

API Specification

# 7K

Fifth Edition, June 2010  
Drilling and Well Servicing Equipment

## 7.9.3 Forgings and Castings

All repair welding shall be performed in accordance with the manufacturer's written welding specifications. WPSs shall be documented and shall be supplied at the purchaser's request. The manufacturer shall document the following criteria for permitted repairs:

- defect type;
- defect size limits;
- definition of major/minor repairs.

All excavations, prior to repair, and the subsequent weld repair shall meet the quality control requirements specified in Section 8.

## 9.2.6 Drive Sprocket

The distance,  $L$ , between the center of the rotary table and the center of the first row of sprocket teeth (see Figure 7) shall be 1353 mm (53 1/4 in.) for machines that will pass a 510 mm (20 in.) bit or larger, and shall be 1118 mm (44 in.) for machines that will not pass a 510 mm (20 in.) bit, except that, by agreement between the manufacturer and purchaser, the distance of 1353 mm (53 1/4 in.) may be used on machines that will not pass a 510 mm (20 in.) bit. The distance,  $L$ , shall be either 1353 mm or 1651 mm (53 1/4 in. or 65 in.) for the 1257 mm (49 1/2 in.) nominal rotary table. The distance,  $L$ , shall be 1840 mm (72 in.) for the 60 1/2 in. nominal rotary table. These distances may be stamped on the nameplate (if used) attached to the rotary table.

### 9.6.2.2 Design Conditions

Exceptions to the requirements specified in 4.1 are provided in the following.

- a) The minimum operating temperature of hose assemblies covered by this specification is  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ).
- b) With regard to the cautionary note in 4.1, operation of the hose assemblies covered by this specification at temperatures below the minimum specified is not recommended under any circumstances. In the event that the requirements of the purchase agreement dictate lower minimum operating temperatures than those specified above, the hose assembly shall be qualified by conducting a low-temperature bending test at the temperature specified in the purchase agreement in addition to those other tests that are required to establish the temperature range and FSL level specified in 9.6.3. In addition, when supplementary requirements SR2 and SR2A are specified in the purchase agreement, they shall only apply to the hose coupling.

## 9.6.3 Temperature Range and Flexible Specification Level (FSL)

---

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

If known at the time of the purchase agreement, the purchaser shall specify the characteristics of the drilling liquids intended to be conveyed in the high-pressure mud hose assembly.

## 9.6.3.2 Flexible Specification Levels (FSLs)

This specification establishes requirements for three FSLs for the hoses covered by this specification. The FSL designations specified below define different levels of design verification requirements specified in 9.6.10.

- a) FSL 0: This shall be specified by the purchaser in the purchase agreement for cement hoses only. This includes all design verification requirements of 9.6.10, excluding the pulsating pressure tests in 9.6.10.4 and 9.6.10.5.
- b) FSL 1: This shall be specified by the purchaser in the purchase agreement for rotary, vibrator, and jumper hoses for normal service conditions only. This includes all design verification requirements of 9.6.10, excluding the high-frequency pulsating pressure test in 9.6.10.5.
- c) FSL 2: This shall be specified by the purchaser in the purchase agreement for rotary, vibrator, and jumper hoses that are likely to incur high frequency pressure pulsations with an amplitude exceeding 6.9 MPa (1000 psi) during operation. This includes all design verification requirements of 9.6.10, excluding the low frequency pulsation test specified in 9.6.10.4.

## 9.6.4 Sizes and Lengths

All hose assemblies shall comply with the sizes specified in Table 9. The length of each hose assembly shall comply with the dimension specified in the purchase agreement within the tolerances specified in 9.6.5. For rotary hose applications, the purchaser should refer to the hose length calculation specified in API 7L, Section A.1.1, to determine the optimum length of a rotary hose for any given application to avoid over-bending, high axial load or compression during operation. For vibrator and jumper hose applications, the purchaser shall take into account the change in length of the hose when it is pressurized as specified in 9.6.5 when specifying the overall length of the hose assemblies in the purchase agreement.

### 9.6.6.2 End Connectors

High-pressure mud and cement hose assemblies shall be furnished with end connectors as specified in the purchase agreement. Although the design and manufacture of end connectors are not covered by this specification, the hose assembly manufacturer shall select end connectors that are fit for purpose for the hose assembly they are attached to. End connectors that are attached to the hose couplings with line pipe threads in accordance with API 5B shall not be used in hose assemblies with working pressures exceeding 34.5 MPa (5000 psi). For hose assemblies with working pressures exceeding 34.5 MPa (5000 psi), the end connector

---

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

shall either be butt-welded onto the hose coupling, or it may be machined from the same piece of material that the hose coupling is made of (integral).

