] Chemical attack [ ] Impeller wear [ ] Hose failure [ ] Diaphragm failure [ ] Check-valve plugging [ ] Cavitation [ ] Loss of prime [ ] Inadequate flow [ ] Excessive pulsation [ ] Excessive energy/air use [ ] Excessive shear [ ] Inaccurate dosing [ ] Motor/gearbox failure [ ] Other

Average time between failures: ______________________________________

Average repair duration: ____

Estimated production downtime per failure: _____________________________

Estimated maintenance labor per failure: ______________________________

Estimated parts cost per failure: _____________________________________

Estimated lost-product cost per failure: ________________________________

Has the operating duty changed since installation?: [ ] Yes [ ] No [ ] Unknown

Describe the change:

K. MATERIALS CURRENTLY IN SERVICE

Pump body: ____

Hose or diaphragm: ____

O-rings or gaskets: ____

Valve balls and seats: ____

Piping: ____

Valves: ____

Current material failures, swelling, cracking or softening:

L. REQUIRED DOCUMENTATION AND COMMERCIAL INFORMATION

Required submittals: [ ] Product data [ ] Performance curve [ ] Chemical-compatibility confirmation [ ] Materials list [ ] Motor data [ ] Electrical drawing [ ] Dimensional drawing [ ] Installation manual [ ] O&M manual [ ] Haz-loc documentation [ ] Spare-parts list [ ] Warranty [ ] Other

Required spare parts with initial purchase:

Preferred service interval: ____

Required warranty terms: ____

Approved manufacturer restrictions: ___________________________________

Budget range, if established: _______________________________________

Photos available: [ ] Yes [ ] No

P&ID available: [ ] Yes [ ] No

Current pump curve available: [ ] Yes [ ] No

Safety data sheet available: [ ] Yes [ ] No

Laboratory fluid or solids analysis available: [ ] Yes [ ] No

04 THREE-WAY TECHNOLOGY COMPARISON MATRIX

Use this matrix as a pre-selection tool. A favorable rating does not replace hydraulic sizing, materials review or model-specific approval.

Selection factor	Graco SoloTech Peristaltic hose	Graco QUANTM Electric diaphragm	Finish Thompson Mag-drive families	Specialist review / different technology
Mining evidence status	Plausible-fit inference. Graco documents abrasive, caustic and sensitive-fluid capability but does not state mining as a SoloTech industry application.	Plausible-fit inference. Graco documents EODD operating capabilities but does not state mining as a QUANTM industry application.	Manufacturer-stated mining fit. Finish Thompson publishes mining-market information and mining application evidence.	Required when the duty exceeds stated limits or falls outside documented evidence.
Primary pumping principle	A roller compresses a replaceable hose and pushes a fixed volume forward. The fluid remains inside the hose.	Electrically driven diaphragms displace fluid through inlet and discharge check valves.	An external magnet transmits torque through a containment shell to the internal impeller. No conventional rotating shaft seal crosses the casing.	May include heavy-duty centrifugal slurry, large industrial hose, progressive cavity, piston, plunger or another purpose-built design.
Strongest campaign use	Low-to-moderate-flow reagent dosing, abrasive or shear-sensitive fluids, pilot duties and smaller slurry transfer.	AODD replacement, intermittent transfer, remote control, self-priming service and fluids containing limited solids.	Predominantly clean corrosive chemical transfer where mechanical-seal leakage is a concern.	Mainline slurry, coarse solids, very high flow, severe abrasion or unusual process conditions.
Campaign flow range	Approximately 0.25-17.7 gpm across referenced SoloTech models.	Approximately 30, 80 or 120 gpm maximum by model family. Actual duty depends on pressure and configuration.	DB: <1-221 gpm. SP: <1-253 gpm. MSDB: approximately 1-69.8 gpm.	Review required when flow exceeds these ranges or the duty demands another performance envelope.
Pressure or head capability	Up to approximately 125 psi, model dependent.	Approximately 100 psi on i30/i80; approximately 60 psi on i120.	DB: 20-201 ft head, 90 psi max. SP: 20-221 ft, 90 psi max. MSDB: 204-306 ft, 135 psi max.	Higher pressure, head or combined flow-and-head requirements may require another technology.
Clean corrosive liquids	Possible when hose and barb materials are verified. May be unnecessary when smooth centrifugal transfer is preferred.	Possible when body, diaphragms, valve balls, seats and seals are verified.	Strong fit when solids are absent or tightly controlled and the construction materials are compatible.	Required when chemistry, temperature or concentration exceeds confirmed materials data.
Abrasive slurry	Potentially strong at suitable flow, pressure, particle size and hose-life expectations.	Limited by the fluid section, check valves and approximately 1/8-in solids passage. Best for lighter or secondary slurry duties.	Generally poor when abrasive solids threaten internal clearances or bushings.	Strongly consider dedicated slurry equipment for large, hard or concentrated solids.
Large solids	Review against hose size, particle shape and the complete fluid path. No universal solids claim should be assumed.	Limited to approximately 1/8 in. on referenced configurations.	Not intended as a general large-solids pump.	Required for solids beyond product passage limits.
High percent solids	Possible in some peristaltic applications, but SoloTech suitability must be confirmed within its size and performance range.	Not a default high-solids solution. Check valves and passages control suitability.	Generally not the preferred path for high-solids slurry.	Dedicated heavy-duty slurry or industrial hose-pump review is normally required.
Accurate dosing	Strong potential with controlled speed. Each hose compression moves a predictable volume.	Variable-speed control is available, but check-valve behavior and pulsation must be considered for precise dosing.	Normally selected for transfer rather than high-turndown metering.	Use a dedicated metering technology when accuracy requirements exceed available capability.
Shear-sensitive polymer	Strong potential because the fluid remains inside the hose and the pumping action is comparatively low shear.	Possible, but valve action and fluid recirculation should be evaluated.	Centrifugal shear may be unsuitable for sensitive polymers.	Testing may be required when polymer damage affects consumption or recovery.
Mechanical seal	No conventional mechanical seal in the process fluid path.	No conventional rotating mechanical seal.	No conventional dynamic shaft seal through the casing.	Other technologies may use seals, packing or different containment methods.
Primary contained-fluid barrier	Replaceable hose.	Diaphragms and static seals.	Pump casing and containment shell.	Depends on technology.
Primary expected wear item	Hose.	Diaphragms, valve balls, valve seats and related fluid-section components.	Bushings, impeller components and internal wetted parts, depending on fluid and operating condition.	Depends on technology and duty.
Check valves in fluid path	No separate inlet and discharge check-valve assemblies in the standard peristaltic pumping principle.	Yes. Valve-ball and seat behavior directly affects solids handling and priming.	No reciprocating check valves required for the centrifugal pumping principle.	Depends on technology.

