Specification for Subsurface Sucker Rod Pump Assemblies, Components, and Fittings

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Introduction

This specification has been developed by users, purchasers, suppliers and manufacturers of subsurface sucker rod pumps intended for use in the petroleum and natural gas industry worldwide. This specification is intended to give requirements and information to all parties in the design, manufacture and selection of subsurface sucker rod pumps and their components. Furthermore, this specification addresses the minimum requirements with which the manufacturer is to claim conformity with this specification.

Included within this specification are normative annexes specifying requirements and informative annexes providing general information.

Attention is brought to users of this specification that requirements above those outlined in this specification can be required for individual applications. This specification is not intended to inhibit a manufacturer from offering, or the user or purchaser from accepting alternative equipment or other engineering solutions. This can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, it is the responsibility of the manufacturer to identify any variations from this specification.

In this specification, quantities expressed in United States Customary (USC) units are also, where practical, expressed in International System (SI) units, either in parentheses in the text or on separate data sheets. USC units shall be the controlling units, SI units are included as a convenience for the user of this specification.

Specification for Subsurface Sucker Rod Pump Assemblies, Components, and Fittings

1 Scope

This specification provides the requirements and guidelines for the design of subsurface sucker rod pumps and their components as defined herein for use in the sucker rod lift method for the petroleum and natural gas industry.

The specification covers subsurface sucker rod pump assemblies (including insert and tubing), components and fittings, in commonly used bore sizes for the sucker rod lift method. Sufficient dimensional and material requirements are provided to assure interchangeability and standardization of all component parts.

Many components and fittings are prescriptively specified in this standard and thus do not require a design package. However, some components require design packages. These components are listed in the following tables: C.10 through C.18, C.22, C.23, C.28, C.30, C.32, C.33, C.37, C.38, C.39, C.40, C.41, C.44, C.49, C.53, C.54, C.55, C.59.

The specification does not cover specialty subsurface sucker rod pump accessories or special design components. Also, installation, operation, and maintenance of these products are not included in this specification, however recommendations can be found in API 11AR.

The formulation and publication of API specifications and the API monogram program are not intended in any way to inhibit the purchase of products from companies not licensed to use the API monogram.

2 Normative References

The following referenced documents are indispensable for the application of this document for manufacture of products. The following referenced documents shall be informative for products that are not manufactured. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Specification 5B, *Specification for Threading, Gauging and Thread Inspection of Casing, Tubing, and Line Pipe Threads*

API Recommended Practice 11AR, *Recommended Practice for Care Use of Subsurface Pumps*

API Specification 11B, *Specification for Sucker Rods, Polished Rods and Liners, Couplings, Sinker Bars, Polished Rod Clamps, Stuffing Boxes, and Pumping Tees*

API Specification Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

ANSI/ASQ Z1 [1], *Sampling Procedures and Tables for Inspection by Attributes*

ANSI/ASQ Z1.4, *Single Sampling Plan for Normal Inspection*

ASNT-TC-1A [2], *Personnel Qualifications and Certification in Nondestructive Testing*

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[1] American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, New York 10036, www.ansi.org.

2 American Society for Nondestructive Testing, 1711 Arlingate Lane, P.O. Box 28518, Columbus, Ohio 43228, www.asnt.org.

3 Terms, Definitions, Symbols, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document the following terms and definitions apply. For quality system related terms used in this Specification and not defined below, see API Q1.

3.1.1
100 % inspection
Inspect each part in the lot.

3.1.2
batch lot processing
Material is processed in a machine in defined quantities or volumes.

3.1.3
calibration standards
Basic measurement tools (such as thread wires or gauge blocks) which are traceable to International Standard Units (SI units) through a national standards organization such as NIST and are used to calibrate measurement tools, inspection equipment, thread form gauges, and plain form gauges.

3.1.4
carbonitrided
Carbon and nitrogen diffused surface hardening process.

3.1.5
carburized
Carbon diffused surface hardening process.

3.1.6
continuous processing
Material flows steadily through the processing equipment in an undefined quantity or volume.

3.1.7
discontinuity
Interruption in the normal physical structure or configuration such as cracks, laps, seams, pits, and laminations.

3.1.8
documented processing instructions
Standard operating procedures (SOP), approved by a qualified person, which include the necessary work instructions for the requirements of a particular process.