**9.6.9.2** Additional information may be marked on the hose assemblies at the discretion of the manufacturer or on request of the purchaser.

## **9.7.5.1 Sizes and Dimensions**

Mud-pump valve pots shall be furnished in the sizes and dimensions given in Table 14 and Figure 21, or as specified on the purchase order. API valve pots for caged valves shall provide a minimum G dimension. See Table 14 for cage clearance.

### **9.7.7.1 Liner Bores**

Bores of mud-pump liners 152.4 mm (6 in.) in diameter and larger shall be supplied in 6.35 mm (1/4 in.) increments. Bores smaller than 152.4 mm (6 in.) in diameter shall be supplied in 12.7 mm (1/2 in.) increments. Bore tolerances shall be as noted in Figure 22 or as specified on the purchase order.

### **9.8.3 Line-shaft Extension for Cathead**

Line-shaft extensions for catheads shall be furnished as specified on the purchase order unless the drawworks is furnished with integral catheads.

**9.16.1.5** Production proof load testing required in 8.6, and as further specified in 9.16.6, shall be required unless it is waived by the purchaser in the purchase agreement.

## **9.16.2 Requirements for Purchaser-defined Information and Specifications in Purchase Agreements for BOP Handling Systems**

### **9.16.2.1 General**

The requirements in 9.16.2.2 and 9.16.2.3 shall be specified by the purchaser in purchase agreements issued for BOP handling systems covered by this standard.

### **9.16.2.2 Control System Features**

---

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

The purchaser shall specify control system features, such as load monitoring and logging (specify USC or SI units), audio/visual alarms, operational displays and ergonomics, any fail-safe shut-downs or other safety features not specified in this standard, and control system functionality such as defaults, interlocks, and detents, redundancy features, manual overrides, trouble-shooting devices, and back-up power supplies and software, etc. Control systems shall be designed so as to prevent unexpected movement of the system when power is interrupted, and when restored after interruption, of power (e.g. electrical, pneumatic, and hydraulic). The controls shall be designed to prevent unexpected movement regardless of whether one source, or multiple sources, of power are interrupted and subsequently restored.

## 9.16.2.3 Ambient Conditions

The purchaser shall specify the environment in which the system is anticipated to operate in terms of maximum and minimum temperatures and humidity levels, the corrosiveness of the atmosphere such as whether the system will be used offshore or onshore, and any other ambient conditions that could affect the design or manufacture of the system that would be reasonably anticipated.

## 9.16.2.4 Other Systems Interface Requirements

**9.16.2.4.1** The purchaser shall identify the other systems that the BOP handling system will interface with physically as well as functionally. This type of interface may include but not be limited to rig system control and monitoring systems (including software compatibility), BOP stack storage structure(s), moonpool guidance systems, and/or structural interface required to distribute and support the primary load of the handling system. The latter requirement should include a transmittal of relevant rig structural drawings to the manufacturer needed to design appropriate system structure to interface with the rig structure.

**9.16.2.4.2** When it is intended that the system is to receive power supplies from the rig after it is installed, the purchaser shall specify the sources of electrical, hydraulic, and/or pneumatic power that is to be made available to supply power to the system.

**9.16.2.4.3** The purchaser shall specify the applicable codes, standards, and regulatory requirements that shall apply to electrical equipment, components, fittings, and cabling and their installation, including applicable requirements for hazardous area or zone classifications in which the BOP handling system is to be installed.

**9.16.2.4.4** The purchaser, at his/her option, shall specify the type of third party certification required for the system.

**9.16.2.4.5** The purchaser shall specify whether a production proof-load test in accordance with 8.6 and 9.16.6 shall be performed by the manufacturer prior to delivery.

---

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

## 9.16.2.5 Loading Conditions

**9.16.2.5.1** The purchaser shall specify the anticipated maximum static load that will be handled by the system, which shall include the entire BOP stack and all of its attachments, including but not limited to bell nipple assembly, work platforms, conductor tensioner system components, drilling spools, high-pressure risers, wellhead spools, choke and kill valves and piping, etc.

**9.16.2.5.2** The purchaser shall specify the dynamic factors that the system will be exposed to, including, but not limited to maximum wind velocity, accelerations caused during transportation if the system is portable, accelerations caused by offshore vessel motion criteria, side loading and/or operation requirements at angles misaligned with the normal load path, and/or other dynamic forces that would be anticipated during system operation.

## 11.3 Documentation to be Delivered with the Equipment

The following documentation shall be delivered with the equipment.

