

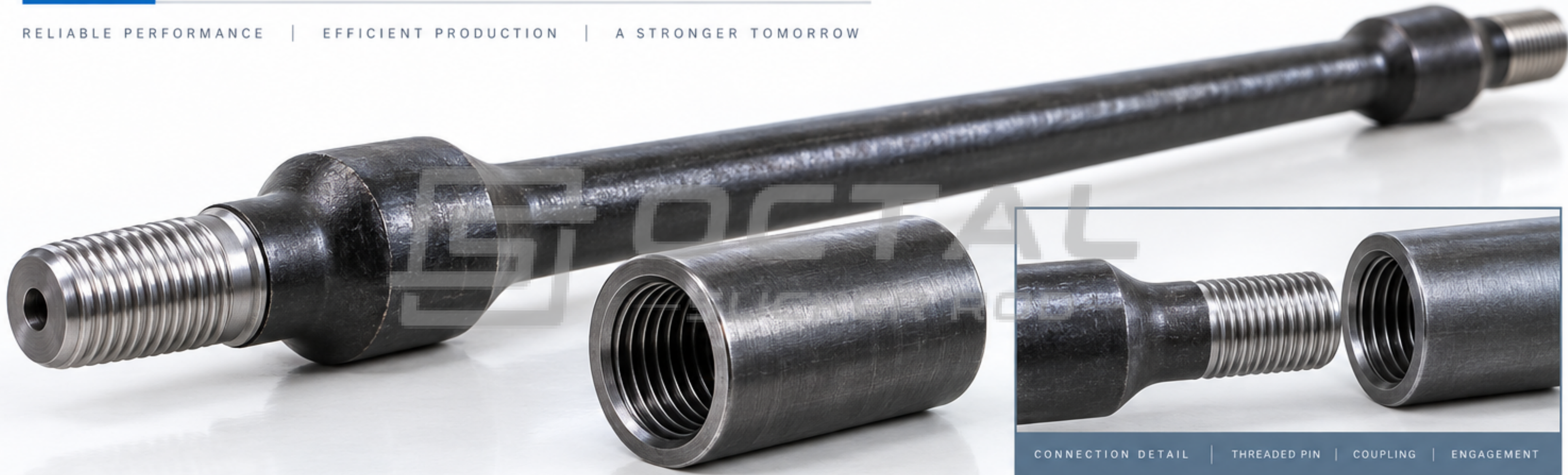
# Grade KD Sucker Rod

## Selection and Engineering Guide

ENGINEERED  
FOR DEMANDING  
WELL CONDITIONS

Sucker Rods.  
Stronger Wells.  
Greater Value.

RELIABLE PERFORMANCE | EFFICIENT PRODUCTION | A STRONGER TOMORROW



### API 11B

Manufactured according to API 11B requirements



### Mechanical Performance

Strength, toughness and fatigue resistance



### Grade Selection

Comparison of Grade C, D, K and KD



### Application Consideration

Selection based on load and well conditions

PROVEN MATERIALS

ENGINEERED SOLUTIONS

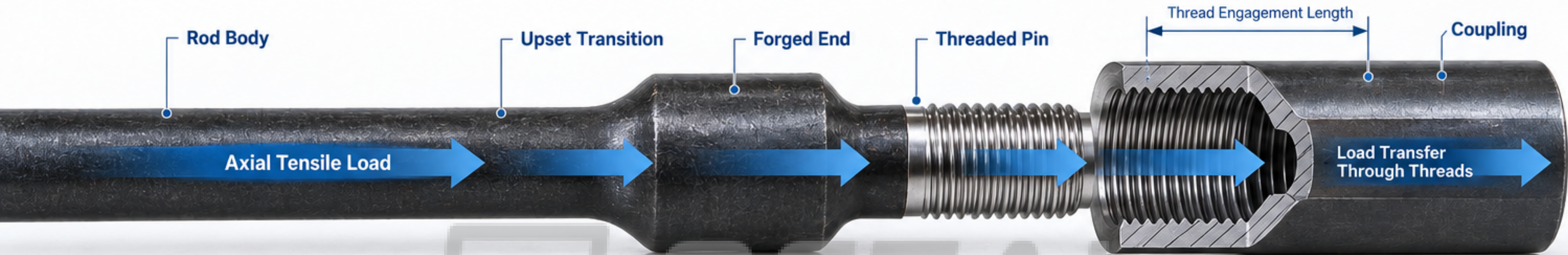
PRODUCTIVE WELLS

# Structure, Dimensions and Load Transfer of Grade KD Sucker Rod

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FOR DEMANDING  
WELL CONDITIONS

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The connection area experiences repeated tensile stress, makeup torque and fatigue loading during rod pumping operation.