3.1.9
dual lapped seat
A valve seat that has been lapped for both API (V12) and Alternate (V12A) size balls.

3.1.10
hard lined
Welded hardface process in which a hard material is overlaid on the base material.

3.1.11
induction case hardened
Surface hardening process by means of induction heating.

3.1.12
material test report
A document from a mill or certifying laboratory that states at a minimum the material type or grade, chemical properties, and mechanical properties. Additionally, it may state hardness.

3.1.13
nickel carbide composite
Nickel alloy coating with carbide particles suspended therein.

3.1.14
nitrided
Nitrogen diffused surface hardening process.

3.1.15
qualified person
Personnel with characteristics or abilities, gained through training and/or experience as measured against established requirements, standards or tests, that enable the individual to perform a required function.

3.1.16
quality assurance
a system of maintaining documents and procedures to a given standard.

3.1.17
quality control
a system of maintaining product characteristics and attributes in manufactured products.

3.1.18
thread wires
A set of precision ground wires used in conjunction with a micrometer to measure the thread pitch diameter on an external (pin) thread.

3.1.19
total indicator runout (circular)
Total gauge reading as circular part is rotated 360°.

3.1.20
working gauge
Gauge used for direct measurement of product.

3.2 Symbols

3.2.1 General Symbols

APL	actual plunger length, soft packed
D_3	diameter, valve rod makeup
D_A	diameter, seating, nipple
D_{ANG}	diameter, face of angle
D_{ALT}	diameter, alternate ball size
D_B	diameter, standard ball size
D_H	diameter, hole
D_{MBA}	diameter, outside, seating, mechanical bottom
D_{MBC}	diameter, pitch length, seating mechanical bottom

D_{MTA} diameter, seating, mandrel

D_{od} diameter, tube, plunger

D_{PD} diameter, mechanical top lock

D_{Q} counterbore diameter

D_{RX} diameter, ring radii centers

L_1 length, fishing neck knob

L_2 length, fishing neck

L_3 length, valve rod makeup

L_4 length, cup base

L_5 length, cup throw

L_6 length, cup

L_7 length, cup ring

L_B length, seating

L_{CB} counterbore length

L_{CBT} length, thread

L_{CU} length, barrel coupling, upper

L_{CL} length, barrel coupling, lower

L_L length, puller thread

L_{MBB} length, seating mechanical bottom

L_{MC1} length, mandrel, cup, makeup

L_{MC2} length, mandrel, cup, clearance

L_{PL} pitch length

L_{PL1} pitch length, mechanical top lock

L_q counterbore length

L_{qm} counterbore length

L_{R2} length, cup ring clearance

L_{R3} length, cup ring pitch length

L_{SL} length, sealing, plunger

L_t length, mandrel, thread

L_{wa} length, clutch flats, external

L_{wb} length, clutch flats, internal

L_{wc} length, clutch

R radius, cup ring

3.2.2 Gauge Symbols

DBD4 diameter of collar on plug gauge, B1 thread

DBD7 major diameter of plug gauge at gauge point, B1 thread

DBDG diameter of notch on plug gauge, B1 thread

DBDO major thread diameter at end of barrel, B1 thread

DBE7 pitch diameter at gauge point, B1 thread

DBKO thread root diameter at end of barrel, B1 thread

LBL2 length of effective thread (on barrel), B1 thread

LBL4 total length of thread (to vanish point), B1 thread

LBL7 length from gauge point to end of barrel, B1 thread

LBLN total depth of box (including undercut, if any), B1 thread

LBS gauge standoff, B1 thread

3.2.3 Thread Dimensional Symbols

D_{CF} diameter, thread, C132

D_{CJ} diameter, thread relief, C11

L_{CA} length, thread, C11, C21, C31

L_{CBM} length, thread, minimum full form C12

L_{CE} length, thread, C22

3.2.4 Thread Designation Symbols

S, S1, S2, C11, C12, C21, C22, C31, C32, A, L, B1, B2, F1, LP, F32, F42, F22, H1, H2, P1, P2

3.3 Abbreviations

ANSI American National Standards Institute

ASNT American Society for Non-Destructive Testing

ASQ American Society for Quality

EU external upset

ID inside diameter

KSI thousand pounds per square inch

MTR Material Test Report

NIST National Institute of Standards and Technology

NDE non-destructive examination

nom nominal dimension

OD outside diameter

TIR total indicator runout

UNS Unified Numbering System

4 Functional Requirements

To order products which conform to this specification, the user or purchaser may determine the applicable well and environmental operational conditions, specify the requirements and/or identify the manufacturer's specific products. Additional detailed ordering information can be found in the normative annexes. Requirements may be conveyed to the manufacturer by means of the manufacturer's part number, data sheet, or other suitable documentation.