Selection factor	Graco SoloTech Peristaltic hose	Graco QUANTM Electric diaphragm	Finish Thompson Mag-drive families	Specialist review / different technology
Pulsation	Present. Level depends on speed, hose size and system design.	Present because of reciprocating diaphragm operation.	Comparatively smooth centrifugal flow.	A dampener, different piping design or different technology may be required.
Self-priming	Strong suction-lift potential, with published wet and dry values around 31-33 ft depending on model and conditions.	Self-priming capability is a stated feature.	SP Series is self-priming. DB and MSDB require appropriate suction conditions.	Review source level, vapor pressure, suction losses and settled solids.
Dry-running	The pump can move air, but hose temperature, speed and duty must be reviewed. Do not assume indefinite dry running.	Dry-run capability is a stated feature.	DB carbon-bushing configurations may run dry for hours under stated conditions. Other models require verification.	Treat dry-run exposure as an operating condition, not an afterthought.
Stall under pressure	Not the defining characteristic. A relief strategy may still be required.	Stalls under pressure without a separate pressure sensor, according to Graco's stated behavior.	A centrifugal pump develops shutoff head when discharge closes. Minimum-flow and deadhead conditions must be reviewed.	Positive-displacement technologies generally require a pressure-relief path.
Flooded-suction service	Suitable when system design supports the hose and inlet conditions.	Suitable.	DB Series is specifically a flooded-suction mag-drive family.	Verify available NPSH and tank conditions.
Suction-lift service	Strong potential within published lift limits and fluid conditions.	Strong potential within model and fluid limits.	SP Series is intended for self-priming service and retains liquid for re-priming.	High vapor pressure, dense slurry or long suction lines may require another arrangement.
Remote variable-speed control	Available with controlled motor options. Confirm control architecture.	4-20 mA speed control and discrete start/stop are stated features.	Requires motor and control configuration suitable for the selected model.	Review PLC, SCADA, VFD and instrumentation requirements.
Compressed-air requirement	None.	None.	None.	AODD technology requires compressed air.
Remote or off-grid potential	Possible with the correct motor, inverter and power system. Must be engineered.	Selected 12/24VDC inverter configurations make remote power a plausible application.	Possible with an appropriate electric supply and motor package.	Confirm starting current, energy storage, generator or solar sizing.
Hazardous-location options	Select ATEX configurations are available. Exact model and approval must be confirmed.	Class I Div 1, Zone 1, ATEX and IECEx configurations are available on selected models.	ATEX availability exists on selected Finish Thompson configurations.	Site classification, temperature code, gas group and local requirements control selection.
High-specific-gravity service	Motor torque, hose loading and reduced performance must be checked.	Performance must be corrected for density and viscosity.	MSDB is positioned for high-head and higher-specific-gravity service, including values above 1.8 in stated configurations.	Extreme density or viscosity may require specialized sizing.
Smooth continuous transfer	Flow contains pulsation.	Flow contains pulsation.	Strongest of the three for smooth centrifugal transfer.	Use a dampener or another technology when smooth flow is mandatory.
Maintenance approach	Plan hose inspection, replacement interval and leak containment.	Plan diaphragm, valve-ball and seat inspection. Track cycle count and wear.	Maintain clean suction, avoid damaging dry-run conditions and inspect internal components per manufacturer instructions.	Build maintenance around the actual wear mechanism.
Main disqualifying condition	Flow above range, unacceptable hose compatibility, oversized particles, unacceptable pulsation or unmanageable hose life.	Solids larger than passage limits, check-valve plugging, unsuitable diaphragm materials, pressure above limits or severe mainline slurry.	Abrasive solids, crystallizing material, inadequate suction, incompatible construction or dry-run outside model limits.	No technology should be selected without complete process data.

05 SELECT BY FAILURE MODE

The failure is not the specification. It is evidence. Use the failed component and operating history to identify the condition the original selection missed.

Current symptom	What it may indicate	Technology or action to investigate
Repeated mechanical-seal leakage on clean corrosive transfer	The dynamic shaft seal creates a recurring leakage and maintenance point. Material compatibility, alignment, dry running or crystallization may also be involved.	Investigate a Finish Thompson sealless mag-drive pump after confirming solids, chemistry, temperature and hydraulic duty.
Visible chemical leakage around the shaft	Seal faces, elastomers or secondary containment may be failing.	Review the complete sealed-pump arrangement. Consider mag-drive technology when the fluid is sufficiently clean.
AODD pump consumes excessive compressed air	The pump may be oversized, running continuously, operating at high pressure or relying on an inefficient compressor system.	Compare the actual duty against QUANTM EODD performance and calculate cost from real air and electricity data.
AODD pump freezes or loses performance	Air-system moisture, icing, muffler restriction or high air demand may be limiting operation.	Correct the air system or investigate EODD operation when the fluid and solids fit.
AODD check valves repeatedly plug	Solids may be too large, fibrous, sticky or prone to settling for the selected valve geometry.	Investigate a peristaltic pump for lower-flow duties, or a specialist slurry pump when flow or solids exceed SoloTech limits.
Metering pump loses prime on viscous reagent	Suction lift, inlet losses, valve loading or fluid viscosity may exceed the pump's inlet capability.	Review suction design. Investigate peristaltic technology when the required flow falls within range.
Flocculant consumption rises without a process change	Excessive shear may be damaging the polymer before it reaches the process.	Investigate a low-shear peristaltic path and verify the complete mixing and injection system.
Lime-slurry dosing becomes inconsistent	Settling, check-valve plugging, suction-line design or particle loading may be disrupting the pump.	Review agitation and piping. Investigate peristaltic technology when particle size, flow, pressure and hose life are acceptable.
Centrifugal impeller wears rapidly	Abrasive particles, operation away from the intended duty point or excessive velocity may be accelerating erosion.	Do not replace the impeller without reviewing the technology. Consider peristaltic or dedicated slurry equipment based on flow and solids.
Pump cavitates or sounds like gravel	Available NPSH may be insufficient. Suction piping, vapor pressure, temperature or inlet restrictions may be controlling the duty.	Correct the suction condition before changing technology. No pump can create available NPSH the system does not provide.
Pump repeatedly loses prime after shutdown	The suction line may drain, the source level may fall or air may enter the system.	Investigate a self-priming QUANTM or Finish Thompson SP Series after reviewing fluid and solids.
Pump must run dry during tank emptying	The installed technology may depend on fluid for lubrication or cooling.	Investigate a stated dry-run-capable configuration. Confirm allowable duration, speed and materials.
Pump produces excessive pulsation	Positive-displacement action is interacting with rigid piping, instrumentation or the injection point.	Add a properly selected pulsation dampener, change speed or consider smooth-flow centrifugal technology for clean fluids.
Diaphragms fail too often	Chemical attack, excessive cycle rate, abrasive solids, overpressure, temperature or improper materials may be involved.	Review cycle count and materials. EODD does not eliminate diaphragm wear; it changes the power source.
Hose life is shorter than expected	Chemical incompatibility, speed, pressure, vacuum, temperature, solids abrasion or compression may be involved.	Correct the operating condition and verify the hose material. Do not treat every hose failure as normal wear.
Chemical feed varies as discharge pressure changes	The pump or control method may not compensate for changing backpressure.	Review pump curve, control loop and injection point. A controlled positive-displacement pump may be appropriate.
Remote pump cannot be monitored or adjusted	The current equipment lacks usable I/O or variable-speed control.	Investigate QUANTM or controlled SoloTech configurations with the required PLC or SCADA interface.