- a) The manufacturer's statement of compliance attesting to full compliance with the requirements of this specification and any other requirements stipulated by the purchase order. The statement shall identify any noted deviations from the specified requirements.
- b) Proof load test record (as applicable).
- c) Operations/maintenance manuals, which shall include but not be limited to:
  - assembly drawings,
  - list of components,
  - nominal capacities and ratings,
  - operating procedures,
  - wear limits,
  - recommended frequency of field inspection and preventive maintenance, methods and acceptance criteria,
  - itemized spare parts (not applicable to single component equipment) and recommended stock levels.

A comprehensive data book can be specified by the purchaser by calling out supplementary requirement SR3 (see Annex A) in the purchase order.

---

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

## **Annex A** (normative)

### **Supplementary Requirements**

#### **A.1 Introduction**

If specified in the purchase order, one or more of the following supplementary requirements shall apply.

#### **A.2 SR1—Proof Load Testing**

The equipment shall be proof load-tested and subsequently examined in accordance with the requirements of 8.6.

The equipment shall be marked “SR1” by means of low-stress hard-die stamping near the load rating identification.

Marking “SR1” is not required on equipment for which proof load testing is normally required under Clause 8 or Clause 9.

#### **A.3 SR2—Low-temperature Testing**

The maximum impact-test temperature, for materials used in primary load-carrying components of covered equipment with a required minimum operating temperature below that specified in 4.1, shall be specified by the purchaser.

Impact testing shall be performed in accordance with the requirements of 6.3.1 and ISO 148 (V-notch Charpy) or ASTM A370 (V-notch Charpy). Except for manual tong hinge pins of wrought material, the minimum average Charpy impact energy of three full-size test pieces tested at the specified (or lower) temperature shall be 27 J (20 ft-lb), with no individual value less than 20 J (15 ft-lb). For manual tong hinge pins of wrought material, the minimum average impact energy of three full-size Charpy impact test pieces, tested at the specified (or lower) temperature, shall be 15 J (11 ft-lb) with no individual value less than 12 J (8.5 ft-lb).

Each primary load-bearing component shall be marked “SR2” to indicate that low-temperature testing has been performed. Each primary load-bearing component shall also be marked to indicate the actual design and test temperature in degrees Celsius.

---

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

## **A.4 SR2A—Additional Low-temperature Testing**

Impact testing shall also be applicable to materials used in the primary load-carrying components of equipment normally exempted from impact testing. The components to which impact testing shall apply shall be determined by mutual agreement of the purchaser and the manufacturer.

Impact testing shall be performed in accordance with the requirements of 6.3.1 and ISO 148 or ASTM A370. The maximum impact test temperature and the minimum average and individual values shall be as agreed upon by the purchaser and the manufacturer.

Each covered primary load-carrying component shall be marked “SR2A” to indicate that additional low-temperature testing has been performed. The component shall also be marked with the temperature in degrees Celsius to indicate the actual design and test temperature.

## **A.5 SR3—Data Book**

When requested by the purchaser, records shall be prepared, gathered, and properly collated in a data book by the manufacturer. The data book shall include for each unit at least the following information:

- a) statement of compliance;
- b) equipment designation/serial number;
- c) assembly and critical area drawings;
- d) wear limits and nominal capacities and ratings;
- e) list of components;
- f) traceability codes and systems (marking on parts/records on file);
- g) steel grades;
- h) heat-treatment records;
- i) material test reports;
- j) NDE records;
- k) performance test records, including functional hydrostatic and load test certificates (when applicable);
- l) certificates for supplementary requirements, as required;
- m) welding procedure specifications (WPSs) and qualification records.

API Specification

# 7K

Fifth Edition, June 2010

Drilling and Well Servicing Equipment

---

## **A.6 SR4—Additional Volumetric Examination of Castings**

The requirements for SR4 shall be identical to the requirements for 8.4.8, except that all critical areas of each primary load-carrying casting shall be examined.

## **A.7 SR5—Volumetric Examination of Wrought Material**

The entire volume of primary load-carrying wrought components shall be examined by the ultrasonic method. When examination of the entire volume is impossible due to geometric factors, such as radii at section changes, the maximum practical volume shall suffice.

Ultrasonic examination shall be in accordance with ASTM A388 (the immersion method may be used) and ASTM E428. Straight-beam calibration shall be performed using a distance vs. amplitude curve based on a flat-bottomed hole with a diameter of 3.2 mm (1/8 in.) or smaller.

Wrought components examined by the ultrasonic method shall meet the following acceptance criteria.

- a) For both straight and angle beam examination, any discontinuity resulting in an indication which exceeds the calibration reference line is not allowed. Any indication interpreted as a crack or thermal rupture is also not allowed.
- b) Multiple indications (i.e. two or more indications), each exceeding 50 % of the reference distance vs. amplitude curve and located within 13 mm (1/2 in.) of one another, are not allowed.