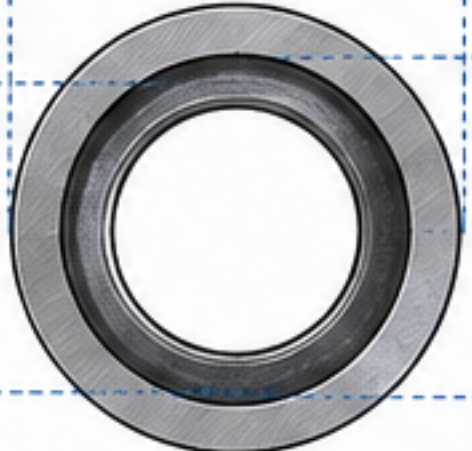
| Typical API 11B Size Range |                   |
|----------------------------|-------------------|
| Nominal Size               | Rod Body Diameter |
| 5/8 in                     | 15.88 mm          |
| 3/4 in                     | 19.05 mm          |
| 7/8 in                     | 22.23 mm          |
| 1 in                       | 25.40 mm          |
| 1-1/8 in                   | 28.58 mm          |

## 7/8 in Example

Rod Body OD: 22.23 mm

Nominal rod size refers to rod body diameter, not connection envelope.

| Structural Function |                                                     |
|---------------------|-----------------------------------------------------|
| Section             | Engineering Function                                |
| Rod Body            | Main tensile load carrying section                  |
| Upset Section       | Provides additional material around connection area |
| Forged End          | Supports thread machining and connection strength   |
| Threaded Pin        | Transfers axial load between rods                   |
| Coupling            | Maintains continuous rod string connection          |

| Rod Body vs. Connection Envelope                                                                                                                                |                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><p>Rod Body Diameter</p><p>22.23 mm</p><p>Rod Body (7/8 in)</p></div> | <div><p>Connection Envelope (Larger than rod body)</p><p>Coupling Connection (Section View)</p><p>Connection strength requires additional material thickness.</p></div> |

## Engineering Considerations



Dimensional  
accuracy



Thread  
integrity



Connection  
strength



Tubing  
clearance



Fatigue  
resistance

# Grade KD vs Grade C, Grade D, and Grade K Sucker Rod

MATERIAL PROPERTIES. SERVICE CONDITIONS. ENGINEERING SELECTION.