Current symptom	What it may indicate	Technology or action to investigate
One wear-part failure shuts down production	The spare-parts and maintenance plan may be as weak as the pump selection.	Establish critical spares, replacement intervals and a documented isolation procedure.
Clean corrosive pump requires repeated alignment and seal work	The mechanically sealed arrangement may be creating avoidable maintenance.	Investigate sealless mag-drive technology. Confirm the fluid is clean enough for internal clearances.
Slurry requires excessive dilution water before pumping	The pump technology or piping may be unable to move the actual solids concentration.	Review a peristaltic or dedicated slurry-pump solution. Do not assume the SoloTech size range fits a mainline duty.
Pump meets flow only at maximum speed	The pump may be undersized or system resistance may be higher than expected.	Recalculate the system curve. Do not accept continuous edge-of-envelope operation without review.
Motor overloads as solids concentration rises	Specific gravity, viscosity or solids loading has moved beyond the original design point.	Size for the worst credible process condition, not only the clean-water condition.
Chemical attacks more than one component	The review may have focused only on the pump body while ignoring diaphragms, hoses, seats, bushings or gaskets.	Complete a full wetted-material review before selecting any technology.
Maintenance changes parts but the same failure returns	The failed part may be the symptom rather than the cause.	Rebuild the application data from the worksheet and reconsider the technology category.

06 CORROSIVE REAGENT-TRANSFER PATH

Sealless mag-drive centrifugal pumps remove the conventional rotating shaft seal, but they still depend on clean enough fluid, correct materials, adequate suction and proper operating range.

The seal is often the first visible failure

Clean corrosive chemical transfer often fails at the mechanical seal.

The pump may still produce flow. The motor may still run. The casing may still be chemically compatible. The leak begins where the rotating shaft crosses the pump casing.

A conventional mechanical seal can perform reliably when the pump is correctly selected, installed and operated. It still remains a dynamic sealing point. Chemical attack, dry running, crystallization, misalignment, vibration, temperature and poor suction conditions can shorten its life.

A sealless mag-drive pump removes that conventional rotating shaft penetration.

How the mag-drive arrangement works

The motor turns an external magnet. Magnetic force passes through a stationary containment shell and turns an internal magnet connected to the impeller. The process fluid remains inside the pump casing. There is no conventional rotating shaft seal passing through the casing wall.

That design removes one common leak path from corrosive chemical transfer. It does not make the pump indestructible.

- Correct materials
- Clean enough fluid
- Adequate suction
- Proper flow
- Acceptable temperature
- Controlled dry-run exposure
- Proper installation

Where the Finish Thompson path is strongest

Finish Thompson explicitly identifies mining as an industry served by its sealless pump products and publishes mining-specific application evidence. This gives the Finish Thompson path a stronger manufacturer-stated mining basis than the Graco applications in this guide.

DB Series - flooded suction

- Flow below 1 gpm up to approximately 221 gpm.
- Head from approximately 20 to 201 ft.
- Maximum pressure up to approximately 90 psi.
- Polypropylene and PVDF construction options.
- Efficiency up to approximately 70 percent in stated configurations.
- Carbon-bushing configurations that may run dry for hours under stated conditions.
- Available ATEX configurations.

The DB path is strongest when the source tank maintains liquid above the pump, the liquid is predominantly clean, smooth transfer is required, corrosion resistance is required, mechanical-seal leakage is a recurring problem, and the duty falls within the selected model’s curve.

DO NOT MISS THE SUCTION CONDITION

A DB pump should not be selected for a suction-lift duty simply because the discharge requirements fit. Flooded suction is part of the application.

SP Series - self-priming

- Flow below 1 gpm up to approximately 253 gpm.
- Head from approximately 20 to 221 ft.
- Self-priming lift up to approximately 18 ft in stated conditions.
- Priming in approximately 90 seconds under stated conditions.
- Maximum pressure up to approximately 90 psi.
- Polypropylene and PVDF construction options.
- Retained liquid that supports re-priming.
- A stated restriction against flammable liquids.

The SP path is strongest when the pump sits above the source liquid, the suction line may drain, the service requires re-priming, the liquid is predominantly clean, the liquid is not flammable, and the chemistry fits the selected construction.

Published priming capability is not a substitute for good suction design. Long suction piping, vapor pressure, hot liquid, air leaks and solids can reduce actual performance.

MSDB Series - lower flow and higher head

- Flow from approximately 1 to 69.8 gpm.
- Head from approximately 204 to 306 ft.
- Maximum pressure up to approximately 135 psi.
- PP/PPS and PVDF/PPS construction options.
- Suitability for higher-specific-gravity fluids, including values above 1.8 in stated configurations.

The MSDB path is strongest when the required flow is comparatively lower, the required head is high, the fluid is clean enough for a mag-drive design, the specific gravity places greater load on a conventional single-stage selection, and the suction conditions remain acceptable.

Mining evidence and the Chilean copper application

Finish Thompson publishes a case study involving sulfuric-acid transfer at a Chilean copper operation. The application supports the broader mining use of sealless magnetic-drive technology for corrosive acid service.

The published case identifies an ULTRAChem pump. It should not be presented as proof that the exact installation used a DB Series pump.

- The case supports Finish Thompson’s mining experience.
- The case supports the sealless mag-drive approach.
- The case supports sulfuric-acid transfer as a documented mining application.
- The case supports mechanical-seal leakage as a reason to consider sealless technology.

The DB, SP or MSDB selection still depends on the required flow, head, suction condition, specific gravity and material requirements.

Fluid cleanliness matters

Mag-drive pumps use close internal clearances and fluid-lubricated internal components. A fluid may be chemically compatible and still be mechanically unsuitable.

- Abrasive particles
- Crystals
- Precipitated solids
- Scale
- Pipe debris
- Settled solids
- Fibers
- Metal fines
- Carbon fines
- Unstable reaction products

A suction strainer is not automatically the solution. A strainer can plug and starve the pump. The process should be reviewed to determine whether solids can be removed, prevented or tolerated by the selected design.

Chemical compatibility is concentration- and temperature-specific

Polypropylene and PVDF are common corrosion-resistant materials. Neither one is universally compatible with every mining reagent. The review must include the exact chemical, concentration, normal and maximum temperature, cleaning chemicals, contaminants, upset conditions and expected exposure duration.

Do not approve the pump from the casing material alone.

Dry running requires exact qualification

Some Finish Thompson DB configurations using carbon bushings are described as capable of running dry for hours. That statement applies to specific configurations and operating conditions. It should not be converted into a blanket statement that every mag-drive pump can run dry indefinitely.

- Internal temperature
- Bearing or bushing lubrication
- Containment-shell temperature
- Magnet temperature
- Fluid residue
- Crystallization
- Component life

Where dry running is expected, the exact model, bushing material, operating speed and allowable duration should be confirmed in writing.

Minimum flow and closed-discharge operation

A centrifugal pump can operate at a closed discharge long enough to generate heat inside the casing. Low-flow operation can increase recirculation and temperature.

- Expected minimum flow
- Whether the discharge valve can close
- Whether a bypass is required
- Whether the pump recirculates to the source
- Whether the fluid can heat, crystallize or decompose

A sealless design removes a mechanical seal. It does not remove the need for hydraulic protection.

Use this path when

- The fluid is predominantly clean.
- The chemical is corrosive.
- Mechanical-seal leakage is a recurring concern.
- The application requires smooth centrifugal flow.
- The flow and head fit an available model.
- The suction arrangement matches the selected family.
- The construction fits the chemistry.
- Solids remain absent or tightly controlled.
- The facility can maintain minimum flow.
- The pump can be protected from damaging conditions.