When pump assemblies are specified by the purchaser, functional testing of assembled pumps shall be conducted in accordance with agreed upon procedures. Documentation of specified testing shall be provided when so required.

In lieu of ordering products by the manufacturer's part numbers, or by API 11AX product number, the following requirements should be specified, as applicable:

a) production rate;

b) material type;

c) well depth, casing size, tubing size, pump size, or other mechanical well parameters;

d) well bore configuration (such as deviation, dog-legs, etc.);

e) produced fluid chemical and physical composition, including produced solids (sand production, scale, etc.), to which the products are exposed during their full life cycle;

f) the selected surface drive system;

g) bottom hole static and producing temperature and pressure;

h) planned chemical treatments.

5 Technical Requirements

5.1 General Requirements

Products shall conform to the requirements of this specification.

5.2 Design Requirements

5.2.1 General

When design of a product is required, component parts shall be designed and manufactured in accordance with this specification, shall comply with the dimensions given in Annex C, and shall be constructed of materials listed in Annex F. Sucker rod pumps shall be identified per Annex E and assembled in accordance with Annex B.

Special processes shall be validated. These include but are not limited to heat treating, plating, spray metal coating and metallurgical surface bonding processes such as carbo-nitriding, nickle carbide coating, etc. The validation of these processes shall be covered in the manufacturer's documentation and be part of the design package.

5.2.2 Design Documentation

Design documentation shall as a minimum include drawings, and as applicable: assumptions, formulas, calculations, design requirements, testing, and acceptance criteria. Design documentation media shall be

clear, legible, reproducible, and retrievable. It shall include design verification, validation, reviews, and any necessary actions.

5.2.3 Design Review

Designs shall be reviewed and verified by a qualified person other than the person(s) who developed the original design to evaluate the ability of the design to meet requirements.

5.2.4 Design Verification

Design verification shall be performed to ensure that each product design meets the manufacturer's technical specifications.

5.2.5 Design Changes

Design changes and changes to design documents that affect conformance to this specification shall require the same control features as the original design.

5.3 Materials

The manufacturer shall develop documented specifications which conform to the requirements of Annex F for all materials used in products manufactured to this specification.

6 Manufacturer Requirements

6.1 General

As a minimum, each of the following topics shall be addressed by the manufacturer.

6.2 Quality Control

6.2.1 General

To maintain accuracy, equipment used to measure, test and gauge products manufactured in accordance with this specification shall be identified, controlled, calibrated and adjusted, if necessary. This shall be performed at specified intervals in accordance with the manufacturer’s specifications and the requirements of this specification.

Technologies for inspections with verifiable accuracies equal to or better than those listed in this specification may be applied with appropriate documentation approved by a qualified person.

6.2.2 Inspection/Measuring/Testing Equipment Calibration

6.2.2.1 Reference master thread gauges are not required for threads defined by this specification. Manufacturers shall have (or have access to) setting plugs to be used to validate and calibrate the thread ring gauges.

6.2.2.2 Inspection, measuring, and testing equipment used for acceptance shall be identified, inspected, calibrated, and adjusted at specific intervals in accordance with documented procedures and this specification. Inspection, measuring, and testing equipment shall be used only within the calibrated range. The calibration or verification of measuring and testing equipment used for product acceptance shall be traceable to International Standard Units (SI units) through a national standards organization such as NIST.

6.2.2.3 Calibration intervals for inspection, measuring, and testing equipment shall be established based on historical calibration data measurements. Calibration intervals shall be a maximum of three months until a recorded calibration history is established. Intervals may be lengthened or shortened based on calibration history. A calibration interval cannot be increased to more than twice the previous interval. In the event of

suspected damage or misuse, the inspection, measuring, or testing equipment shall be immediately removed from service until calibration is verified.