MATCHING SUCKER ROD GRADES TO THE DEMANDS OF YOUR WELL FOR LONG-TERM PERFORMANCE



**Grade C**  
General Service



**Grade D**  
Higher Mechanical Loading

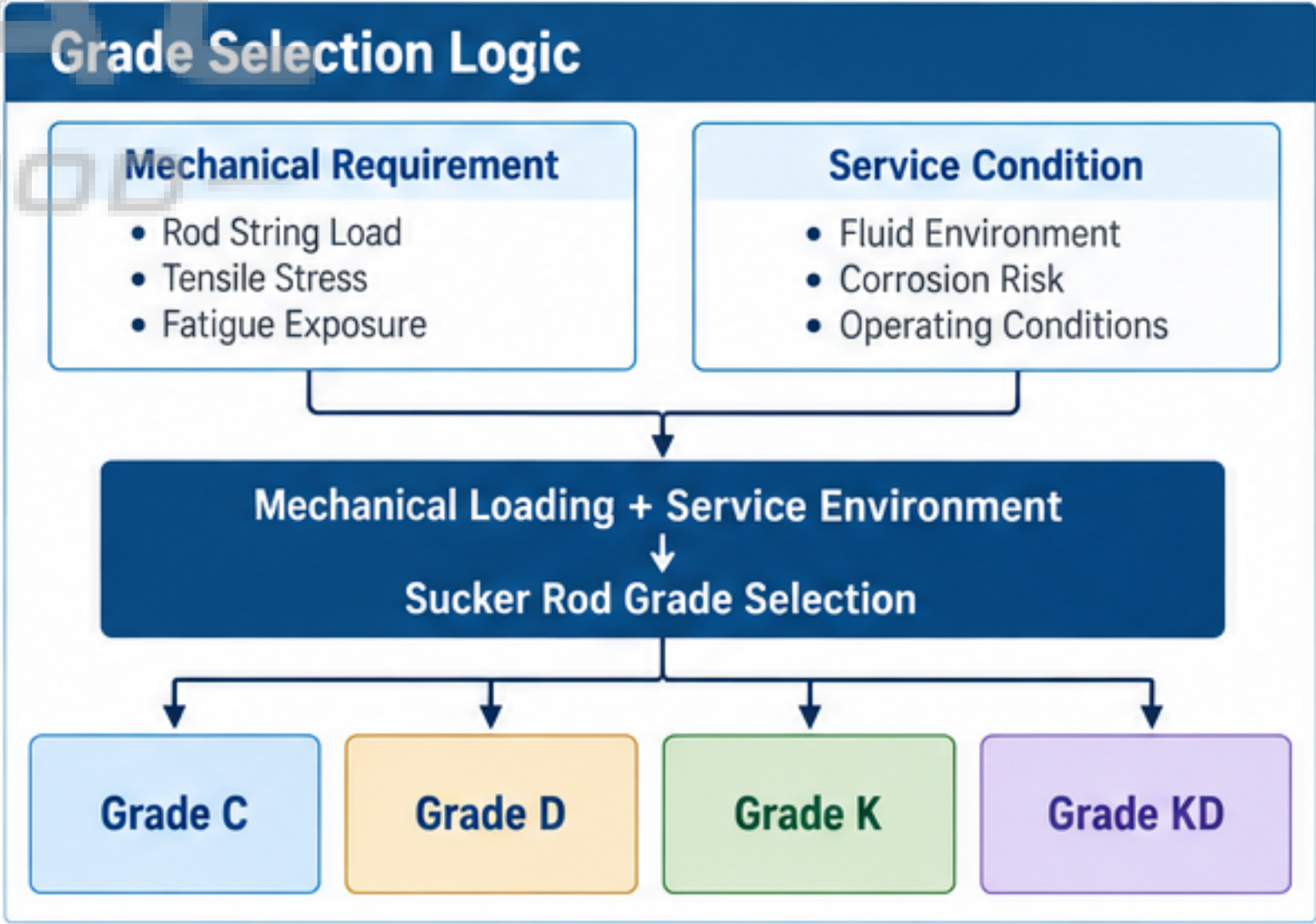


**Grade K**  
Material Selection for  
Corrosion-Related Conditions



**Grade KD**  
Strength + Service  
Reliability Balance

| API 11B Sucker Rod Grade Comparison |                                |                                                               |                                           |                                                                            |
|-------------------------------------|--------------------------------|---------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------|
| Grade                               | Yield Strength                 | Tensile Strength                                              | Main Characteristics                      | Typical Selection                                                          |
| Grade C                             | 60,000 psi<br>414 MPa          | 90,000 – 115,000 psi<br>621 – 793 MPa                         | Standard strength level                   | General rod pumping conditions                                             |
| Grade D                             | 85,000 psi<br>586 MPa          | 115,000 – 140,000 psi<br>793 – 965 MPa                        | Higher mechanical strength                | Higher tensile loading applications                                        |
| Grade K                             | 60,000 psi<br>414 MPa          | 90,000 – 115,000 psi<br>621 – 793 MPa                         | Alloy material selection                  | Corrosion-related service conditions                                       |
| Grade KD                            | D-level mechanical performance | KD-level tensile performance with KD material characteristics | Combined strength and service reliability | Applications requiring both mechanical performance and service reliability |



### Engineering Consideration

**1. Yield Strength**

Resist permanent deformation under load.

**2. Tensile Capacity**

Withstand maximum applied tensile loads.

**3. Fatigue Performance**

Sustain cyclic loading throughout service life.