Do not force this path when

- The fluid contains abrasive slurry.
- Solids can enter during normal operation.
- The liquid crystallizes during shutdown.
- The source cannot provide adequate suction.
- The duty requires frequent uncontrolled dry running.
- The fluid is flammable and the proposed model is not approved.
- The chemistry is outside confirmed data.
- The pressure or head exceeds the selected family.
- Minimum flow cannot be maintained.
- The application requires accurate high-turndown metering.

Information required for a Finish Thompson review

1. Exact chemical name
2. Concentration
3. Normal and maximum temperature
4. Specific gravity
5. Solids content
6. Minimum, normal and maximum flow
7. Total dynamic head
8. Suction condition
9. Available NPSH, when calculated
10. Required construction material
11. Dry-run exposure
12. Hazardous-location requirements
13. Operating hours
14. Cleaning and upset conditions
15. Current failure history

ASK THE COMPLETE QUESTION

Not: “Which mag-drive pump handles sulfuric acid?” Ask: “Which pump family, construction and operating range fit this exact sulfuric-acid duty without introducing a new failure mode?”

07

ABRASIVE SLURRY AND REAGENT-DOSING PATH

Peristaltic hose pumps isolate the process fluid inside a replaceable hose. The technology can fit selected abrasive, viscous and shear-sensitive duties when flow, pressure, particles and hose life are verified.

The fluid path changes the failure mode

Abrasive and shear-sensitive fluids create two separate problems. The solids wear conventional internal components. The pumping action may damage the fluid itself.

Peristaltic hose pumps change the fluid path. The process material remains inside a replaceable hose. A roller compresses the hose and moves the trapped volume forward. There is no conventional mechanical seal in contact with the process fluid and no separate inlet and discharge check-valve assemblies in the basic pumping principle.

The Graco SoloTech evidence boundary

Graco documents SoloTech for caustic, abrasive and sensitive materials. The product's single-roller design, hose construction, suction capability and variable-speed options create plausible mining uses.

Graco does not currently state mining as a SoloTech industry application. The guide therefore treats SoloTech as an inferred fit.

Broader mining use of peristaltic technology supports the technology category. It does not automatically validate every SoloTech mining application.

SoloTech campaign capabilities

- Flow from approximately 0.25 to 17.7 gpm.
- Maximum pressure up to approximately 125 psi.
- Wet and dry suction lift around 31-33 ft, depending on model and conditions.
- Natural-rubber, CSM, EPDM and nitrile hose options.
- Stainless-steel, PVDF and Hastelloy barb options.
- AC gearmotor and BLDC motor-control configurations.
- Select ATEX-certified models.
- Single-roller design with one hose compression per revolution.

NATURAL CAMPAIGN POSITION

This is not a mainline high-volume mine-slurry pump. The strongest initial applications are reagent dosing, pilot-plant transfer, small-process transfer, lime-slurry dosing, polymer/flocculant dosing and selected smaller abrasive-slurry duties.

Why the hose changes the maintenance model

In a peristaltic pump, the hose is both the fluid path and the principal wear component. That concentrates wear into a replaceable part. It can simplify maintenance when the operating conditions are understood. It can create unexpected downtime when hose life is assumed instead of established.

- Chemical compatibility
- Temperature
- Operating speed
- Discharge pressure
- Suction vacuum
- Particle hardness

- Particle shape
- Solids concentration
- Hose material
- Hose compression
- Operating hours
- Start/stop frequency
- Cleaning conditions
- Dry-running conditions

The selection should establish the inspection frequency, initial replacement interval, leak-detection method, spare-hose quantity, replacement procedure and safe containment if the hose fails.

The single-roller design

The SoloTech uses a single-roller pumping design. One hose compression occurs per revolution. Fewer compressions per revolution may reduce cyclic loading compared with multi-shoe designs operating at an equivalent rotational speed.

Actual hose life still depends on the complete duty. The single-roller design should not be presented as a guarantee of a specific service interval.

Reagent-dosing applications

A reagent-dosing pump needs more than chemical compatibility. It must also maintain useful control across the required operating range.

- Minimum, normal and maximum dose
- Required turndown
- Required repeatability
- Calibration method
- Discharge-pressure range
- Control signal
- Pulsation tolerance
- Injection-point design
- Required backpressure
- Whether the fluid settles during shutdown

A variable-speed SoloTech configuration can provide controllable flow. The system still requires calibration against the actual fluid and discharge conditions.

Lime-slurry dosing

Lime slurry can settle, compact, abrade and plug check-valve assemblies. A hose pump removes separate check valves from the basic pumping mechanism. That can reduce one common plugging location. The rest of the system still matters.

- Tank agitation
- Suction-line velocity
- Pipe slope
- Dead legs
- Flush connections
- Particle size
- Solids concentration
- Maximum pressure
- Hose material
- Startup after settling
- Cleaning procedure

A peristaltic pump cannot pull a packed column of settled solids through a poorly designed suction line indefinitely. The piping and agitation must support the pump.

Polymer and flocculant

Flocculants and activated polymers can lose effectiveness when subjected to excessive shear. A hose pump can provide a comparatively low-shear transfer path. That makes the technology worth reviewing where polymer damage contributes to higher chemical use or unstable process performance.

- Polymer type
- Make-down concentration

- Final concentration
- Degree of activation
- Viscosity
- Required flow
- Maximum allowable shear
- Pipe velocity
- Injection-point design
- Recirculation
- Mix-energy requirements

The pump is only one source of shear. Control valves, static mixers, high-velocity piping and recirculation loops may also damage the polymer.

Cyanide service

Seal-less fluid containment can be attractive in cyanide-related duties. That does not reduce the need for conservative materials review and containment planning.

- Exact cyanide compound
- Concentration
- pH
- Temperature
- Oxidizers or contaminants
- Hose compatibility
- Barb compatibility
- Secondary containment
- Leak detection
- Ventilation
- Isolation and decontamination procedures
- Regulatory and site requirements

EPDM may appear in preliminary compatibility discussions for selected cyanide solutions. That is not a universal approval. The exact chemical conditions must be confirmed.

Sulfuric-acid service

CSM may appear in preliminary material screening for selected sulfuric-acid duties. PVDF or Hastelloy barbs may also be considered depending on concentration and temperature. These are starting points. They are not final selections.

- Concentration
- Temperature
- Water content
- Contamination
- Flow velocity
- Startup and cleaning conditions

A written manufacturer review should confirm the full wetted path.

Hose materials are application-specific

Hose material	Preliminary screening position
Natural rubber	May offer useful abrasion resistance in selected slurry applications. Do not assume compatibility with every chemical reagent.
EPDM	May fit selected water-based chemicals, caustic solutions, cyanide solutions, lime slurries or polymer duties. Concentration and temperature remain controlling.
CSM	May fit selected acidic or oxidizing chemical applications. The exact chemical service must be confirmed.
Nitrile	May fit selected oils, hydrocarbons and process fluids. It is not a default mining-slurry hose.

Particle size and shape

A hose pump does not use a narrow impeller clearance. That can be an advantage with solids. The solids still must pass through the suction piping, pump inlet, hose, outlet barb, discharge piping and any valves or instrumentation.

Sharp particles can damage the hose. Large particles can lodge at fittings. Dense solids can settle in the suction line. Do not approve the application from percent solids alone.

Suction lift

Published SoloTech suction-lift values approach 31-33 ft in stated wet and dry conditions. Actual performance changes with density, viscosity, vapor pressure, hose size, speed, suction-pipe diameter, length, fittings, solids, air leakage and elevation.

