Sucker Rod Pump Selection Guide

Well Conditions, Pump Configuration and Engineering Verification

Selecting a sucker rod pump requires more than matching nominal diameter. The selected design must suit the well's fluid, solids and gas conditions, fit the completion and surface pumping unit, and maintain compatibility with tubing and sucker rod connections.

This guide provides a practical workflow for screening pump configurations, checking mechanical compatibility and preparing a technically complete purchase inquiry.

The Four-Step Selection Process

01 — Define Well Conditions
Fluid properties, solids, gas, temperature, well trajectory and completion geometry.

02 — Shortlist Pump Designs
Identify suitable pump families according to the dominant operating challenge.

03 — Verify Compatibility
Check dimensions, connections, stroke requirements and installation clearances.

04 — Confirm the Order
Document the final configuration and resolve outstanding technical questions before purchase.

Scope of This Guide

Use for preliminary selection and engineering verification. Confirm model-specific dimensions, connections and operating limits against the applicable technical specifications and the manufacturer's written confirmation.

REFERENCE CUTAWAY · RHAM-AC



RHAM-AC | Top Anchor Double-Clip Rod Pump

WELL CONDITIONS | PUMP CONFIGURATION | DIMENSIONAL FIT | ORDER VERIFICATION

A practical selection and verification workflow for sucker rod pump applications.

Page 2 — Well Conditions and Operating Data

Well-condition data collection

This page helps engineers organize complete well data before selecting a pump configuration. Its role is to build the data foundation for later selection, not to recommend a model directly.

1. Build the Well-Condition Profile

Complete the following profile before comparing pump configurations. Record measured values, estimates and unknowns separately.

Information required	Data to collect	Why it matters
Production objective	Target liquid production rate and expected operating range	Establishes the sizing objective and operating assumptions.
Fluid properties	Fluid composition, viscosity and operating temperature	Helps assess material compatibility and operating suitability.
Corrosive environment	H_2S, CO_2, chlorides and other known corrosive constituents	Supports the evaluation of materials, coatings and wetted components.
Solids conditions	Sand type, particle size if known, solids loading and settling tendency	Helps distinguish plunger-sticking risks from requirements for a dedicated settling passage.
Gas conditions	Gas-liquid ratio if available, free gas at the pump intake and expected pump submergence	Helps assess gas interference and the suitability of anti-gas configurations.
Well geometry	Vertical, deviated or horizontal trajectory; completion restrictions and minimum internal clearance	Affects mechanical fit, eccentric-wear risk and installation or retrieval.
Surface pumping unit	Available stroke range, operating speed and relevant unit limitations	Supports verification of the selected pump's operating range.
Installation and intervention	Tubing arrangement, retrieval method and workover constraints	Helps determine whether a tubing pump or an insert-type rod pump is appropriate.
Downhole operating envelope	Expected pressure and temperature, including relevant operating extremes	Identifies conditions requiring confirmation against manufacturer limits.