**4. Material Selection**

Match material to well fluids and corrosion risk.

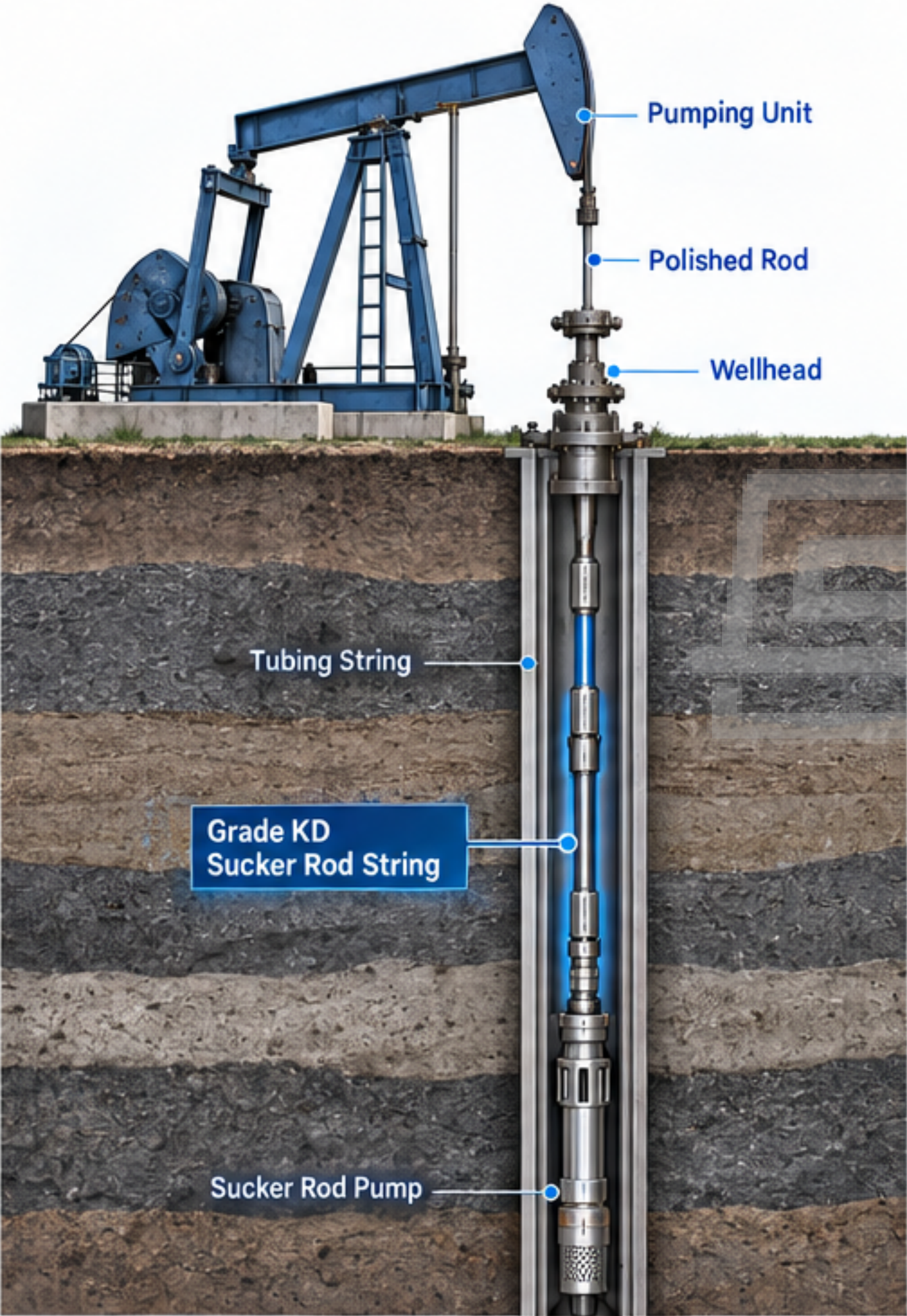
**5. Operating Environment**

Consider well conditions, temperature, chemistry, and other operating factors.