A high published suction-lift value does not justify an undersized suction line. Keep the suction path short, direct and appropriately sized.

Pulsation and pressure

Peristaltic pumps produce pulsating flow. Pulsation can affect flowmeters, pressure transmitters, injection points, flexible hoses, pipe supports, dosing accuracy, static mixers and filters. A chemically compatible pulsation dampener may be required.

The referenced SoloTech range reaches up to approximately 125 psi. Maximum pressure is not the same as preferred continuous operating pressure. Higher pressure can increase hose loading, heat, power demand, pulsation and wear.

Use this path when

- Flow remains within approximately 0.25-17.7 gpm.
- Pressure remains within the selected model's range.
- The fluid is abrasive, viscous or shear-sensitive.
- Check valves are creating maintenance problems.
- Accurate variable-speed dosing is needed.
- Suction lift is required.
- A replaceable hose is an acceptable wear component.
- Hose and barbs can be confirmed.
- Pulsation can be accepted or controlled.
- The duty is reagent, pilot or smaller transfer rather than mainline high-volume slurry.

Do not force this path when

- Required flow exceeds the SoloTech range.
- Particles are too large for the complete fluid path.
- Sharp solids create unacceptable hose risk.
- Hose compatibility cannot be confirmed.
- Expected hose life makes maintenance uneconomical.
- Pulsation is unacceptable.
- The application requires smooth centrifugal flow.
- The duty is mainline high-volume slurry.
- Pressure approaches the limit continuously.
- Hose failure would create an unmanaged release.
- The mine application is being claimed as manufacturer-stated.

Information required for a SoloTech review

1. Fluid name
2. Chemical concentration
3. Normal and maximum temperature
4. Specific gravity
5. Viscosity
6. Percent solids
7. Maximum particle size
8. Particle hardness and shape
9. Minimum, normal and maximum flow
10. Required pressure

11. Suction lift
12. Required dosing accuracy
13. Required control signal
14. Expected operating hours
15. Current failure mode
16. Preferred hose material, if any
17. Required barb material
18. Hazardous-location requirements
19. Secondary-containment plan
20. Acceptable maintenance interval

ASK THE COMPLETE QUESTION

Not: “Can a hose pump handle slurry?” Ask: “Can this hose, at this speed and pressure, move these particles and this chemistry for an acceptable maintenance interval?”

08 AODD REPLACEMENT AND REMOTE-DUTY PATH

Electric double-diaphragm pumps remove the compressed-air drive, not the diaphragms, check valves or solids limits.

The air pump is only the visible part of the system

An air-operated double-diaphragm pump may be simple at the point of use. The compressor system behind it is not simple.

Electricity powers the compressor. The compressor produces air. The air is dried, filtered, regulated and distributed. Pressure is lost through piping, fittings and control components. The pump converts the remaining air energy into diaphragm movement.

That chain can make compressed-air pumping expensive in continuous service. An electric double-diaphragm pump keeps the reciprocating fluid section while replacing compressed air with an electric drive.

The Graco QUANTM evidence boundary

Graco documents QUANTM as an electric double-diaphragm pump with a high-efficiency electric drive, self-priming operation, dry-run capability, stall-under-pressure behavior, variable-speed control, remote I/O, multiple voltage options, hazardous-location configurations, multiple fluid-section materials and limited solids passage.

Those capabilities create plausible mining and mineral-processing applications. Graco does not currently list mining as a stated QUANTM industry application.

QUANTM campaign capabilities

Model family	Maximum flow	Maximum pressure
i30	Up to approximately 30 gpm	Up to approximately 100 psi
i80	Up to approximately 80 gpm	Up to approximately 100 psi
i120	Up to approximately 120 gpm	Up to approximately 60 psi

- Fluid-section materials include selected aluminum, polypropylene, conductive polypropylene, stainless steel, PVDF and cast-iron configurations.
- Electrical options include selected 120V, 240V, 480V, 12VDC and 24VDC configurations.
- Control features include 4-20 mA speed control, discrete start/stop and variable speed.
- Selected hazardous-location approvals include Class I Div 1, Zone 1, ATEX and IECEx.
- Solids passage is up to approximately 1/8 in., depending on configuration.

Where QUANTM is strongest

- Existing AODD pumps operating many hours per year.
- Applications with high compressed-air cost.
- Self-priming transfer.
- Tank unloading.
- Sump or pit service with limited solids.
- Intermittent chemical transfer.
- Remote start/stop.
- Variable process demand.
- SCADA-connected systems.
- Duties requiring dry-run capability.
- Duties that benefit from stall-under-pressure behavior.
- Remote sites with compatible DC or inverter power.

STRONGEST BUSINESS CASE

Not: “Electric is better than air.” The stronger case is: “The fluid section fits the duty, the controls solve an operating problem, and the measured energy and maintenance costs justify the change.”

Energy claims need real operating data

Graco states that QUANTM may reduce energy use by up to 80 percent compared with AODD operation. “Up to” is a maximum claim under qualifying conditions. It should not be presented as a guaranteed result for every mine.

- Current AODD size
- Air consumption
- Operating pressure
- Flow
- Compressor efficiency and loading
- Distribution losses
- Electricity price
- Operating hours
- QUANTM size and operating point
- Maintenance changes

AODD-to-EODD operating-cost worksheet

A. CURRENT AODD SYSTEM

Number of pumps: ____

Pump manufacturer and model: ____

Actual flow per pump: ____

Actual discharge pressure: ____

Air consumption at operating point: ______________________________________

Operating hours per day: ____

Operating days per year: ____

Total annual operating hours: ____

Plant cost of compressed air: ____

Estimated annual compressed-air cost: _____________________________________

Diaphragm repair events per year: _______________________________________

Valve-ball or seat repairs per year: ______________________________________

Average labor cost per repair: ____

Average parts cost per repair: ____

Estimated annual AODD maintenance cost: __________________________________

B. PROPOSED QUANTM SYSTEM

Proposed model: ____

Expected operating flow: ____

Expected discharge pressure: ____

Expected electrical input: ____

Electricity rate: ____

Expected annual operating hours: ____

Estimated annual electricity cost: ____

Estimated annual maintenance cost: ____

Required electrical-installation cost: ______________________________________

Required control-integration cost: _______________________________________

Required hazardous-location cost: ____

Estimated total installed cost: ____

C. PRELIMINARY COMPARISON

Estimated annual AODD operating and maintenance cost: ______________________

Estimated annual QUANTM operating and maintenance cost: ____________________
Estimated annual difference: ____
Estimated simple payback: ____

Also consider production downtime, compressor-capacity constraints, maintenance access, remote controllability, spare-parts inventory, electrical classification, installation complexity and failure consequence.

Self-priming and dry running

QUANTM is self-priming. Actual suction performance still changes with viscosity, specific gravity, suction lift, pipe length, pipe diameter, valve condition, air leakage, solids and speed. The fluid section cannot compensate for a collapsed hose, blocked suction line or packed solids.

QUANTM is described as dry-run capable. That is useful during tank emptying, intermittent level control, remote sump duty and loss-of-feed conditions. Repeated dry cycling still increases diaphragm cycles, valve movement and component wear. Level controls should stop unnecessary operation where practical.

Stall-under-pressure behavior

QUANTM can stall when downstream pressure reaches the pump's operating limit. That behavior can simplify some transfer systems. It does not remove every pressure hazard.