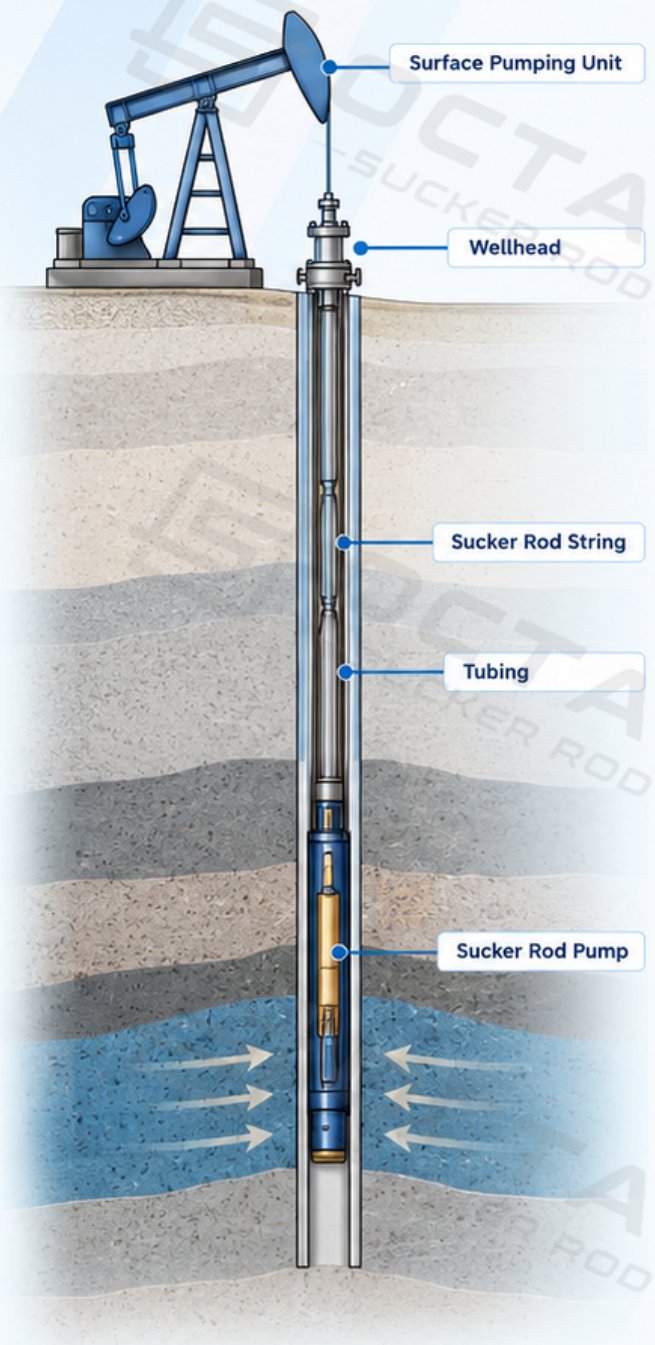
Data Quality Check

Before moving to pump selection:

- Confirm which values come from field measurements or operating records.
- Identify estimated values and the assumptions behind them.
- Flag missing information that could affect pump sizing, material selection or mechanical compatibility.
- Request clarification where the available data do not establish a reliable selection basis.

Engineering note

A nominal pump size cannot compensate for incomplete well data. Selection should account for the actual operating environment and the mechanical constraints of the completion.



Page 3 — Pump Configuration Selection Matrix

Six Pump Designs and Selection Logic

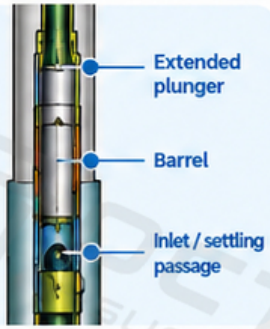
This matrix identifies pump configurations to evaluate when specific downhole operating challenges dominate. Final selection still requires verification against the actual well conditions and completion design.

2. Match the Dominant Operating Challenge

Operating challenge	Pump design to evaluate	Key selection checks
Wear and corrosion	Anti-Wear and Anti-Corrosion Tubing Pump	Fluid chemistry, material compatibility, upper and lower tubing connections, installation and retrieval arrangement.
Wear and corrosion with insert-type retrieval	Anti-Wear and Anti-Corrosion Rod Pump	Completion compatibility, retrieval path, rod and tubing connections, model-specific operating limits.
Fine sand associated with plunger sticking	Long-Plunger Anti-Sand-Sticking Pump	Solids loading, extended-plunger arrangement, barrel configuration, stroke range, maximum OD and clearance code.
Sand accumulation requiring a dedicated settling passage	Long-Plunger Sand-Settling Pump	Lateral or bottom inlet, completion flow path, settling arrangement and lower-end clearance.
Gas interference	Hollow Anti-Gas Sucker Rod Pump	Gas conditions, hollow coupling and internal flow arrangement, pump dimensions and operating conditions.
Gas interference requiring evaluation of a mechanical valve design	Anti-Gas Pump with Forced Mechanical Valve	Mechanical valve configuration, multi-section sealing arrangement, dimensional compatibility and operating conditions.

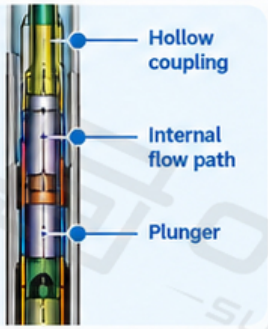
3. Selection Rules

1 Sand-related problems



Distinguish between sand accumulation around the plunger and the need for a dedicated settling passage. These are different design considerations and should not be treated as interchangeable requirements.

2 Gas-related problems



Compare the hollow anti-gas and forced mechanical valve designs against the actual gas conditions, pump arrangement and completion constraints. A product name alone does not establish suitability.

3 Installation and retrieval



Tubing-installed pump



Insert-type rod pump

Confirm whether the completion supports the intended installation and retrieval method before selecting between tubing-installed and insert-type arrangements.

When Several Problems Occur Together

Rank the operating challenges by their expected effect on pump performance, reliability and maintenance. Evaluate secondary requirements before finalizing the configuration.

Page 4 — Dimensional Fit and Engineering Verification

DIMENSIONS · CONNECTIONS · OPERATING CONDITIONS

Once a pump family has been shortlisted, verify the selected model against the completion drawing, surface-unit requirements and model-specific technical data.