# Application and Selection Considerations of Grade KD Sucker Rod

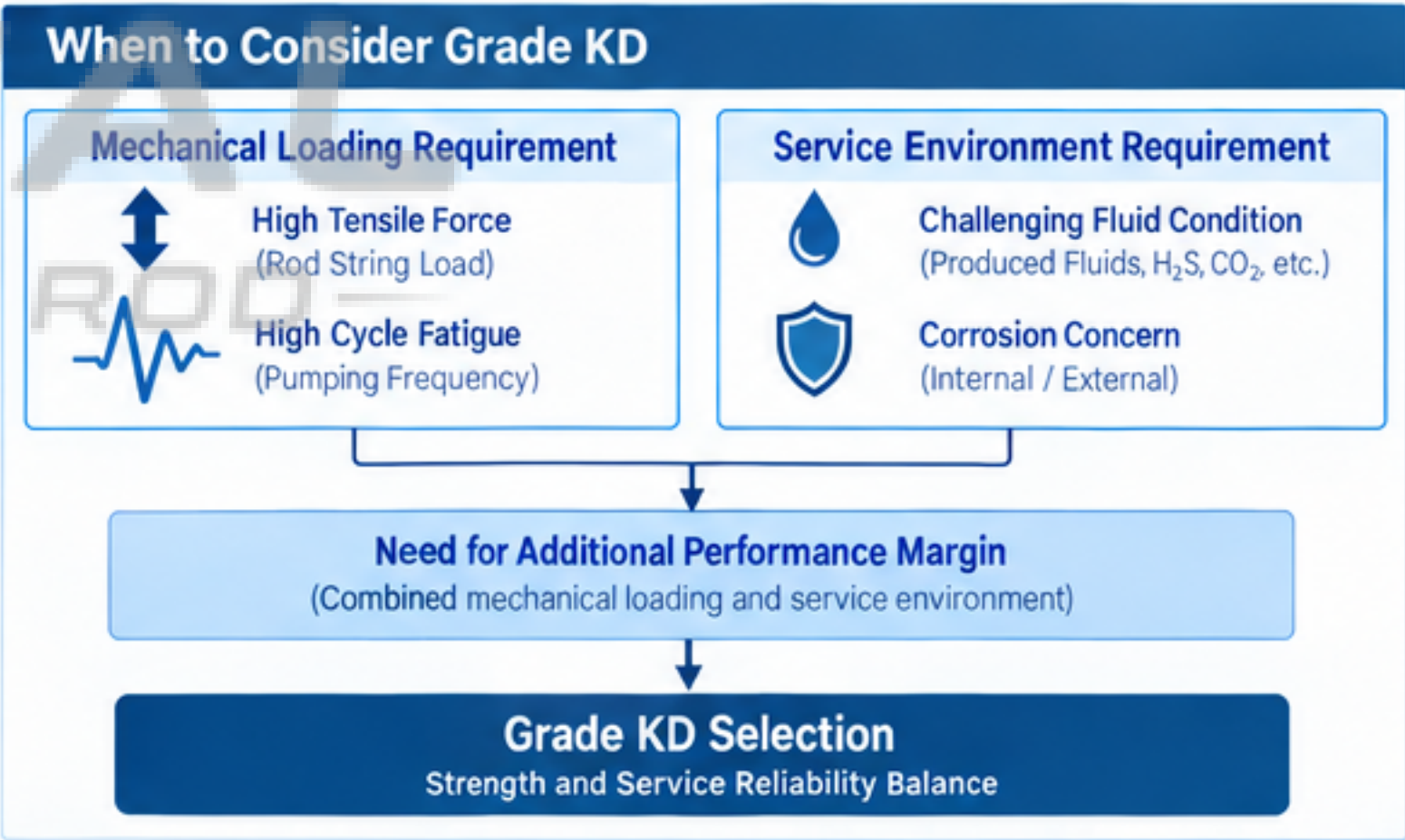
OPERATING CONDITIONS. ENGINEERING EVALUATION. PRACTICAL SELECTION.

MATCHING ROD GRADE  
TO REAL-WORLD CONDITIONS  
FOR SAFE, EFFICIENT AND  
RELIABLE OPERATION.