6.2.2.4 Calibration standards used to calibrate inspection, measuring, and testing equipment shall be validated and approved at a minimum of once a year by a national standards organization such as NIST or an organization accredited by a signatory of the ILAC Mutual Recognition Arrangement.

6.2.2.5 Pressure gauges or transducers shall be accurate to at least 3 % of full-scale range. These devices shall be calibrated at a minimum of once a year with a master measuring device or a dead weight tester to at least three equidistant points distributed across the full scale (0 % to 100 %), excluding zero and full scale, as required points of calibration, using approved procedures.

6.2.3 Personnel Qualifications

All personnel performing quality control activities directly affecting material and product quality shall be qualified in accordance with the manufacturer's documented requirements. This is separate from Quality Assurance activities.

6.2.4 Acceptance Criteria

6.2.4.1 General

Products designed and manufactured in accordance with this specification shall meet the requirements of the appropriate annexes of this specification. Records shall be maintained for a minimum of five years for all accepted finished products. All products covered in this standard shall be manufactured from new material supplied by the steel mill or distributor. Cast bars shall not be used as raw material for manufacturing components. When specified, non-destructive examinations shall be performed and accepted according to the manufacturer’s documented specifications which shall include acceptance criteria.

Material Test Report (MTR) shall be considered as evidence of compliance with material requirements as listed in Annex F.

Dimensional inspection shall be performed by a qualified person to assure proper function and conformance with design criteria, specifications and final component dimensions.

6.2.4.2 Frequency and Acceptance of Inspection

6.2.4.2.1 Batch Lot Processing

Unless otherwise stated in this specification, frequency and acceptance of inspection of manufacturing lots shall be in accordance with the acceptance criteria for the single sampling plan for normal inspection, general inspection level I, acceptable quality level of 4.0 %, as specified in ANSI/ASQ Z1.4. More stringent inspection plans are acceptable. Acceptance criteria shall be based on either continuous monitoring or statistical process control such as described in ANSI/ASQ Z1.4.

The frequency of dimensional inspections for components shall be accomplished according to the random single sampling plan in Table 1. This is based on acceptance of inspection per ANSI/ASQ Z1.4, General Inspection Level I, Acceptance Quality Level = 4.0 %.

6.2.4.2.2 Continuous Processing

In continuous processing, a minimum of 10.0 % of the produced parts shall be inspected. Processing of non-conforming items shall conform to 6.2.5. Parts manufactured prior to the non-conforming items shall be inspected back to the last acceptable part and the non-conforming parts shall be dispositioned according to the manufacturer's documented procedures. Acceptance criteria shall be based on either continuous monitoring or statistical process control such as described in ANSI/ASQ Z1.4.

Table 1—Sampling Procedures (See Note)

(1)	(2)	(3)	(4)
Lot Size	**Sample Size**	**No. of Parts, Accept Lot**	**Out of Spec., Reject Lot [a]**
2 to 8	2	0	1
9 to 15	2	0	1
16 to 25	3	0	1
26 to 50	5	0	1
51 to 90	5	0	1
91 to 150	8	1	2
151 to 280	13	1	2
281 to 500	20	2	3
501 to 1200	32	3	4
1201 to 3200	50	5	6
3201 to 10,000	80	7	8
10,001 to 35,000	125	10	11
NOTE Excerpt from ANSI/ASQ Z1.4, 2008 *Single Sampling Plan for Normal Inspection*, General Inspection Level I, Acceptable Quality Level = 4.0 %.			
[a] 100 % inspection (sort) of rejected parts is acceptable practice.			

6.2.4.3 Component Parts

Component parts shall be dimensionally inspected for conformance to manufacturer's drawings and written specifications. Manufacturer's drawings and written specifications shall meet all the requirements of this standard as a minimum.

6.2.4.4 Threads

All threaded connections shall conform to the dimensions and tolerances of Annex G.

6.2.4.5 Surface Finish

Surface finishes shall be 250 Ra maximum unless otherwise noted.

Machined sealing surfaces shall be 125 Ra maximum unless otherwise noted.

Any specified surface finish shall be maximum, unless otherwise noted.