Verification item	Required check	Common selection error
Nominal diameter	Confirm the exact selected model and its intended sizing basis.	Assuming nominal diameter alone establishes compatibility.
Maximum outside diameter	Check clearance through the completion and all relevant restrictions.	Checking the nominal pump size but overlooking the maximum OD.
Upper and lower connections	Confirm each connection independently, including thread size and NU/EU designation where applicable.	Assuming both ends use the same thread.
Sucker rod thread and coupling	Match the specified rod thread to its mating coupling.	Inferring the rod thread size from the tubing connection.
Plunger and barrel lengths	Verify the dimensions and arrangement of the exact pump design.	Transferring dimensions from another pump family.
Stroke requirements	Check the selected model's specified stroke range against the surface-unit geometry and operating requirements.	Selecting a pump without verifying the available stroke.
Inlet configuration	Confirm that a lateral or bottom inlet, where applicable, matches the completion flow path.	Selecting an inlet arrangement that does not match the intended intake path.
Clearance code	Confirm the clearance option listed for the selected model and its suitability for the operating conditions.	Assuming clearance options are identical across pump designs.
Materials and coatings	Verify compatibility with the actual fluid chemistry, solids and operating environment.	Choosing materials or coatings without sufficient service-condition data.
Pump constant	Use the value for the exact pump type and nominal diameter, with its sizing basis confirmed.	Treating a pump constant as a guaranteed field production rate.

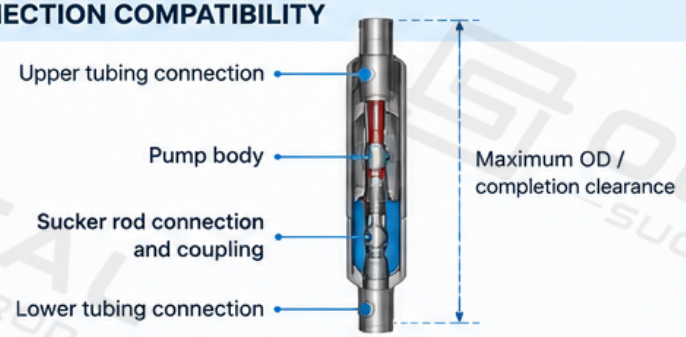
COMPPATIBILITY RULE

Every interface must be checked independently. A matching nominal diameter does not guarantee that the maximum OD, tubing connections, sucker rod connection, stroke range or internal configuration will be compatible.

BEFORE FINALIZING THE MODEL

- The selected model's current technical data sheet.
- A dimensioned drawing showing the actual connection arrangement.
- The required maximum OD and installation clearance.
- The applicable stroke, barrel and plunger dimensions.
- The selected material, coating and clearance options, where applicable.

CONNECTION COMPATIBILITY



Verify each interface against the model drawing.

Page 5 — RFQ and Pre-Order Confirmation Sheet

PURCHASING WORKSHEET · TECHNICAL RELEASE

Use this worksheet to consolidate the well data, requested pump configuration and outstanding technical confirmations before issuing a purchase order.

A. WELL AND OPERATING DATA

Item	Project information
Project / Well ID	
Well trajectory	
Target liquid production rate and sizing basis	
Fluid properties and operating temperature	
Known corrosive constituents	
Sand / solids conditions	
Gas conditions and expected pump submergence	
Pump setting depth	
Completion type and minimum internal clearance	
Surface-unit stroke and operating speed range	

B. REQUESTED PUMP CONFIGURATION

Item	Confirmation
Selected pump family and model designation	
Nominal diameter	
Maximum outside diameter	
Upper connection / thread designation	
Lower connection / thread designation	
Sucker rod thread and mating coupling	
Plunger and barrel length	
Applicable stroke range	
Inlet configuration, where applicable	
Clearance code, where applicable	
Required material, coating and valve options	
Applicable product standard and edition	

C. DOCUMENTS TO REQUEST

Request documents relevant to the selected model and project contract.

- Model-specific technical data sheet.
- Dimensioned assembly drawing and cross-sectional drawing.
- Confirmation of upper and lower connection details.
- Material, coating, heat-treatment or inspection records, where specified.
- Applicable testing and traceability documentation.
- Installation, retrieval and recommended spare-parts information, where required.

D. FINAL TECHNICAL RELEASE

Before releasing the purchase order, confirm that:

- ○ The pump model and nominal diameter match the approved selection.
- ○ Maximum OD and completion clearance have been checked.
- ○ Upper and lower connections have been verified independently.
- ○ The sucker rod thread and mating coupling are compatible.
- ○ Stroke, barrel and plunger dimensions match the selected model.
- ○ Inlet arrangement, clearance and material options are confirmed where applicable.
- ○ The manufacturer has resolved all outstanding technical questions in writing.

FINAL NOTE

The approved order configuration should identify the exact pump model, dimensions, connections and required options. Any deviation from the agreed technical specification should be reviewed and resolved before purchase-order release.

WELL CONDITIONS | PUMP CONFIGURATION | DIMENSIONAL FIT | ORDER VERIFICATION