- Maximum system pressure
- Blocked-discharge condition
- Thermal expansion
- Trapped liquid
- Downstream valve closure
- Pipe and hose ratings
- Restart behavior
- Pressure-control requirements

A pump that stalls under pressure does not protect trapped liquid from thermal expansion.

Solids limit

The referenced QUANTM configurations handle solids up to approximately 1/8 in. That limit immediately separates QUANTM from a heavy-duty mine-slurry pump.

- Maximum and typical particle size
- Particle shape
- Fibrous content
- Settling behavior
- Solids concentration
- Whether particles can lodge in valve seats
- Whether the suction line contains settled solids at startup

A small particle can still cause trouble when it is sharp, fibrous or sticky.

Diaphragms, valve balls and valve seats

EODD technology eliminates the compressed-air drive. It does not eliminate the reciprocating fluid-section wear parts. The material review must include diaphragms, valve balls, valve seats, O-rings, manifolds, pump body, fasteners and connected piping.

A chemically resistant body with an incompatible diaphragm is not a compatible pump.

Remote and SCADA-connected operation

QUANTM's 4-20 mA control and discrete I/O create a strong remote-automation case. A connected pump needs a defined operating philosophy.

- Start condition
- Stop condition
- Low-level shutdown
- High-pressure response
- Leak response
- Power-loss response
- Communications-loss response

- Manual override
- Restart permission
- Alarm acknowledgment

DC and off-grid operation

Selected QUANTM configurations support 12- or 24-volt DC operation with an inverter arrangement. That creates a plausible path for remote locations, solar-supported pumping, mobile systems and sites without compressed-air infrastructure.

- Starting demand
- Continuous demand
- Peak pressure
- Battery capacity
- Solar production
- Inverter efficiency
- Ambient temperature
- Required operating hours
- Backup power
- Control-system demand

“Solar-powered” is not a pump specification. It is a complete energy-system design.

Hazardous locations

Selected QUANTM models are available with hazardous-location certifications. The selection must match the class or zone, division, gas group, temperature code, ambient range, wiring method, motor configuration, control enclosure, local electrical code and site standards.

Do not apply one model’s certification to the entire product family.

Use this path when

- The current AODD pump creates high air cost.
- Required flow and pressure fall within an available model.
- Solids remain within the passage.
- Diaphragms, balls and seats can be confirmed.
- Self-priming or dry running is required.
- Variable speed or remote control is useful.
- Electrical power is available.
- Hazardous-location requirements can be met.
- The duty is secondary slurry, chemical transfer, dewatering or another compatible service rather than coarse mainline slurry.

Do not force this path when

- Solids exceed approximately 1/8 in.
- Fibrous or irregular solids foul check valves.
- The duty is severe high-solids mainline slurry.
- Pressure or flow is outside the useful range.
- Diaphragm compatibility cannot be confirmed.
- The electrical classification cannot be met.
- Pulsation is unacceptable.
- The application requires a manufacturer-stated mining claim Graco has not made.
- The savings case relies on assumed rather than measured air use.

Information required for a QUANTM review

1. Existing pump model
2. Existing air consumption
3. Actual operating flow
4. Actual discharge pressure
5. Annual operating hours
6. Plant compressed-air cost
7. Available voltage

8. Hazardous-location classification
9. Fluid name and concentration
10. Temperature
11. Viscosity
12. Specific gravity
13. Percent solids
14. Maximum particle size
15. Particle shape
16. Required suction lift
17. Required control signal
18. PLC or SCADA requirements
19. Current maintenance frequency
20. Required fluid-section materials

ASK THE COMPLETE QUESTION

Not: “Can an EODD replace an AODD?” Ask: “Does the EODD fluid section fit the material, and does the measured operating cost justify replacing compressed air with electric drive?”

09 “NONE OF THESE FIT” RED FLAGS

The fastest way to lose credibility is to make every application fit the products already on the page. Stop the selection when any of these conditions are present.

1. Mainline high-volume slurry

The application moves thickener underflow, coarse tailings, mill discharge or another major process slurry at flow beyond the campaign pump ranges.

Next action: Review a purpose-built centrifugal slurry pump, larger industrial hose pump or another mine-duty technology.

2. Large, hard or irregular solids

The maximum particle size exceeds the pump passage, hose opening, barb opening or valve geometry.

Next action: Provide maximum particle size, shape and hardness. Do not rely on average particle size.

3. Unknown solids concentration

The process team describes the fluid as slurry but cannot provide percent solids or settling behavior.

Next action: Collect laboratory data or establish conservative normal and worst-case values.

4. Unconfirmed chemistry

The chemical is known, but concentration, temperature or contaminants are unknown.

Next action: Obtain the current SDS, process composition and upset conditions before selecting wetted materials.

5. Severe abrasion and severe corrosion

The fluid attacks materials chemically and mechanically. The best corrosion material may not provide the best wear resistance.

Next action: Use a combined abrasion-and-corrosion review. Do not select from a basic compatibility chart.

6. Crystallizing or precipitating fluid

The fluid forms crystals or solids during cooling, evaporation, shutdown or concentration changes.

Next action: Define flushing, heating, draining and restart procedures before choosing the pump.

7. Required pressure exceeds the range

The system needs more pressure than the selected pump can safely provide.

Next action: Recalculate resistance and select a technology with appropriate continuous-duty margin.

8. Required flow exceeds the range

The desired flow is beyond the pump family’s practical capability.

Next action: Review a larger technology rather than building the system around the absolute limit.

9. Inadequate suction data

The request includes discharge pressure but no source level, suction lift, pipe length or vapor pressure.

Next action: Complete the suction section of the worksheet before selecting a model.

10. Settled solids in a long suction line

The fluid sits long enough to form a dense settled bed.

Next action: Review agitation, suction-line slope, flush connections, pump location and startup procedure.

11. Uncontrolled dry running

The pump regularly runs without fluid and no level control or shutdown strategy exists.
Next action: Define frequency, duration and speed. Add level control where practical.

12. Closed discharge without protection

The discharge can close while a positive-displacement pump continues to operate, or trapped liquid can heat after isolation.
Next action: Provide an approved relief, bypass or control strategy.

13. Flammable liquid on an unapproved model

The proposed pump carries a restriction or lacks required certification.
Next action: Confirm the exact approval, electrical classification and process-fluid restrictions.

14. Unknown hazardous-area classification

The site is underground or potentially gassy, but no classification is provided.
Next action: Obtain the site electrical classification before selecting equipment.

15. High-consequence leakage without containment

The fluid is toxic, highly corrosive or regulated, but the design has no containment or leak response.
Next action: Define secondary containment, leak detection, isolation and emergency response.

16. No acceptable maintenance interval

The process cannot tolerate planned hose, diaphragm, valve or internal-component service.
Next action: Establish the required service interval and compare it against realistic component life.

17. Unsupported industry claim

A product is being represented as “made for mining” without manufacturer-stated evidence.
Next action: State the distinction plainly and obtain written application approval.

18. Model number before duty

The request says “quote this pump” but provides no fluid or system data.
Next action: Complete the worksheet and confirm the duty before repeating the selection.

19. Substantially changing operating point

Flow, pressure, solids or specific gravity vary more than the selected pump can tolerate.
Next action: Provide minimum, normal and maximum values. Select for the complete envelope.