6.2.5 Manufacturing Non-conformances

The manufacturer shall establish and maintain documented procedures to ensure that a product which does not conform to specified requirements is prevented from unintended use or installation. This control shall provide for identification, evaluation, segregation, and disposition of non-conforming assemblies or components.

The responsibility for review and authority for the disposition of non-conforming product shall be defined by the manufacturer. Non-conforming product shall be:

a) reworked to meet the specified requirements or the specified requirements of another product;

b) accepted without repair by concession of a manufacturer's qualified and authorized person, provided the concession is within the design acceptance criteria and at no time is this product allowed to violate the requirements of this specification; or

c) rejected and scrapped.

Records of the nature of nonconformities and any subsequent actions taken, including concessions obtained, shall be maintained in accordance with manufacturer's documented procedures. These records shall be retained for a minimum of five years.

6.2.6 Coatings

6.2.6.1 Product Coatings

Coatings applied to products (e.g. chrome plating, nickel carbide, etc.) shall be controlled by documented processing instructions, which have been approved by a qualified person. These instructions shall include acceptance criteria.

6.2.6.2 Coatings for Product Storage and Handling

Coatings that will provide protection from atmospheric corrosion and mechanical damage of products during storage and handing shall be applied in accordance with documented procedures.

6.2.7 Heat Treating Furnace Instrumentation

Automatic controlling and recording instruments shall be used. Thermocouples shall be located in the furnace working zone(s). The controlling and recording instruments used for the heat treatment processes shall possess an accuracy to within ± 1 % of their full-scale range. Temperature controlling and recording instruments shall be calibrated at least once every six months until a documented calibration history can be established. Calibration intervals shall then be established based on repeatability, degree of usage and documented calibration history. Equipment used to calibrate the furnace equipment shall possess an accuracy to within ± 0.25 % of full-scale range.

6.2.8 Ultrasonic or Magnetic Particle Methods of Non-destructive Examination (NDE)

If NDE is utilized as a manufacturer's option, instructions shall be detailed in the manufacturer's documented procedures and conform to the requirements of this specification. All NDE instructions shall be approved by a Level III examiner qualified in accordance with an international or national standard such as ASNT Recommended Practice SNT-TC-1A.

In case discontinuities are detected by non-visual NDE methods, the evaluation shall be supplemented by visual examination and measurement to determine the size of the discontinuity in accordance with the manufacturer's specification.

Personnel performing NDE shall be qualified to at least Level II for evaluation and interpretation in accordance with an international or national standard such as ASNT Recommended Practice SNT-TC-1A. Any unacceptable indications shall be removed, repaired, and re-examined using the original NDE method.

6.3 Product Identification

All products manufactured under this specification shall be marked in accordance with the requirements detailed in the Annex E and the manufacturer's documented procedures.

6.4 Documentation

The manufacturer shall establish and maintain documented procedures to control documents and data required by this specification. These documents and data shall be clear, legible, reproducible and retrievable.

These documents and data shall be retained in facilities that provide an environment which prevents damage, deterioration, or loss. Documents and data may be in the form of any type of media, such as hard copy or electronic media, and shall be retained for a minimum of five years from the date of manufacture.

Annex A
(informative)

Use of API Monogram by Licensees

A.1 Scope

The API Monogram® is a registered certification mark owned by the American Petroleum Institute (API) and authorized for licensing by the API Board of Directors. Through the API Monogram Program, API licenses product manufacturers to apply the API Monogram to new products which comply with product specifications and have been manufactured under a quality management system that meets the requirements of API Q1. API maintains a complete, searchable list of all Monogram licensees on the API Composite List website (www.api.org/compositelist).

The application of the API Monogram and license number on products constitutes a representation and warranty by the licensee to API and to purchasers of the products that, as of the date indicated, the products were manufactured under a quality management system conforming to the requirements of API Q1 and that the product conforms in every detail with the applicable standard(s) or product specification(s). API Monogram program licenses are issued only after an on-site audit has verified that an organization has implemented and continually maintained a quality management system that meets the requirements of API Q1 and that the resulting products satisfy the requirements of the applicable API product specification(s) and/or standard(s). Although any manufacturer may claim that its products meet API product requirements without monogramming them, only manufacturers with a license from API can apply the API Monogram to their products.