### Key Factors Affecting Grade Selection

| Factor            | Engineering Influence                                   |
|-------------------|---------------------------------------------------------|
| Rod String Load   | Determines required tensile strength and load capacity. |
| Pumping Frequency | Influences fatigue exposure during repeated cycles.     |
| Well Depth        | Increases rod-string weight and tensile stress.         |
| Well Deviation    | Increases bending and tubing contact risk.              |
| Fluid Environment | Influences material selection considerations.           |
| Tubing Clearance  | Determines rod and coupling configuration.              |



### Engineering Note

- Grade D may be suitable when mechanical loading is the dominant concern.
- Grade KD should be considered when both cyclic loading and service environment require additional performance evaluation.

### Selection Should Consider

**Rod String Design**  
Rod size, rod grade, and string configuration

**Load Calculation**  
Tensile, compressive and dynamic loads

**Well Depth**  
Total vertical depth and measured depth

**Deviation**  
Wellbore trajectory and dogleg severity

**Fluid Condition**  
Produced fluid properties and corrosion risk

**Connection Compatibility**  
Thread type, coupling design and make-up requirements

# Procurement Checklist and Technical Support for Grade KD Sucker Rod

Purchasing Requirements, Documentation, and Supply Capability



## Procurement Checklist

### 1 Product Specification



- |                                           |                                  |
|-------------------------------------------|----------------------------------|
| <input type="checkbox"/> Grade            | e.g. Grade KD (API 11B)          |
| <input type="checkbox"/> Nominal Diameter | e.g. 5/8", 3/4", 7/8", 1"        |
| <input type="checkbox"/> Length           | e.g. 25 ft, 30 ft, custom length |
| <input type="checkbox"/> Rod Type         | Sucker rod / Pony rod            |
| <input type="checkbox"/> Coupling Type    | Standard / Special               |

### 2 Connection Information



- |                                                   |                                  |
|---------------------------------------------------|----------------------------------|
| <input type="checkbox"/> Thread Configuration     | e.g. API, special thread         |
| <input type="checkbox"/> Coupling Design          | e.g. full size, slim hole        |
| <input type="checkbox"/> Connection Compatibility | Confirm with existing rod string |

### 3 Service Requirement



- |                                                |                                                                  |
|------------------------------------------------|------------------------------------------------------------------|
| <input type="checkbox"/> Well Depth            | e.g. XX ft / XX m                                                |
| <input type="checkbox"/> Rod String Load       | Maximum design load (lbf or kN)                                  |
| <input type="checkbox"/> Operating Environment | Temperature, corrosion (H <sub>2</sub> S/CO <sub>2</sub> ), etc. |
| <input type="checkbox"/> Tubing Clearance      | Confirm minimum ID                                               |

### 4 Quality Requirement



- |                                                   |                                              |
|---------------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> Inspection Requirement   | Visual, dimensional, NDT (as required)       |
| <input type="checkbox"/> Test Documentation       | Material, mechanical, chemical analysis      |
| <input type="checkbox"/> Traceability Requirement | Heat number, batch number, full traceability |

## Octal Supply and Technical Support



### Product Supply

- Grade KD Sucker Rod
- Coupling
- Pony Rod
- Related Rod String Components



### Technical Support

- Grade selection assistance
- Size and connection confirmation
- Application condition review
- Production specification confirmation

#### Support Output

- ✓ Technical recommendation
- ✓ Rod string configuration check
- ✓ Compatibility verification
- ✓ Response to field application questions



### Documentation Package

Material Certificate

Chemical Composition Record

Mechanical Test Report

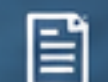
Dimensional Inspection Record

Traceability Documentation

## Supply Process



Customer Requirement



Technical Review



Production



Inspection



Documentation



Delivery

Specification, quantity, service conditions

Feasibility assessment, confirmation of details

Material preparation, machining, heat treatment

Dimensional, mechanical, visual inspection

Complete records and certificates

On-time shipment global supply

## Reliable Supply Requires Complete Specification Control

1



### Correct Grade Selection

Match grade to well conditions and design requirements

2



### Accurate Dimensions

Ensure proper length, diameter and tolerances

3



### Reliable Connection Design

Confirm thread configuration and compatibility

4



### Complete Inspection Records

Material, mechanical, dimensional and NDT records

5



### Full Product Traceability

Heat number, batch number and supply chain traceability