20. The team cannot agree on the failure

Operations reports plugging, maintenance reports chemical attack, engineering reports cavitation and procurement reports high parts cost.
Next action: Document failed parts, operating data and timeline before selecting the replacement.

STOP MEANS STOP

A red flag is not a reason to choose the closest available product. It is a reason to complete the missing engineering work or move to a different pump category.

10 PROCUREMENT HANDOFF SHEET

Attach this sheet to the request for quotation. A complete handoff reduces repeated questions and prevents quotations built on assumptions.

Mining Pump Request for Technical Review

1. PROJECT IDENTIFICATION

Facility: ____
Process area: ____
Project name: ____
Equipment tag: ____
Prepared by: ____
Company: ____
Phone: ______________________________
Email: ____
Quotation required by: ____
Equipment required by: ____

2. APPLICATION SUMMARY

What the pump must do:

Source vessel or process: ____
Destination: ____
New installation or replacement: _____________________________________
Current pump, if any: ____

3. CURRENT FAILURE OR PROJECT OBJECTIVE

Objective: [ ] Eliminate seal leakage [ ] Reduce air cost [ ] Improve solids handling [ ] Improve dosing accuracy [ ] Reduce polymer shear [ ] Improve suction lift [ ] Add dry-run capability [ ] Add self-priming [ ] Add remote control [ ] Add SCADA [ ] Reduce maintenance [ ] Reduce water use [ ] Improve containment [ ] Increase flow [ ] Increase pressure [ ] Replace obsolete equipment [ ] Other
Describe the current failure or project objective:

4. FLUID INFORMATION

Fluid or slurry: ____
Chemical concentration: ____
Normal temperature: ____
Maximum temperature: ____
Specific gravity: ____
Viscosity: ____
pH: _________________________
Hazardous, toxic or flammable properties:

5. SOLIDS INFORMATION

Percent solids by weight: ____
Percent solids by volume: ____
Typical particle size: ____
Maximum particle size: ____
Particle material: ____
Particle shape: ____
Abrasiveness: ____
Settling behavior: ____

6. HYDRAULIC DUTY

Condition	Minimum	Normal	Maximum
Flow			
Total dynamic head			
Discharge pressure			
Suction pressure or lift			
Specific gravity			
Viscosity			
Percent solids			

Operating hours per day: ____
Operating days per year: ____
Continuous or intermittent: ____
Required turndown: ____
Required dosing accuracy: ____

7. SUCTION CONDITIONS

Flooded suction or suction lift: ____
Vertical lift: ____
Suction-pipe diameter: ____
Suction-pipe length: ____
Minimum source level: ____
Can the suction line drain?: ____
Can solids settle in the suction line?: ____________________________________
Available NPSH, if known: ____

8. POWER AND CONTROLS

Available voltage: ____
Compressed air available: ____
Hazardous-location classification: _______________________________________
Required controls: [ ] Fixed speed [ ] Variable speed [ ] 4-20 mA [ ] Discrete start/stop [ ] PLC [ ] SCADA [ ] Level [ ] Pressure [ ] Batch [ ] Other
Required feedback or alarms:

9. MATERIALS UNDER CONSIDERATION

Pump body: ____
Hose or diaphragm: ____
Valve balls and seats: ____
O-rings and gaskets: ____
Barbs or fittings: ____
Piping material: ____
Materials that have already failed:

10. INSTALLATION REQUIREMENTS

Indoor, outdoor, underground or mobile: ________________________________
Ambient-temperature range: ____
Available footprint: ____
Required orientation: ____
Secondary containment: ____
Leak detection: ____
Washdown or environmental exposure: ___________________________________

11. REQUIRED DOCUMENTATION

Submittals: [ ] Performance curve   [ ] Dimensional drawing   [ ] Product data   [ ] Chemical-compatibility confirmation   [ ] Wetted-material list   [ ] Electrical drawing   [ ] Motor data   [ ] Haz-loc documentation   [ ] Installation manual   [ ] O&M manual   [ ] Spare-parts list   [ ] Warranty   [ ] Other

12. REQUIRED SPARE PARTS

Initial spares: [ ] Hose   [ ] Diaphragm kit   [ ] Valve-ball and seat kit   [ ] O-ring kit   [ ] Bushing kit   [ ] Impeller/internal assembly   [ ] Complete fluid-section kit   [ ] One-year spares   [ ] Two-year spares   [ ] Other

13. SUPPORTING INFORMATION

Available with the request: [ ] P&ID   [ ] Current pump curve   [ ] Current pump data sheet   [ ] SDS   [ ] Fluid analysis   [ ] Particle-size analysis   [ ] Installation photos   [ ] Failure photos   [ ] Maintenance history   [ ] Energy/air data   [ ] Area classification   [ ] Other

14. UNKNOWNS REQUIRING REVIEW

List every item that remains unknown:

SUBMIT THE COMPLETED HANDOFF

Send the worksheet, available process data and application photos to james@libertyces.com or sales@libertyces.com. A complete submittal should identify both the normal condition and the worst credible condition.

11 EVIDENCE, LIMITATIONS AND FINAL REVIEW

This guide separates manufacturer-stated applications from engineering inferences. That distinction should remain visible wherever the guide is excerpted, quoted or used in a specification discussion.

Evidence-status register

Product or evidence	Status	What may be stated	What should not be stated
Finish Thompson mag-drive pumps	Manufacturer-stated mining fit. Finish Thompson publishes mining-market information and mining case evidence.	State that Finish Thompson serves mining applications and that sealless mag-drive technology is used for selected corrosive chemical duties.	Do not claim every model fits every mining chemical or that every published case used DB Series.
Finish Thompson Chilean copper case	Published manufacturer case evidence involving sulfuric-acid transfer and a sealless pump.	State that the case supports sealless mag-drive technology and Finish Thompson mining experience in corrosive acid transfer.	Do not rename the installed pump as DB Series. The published case identifies ULTRAChem.
Graco SoloTech	Plausible-fit inference based on documented abrasive, caustic and sensitive-fluid capabilities.	State that SoloTech may warrant review for selected reagent, slurry, polymer and dosing applications when the duty fits.	Do not state that Graco markets SoloTech specifically for mining or invent mining service-life results.
Peristaltic mining technology generally	Broader industry evidence exists for mining use of peristaltic and hose-pump technology.	State that peristaltic technology is used in mining for selected slurry, reagent and polymer duties.	Do not transfer another manufacturer's case-study result to SoloTech.
Graco QUANTM	Plausible-fit inference based on documented EODD operating features.	State that QUANTM may warrant review for selected AODD replacement, remote transfer, dewatering, chemical and limited-solids duties.	Do not state that Graco markets QUANTM specifically for mining or present mine-specific savings without verified data.
QUANTM energy reduction	Graco states energy reduction of up to 80 percent compared with AODD under qualifying conditions.	Use "up to 80 percent" only when attributed and clearly qualified.	Do not guarantee 80 percent savings or calculate payback from assumed air consumption.
QUANTM remote and DC operation	Manufacturer-documented feature on selected configurations.	State that selected configurations support remote control and DC/inverter arrangements.	Do not claim every model operates from every voltage or is automatically suitable for solar power.
SoloTech hose-material examples	Preliminary application-screening information.	State that natural rubber, CSM, EPDM and nitrile are available hose options.	Do not state universal compatibility without exact concentration and temperature confirmation.
Finish Thompson PP and PVDF construction	Manufacturer-documented construction options on selected families.	State that PP and PVDF options are available and may fit selected corrosive reagents.	Do not approve a reagent from the polymer name alone.
None-of-these category	Engineering safeguard.	State that some duties require dedicated heavy-duty slurry or another specialized technology.	Do not force campaign products into a duty that exceeds their limits.

What this guide establishes

Which technology category should be investigated.
Which applications clearly fall outside the category.
Which technical information is still missing.
Which claims are manufacturer-stated.
Which applications are inferred from capability.
Which questions should be answered before a quotation is accepted.

What this guide does not establish

Final chemical compatibility.
Final hydraulic sizing.
Guaranteed hose or diaphragm life.

Guaranteed energy savings.
Guaranteed maintenance intervals.
Guaranteed mine-site performance.
Applicable code compliance.
Final hazardous-location approval.
Professional engineering approval.
Suitability for a specific site without complete process data.

Chemical-compatibility limitation

Compatibility tables are screening tools. The final review must include the exact chemical, concentration, temperature, specific gravity, contaminants, cleaning solution, exposure duration, static and dynamic conditions and every wetted component. Where the consequence of failure is high, written manufacturer confirmation should be retained with the project records.

Hydraulic-sizing limitation

Maximum published flow and pressure values describe a product envelope. They do not prove that one model can deliver maximum flow and maximum pressure at the same time. Final selection requires the actual performance curve and operating point, corrected for density, viscosity, solids and temperature.

Solids-handling limitation

"Handles solids" is incomplete. A proper review includes maximum and typical particle size, shape, hardness, concentration, settling, fibrous content, abrasiveness, passage geometry, startup condition and cleaning condition.

Dry-running limitation

Dry-running capability varies by technology, material, speed and duration. It should be documented for the exact model. Dry running can affect hose life, diaphragm cycles, bushings, internal temperature, containment components, residual chemical, crystallization and restart behavior.

Energy-savings limitation

AODD-to-EODD savings must be calculated from real air consumption, operating pressure, annual hours, compressed-air cost, electrical cost, maintenance history and the proposed EODD operating point. Savings estimates should show their assumptions.

Mining-use limitation

Finish Thompson provides manufacturer-stated mining evidence. SoloTech and QUANTM mining applications are inferred from documented product capabilities. This does not make the Graco products unsuitable. It means the statement must remain accurate: the product may fit the application, but the manufacturer does not currently present mining as a stated industry use for the product.

Final technical-review checklist

Review item	Review item
[ ] Complete fluid description	[ ] Chemical concentration
[ ] Normal and maximum temperature	[ ] Specific gravity
[ ] Viscosity	[ ] Percent solids
[ ] Maximum particle size	[ ] Particle hardness and shape
[ ] Minimum, normal and maximum flow	[ ] Total dynamic head
[ ] Suction condition	[ ] Available voltage
[ ] Hazardous-location classification	[ ] Required control signals
[ ] Complete wetted-material review	[ ] Manufacturer performance curve
[ ] Manufacturer chemical-compatibility confirmation	[ ] Dry-run qualification, when applicable
[ ] Minimum-flow or pressure-protection plan	[ ] Secondary-containment plan
[ ] Leak-detection plan	[ ] Recommended spare-parts list
[ ] Maintenance-access review	[ ] Operating and maintenance manual
[ ] Written record of all assumptions	[ ] Final engineering approval where required

FINAL SELECTION RULE

Select the pump from the complete duty. Not the fluid name. Not the connection size. Not the pump already installed. Not the lowest quotation. When one controlling condition remains unknown, the selection remains incomplete.

THE CORE TAKEAWAY

The pump fails later.
The selection error happens first.

A reliable selection connects six things at the same time:

Selection factor	What must be known
CHEMISTRY	The exact fluid, concentration, temperature and full wetted path.
SOLIDS	Size, shape, hardness, concentration, settling and abrasion.
HYDRAULICS	Flow, head, suction, turndown and the full operating envelope.
POWER	Compressed air, AC or DC power, efficiency and installed infrastructure.
CONTROLS	Local operation, remote I/O, PLC/SCADA and failure response.
MAINTENANCE	The actual wear component, service interval, spares and containment plan.

When a technology fits all six, move to model selection. When one remains unknown, keep gathering data.

The goal is not to find a pump that can move the fluid once. The goal is to specify a system that can operate through the real process conditions without transferring the failure somewhere else.

NEXT STEPS

Bring the complete duty into the specification conversation.

Complete the Mining Pump Application Worksheet and send the normal operating condition, worst credible condition, available process data, current pump information and failure photos. Unknown values should remain marked as unknown rather than being replaced with assumptions.

CONTACT / NEXT STEPS

LibertyCES can review the application data, identify the most appropriate technology path and help determine which details still require manufacturer confirmation.

LibertyCES (Liberty Chemical Equipment & Supply)

Phone: (559) 395-5500

Email: james@libertyces.com | sales@libertyces.com

Website: libertyces.com

LinkedIn: LibertyCES

SOURCES & EVIDENCE APPENDIX

This guide was developed from manufacturer product literature, manufacturer application evidence and industry selection resources. The sources below support the product ranges, operating features, evidence boundaries and selection principles used throughout the guide.

Source	Evidence used	Reference
Finish Thompson - Mining market page	Manufacturer-stated mining applications and applicable sealless pump families.	finishthompson.com/markets/mining/
Finish Thompson - DB Series product literature	Flooded-suction mag-drive flow, head, pressure, construction and dry-run configuration information.	finishthompson.com
Finish Thompson - SP Series product literature	Self-priming mag-drive performance, retained-prime behavior and flammable-liquid restriction.	finishthompson.com
Finish Thompson - MSDB Series product literature	Multi-stage mag-drive flow, high-head, pressure and high-specific-gravity information.	finishthompson.com
Finish Thompson - Chilean copper mining case study	Published sulfuric-acid transfer evidence using Finish Thompson sealless technology; the case identifies ULTRAChem.	finishthompson.com
Graco - SoloTech Peristaltic Pumps product page and literature	Flow, pressure, suction lift, single-roller design, hose/barb materials and stated abrasive/caustic/sensitive-fluid capabilities.	graco.com
Graco - QUANTM Electric Diaphragm Pumps product literature	Model flow and pressure ranges, materials, voltage options, controls, dry-run, self-priming, stall behavior and hazardous-location configurations.	graco.com
Graco - QUANTM ROI tools	Inputs and limitations required for AODD-to-EODD operating-cost comparisons.	graco.com/us/en/in-plant-manufacturing/support/tools/quantm-roi-advanced.html
Hydraulic Institute - solids and slurry selection guidance	Particle characteristics, concentration, density, abrasion and corrosion considerations in pump selection.	pumps.org
Metso slurry-pump selection resources	Application-data requirements and slurry selection methodology.	metso.com
Watson-Marlow / Bredel mining resources	Broader industry evidence for peristaltic and hose-pump technology in mining slurry, reagent and polymer duties.	wmfts.com/en-us/mining/

Evidence note

Manufacturer product literature controls product-specific statements. Broader industry case studies support the technology category only and should not be transferred to a different manufacturer’s product as if they were product-specific proof. Site-specific selection still requires current manufacturer review and complete application data.

Document contact

Questions about the application worksheet or the evidence boundary can be sent to james@libertyces.com or sales@libertyces.com. Phone: (559) 395-5500. Website: libertyces.com.