Together with the requirements of the API Monogram license agreement, this annex establishes the requirements for those organizations who wish to voluntarily obtain an API license to provide API monogrammed products that satisfy the requirements of the applicable API product specification(s) and/or standard(s) and API Monogram Program requirements.

For information on becoming an API Monogram Licensee, please contact API, Certification Programs, 1220 L Street, N. W., Washington, DC 20005 or call 202-682-8145 or by email at certification@api.org.

A.2 Normative References

API Specification Q1, *Specification for Quality Management System Requirements for Product Manufacturing for the Petroleum and Natural Gas Industry*

A.3 Terms and Definitions

For purposes of this annex, the following terms and definitions apply:

A.3.1
API monogrammable product
Product that has been newly manufactured by an API licensee utilizing a fully implemented API Q1 compliant quality management system and that meets all the API specified requirements of the applicable API product specification(s) and/or standard(s)

A.3.2
API specified requirements
Requirements, including performance and licensee-specified requirements, set forth in API Q1 and the applicable API product specification(s) and or standard(s).

NOTE Licensee-specified requirements include those activities necessary to satisfy API specified requirements.

A.3.3
API product specification
Prescribed set of rules, conditions, or requirements attributed to a specified product which address the definition of terms; classification of components; delineation of procedures; specified dimensions; manufacturing criteria; material requirements, performance testing, design of activities; and the measurement of quality and quantity with respect to materials; products, processes, services, and/or practices

A.3.4
licensee
Organization that has successfully completed the application and audit process and has been issued a license by API

A.3.5
design package
Records and documents required to provide evidence that the applicable product has been designed in accordance with API Q1 and the requirements of the applicable product specification(s) and/or standard(s)

A.4 Quality Management System Requirements

An organization applying the API Monogram to products shall develop, maintain, and operate at all times a quality management system conforming to API Q1.

A.5 Control of the Application and Removal of the API Monogram

Each licensee shall control the application and removal of the API Monogram in accordance with the following:

a) Products that do not conform to API specified requirements shall not bear the API Monogram.

b) Each licensee shall develop and maintain an API Monogram marking procedure that documents the marking/monogramming requirements specified by this annex and any applicable API product specification(s) and/or standard(s). The marking procedure shall:

   1) define the authority responsible for application and removal of the API Monogram;

   2) define the method(s) used to apply the Monogram;

   3) identify the location on the product where the API Monogram is to be applied;

   4) require the application of the licensee's license number and date of manufacture of the product in conjunction with the use of the API Monogram;

   5) require that the date of manufacture, at a minimum, be two digits representing the month and two digits representing the year (e.g. 05-12 for May 2012) unless otherwise stipulated in the applicable API product specification(s) or standard(s); and

   6) require application of the additional API product specification(s) and/or standard(s) marking requirements.

c) Only an API licensee may apply the API Monogram and its designated license number to API monogrammable products.

d) The API Monogram license, when issued, is site-specific and subsequently the API Monogram shall only be applied at that site specific licensed facility location.

e) The API Monogram may be applied at any time appropriate during the production process but shall be removed in accordance with the licensee's API Monogram marking procedure if the product is subsequently found to be out of conformance with any of the requirements of the applicable API product specification(s) and/or standard(s) and API Monogram Program.

For certain manufacturing processes or types of products, alternative API Monogram marking procedures may be acceptable. Requirements for alternative API Monogram marking are detailed in the API Policy, *API Monogram Program Alternative Marking of Products License Agreement*, available on the API Monogram Program website at http://www.api.org/alternative-marking.

A.6 Design Package Requirements

Each licensee and/or applicant for licensing must maintain a current design package for all of the applicable products that fall under the scope of each Monogram license. The design package information must provide objective evidence that the product design meets the requirements of the applicable and most current API product specification(s). The design package(s) must be made available during API audits of the facility.

In specific instances, the exclusion of design activities is allowed under the Monogram Program, as detailed in *Advisory # 6*, available on API Monogram Program website at http://www.api.org/advisories.

A.7 Manufacturing Capability

The API Monogram Program is designed to identify facilities that have demonstrated the ability to manufacture equipment that conforms to API specifications and/or standards. API may refuse initial licensing or suspend current licensing based on a facility's level of manufacturing capability. If API determines that additional review is warranted, API may perform additional audits (at the organization's expense) of any subcontractors to ensure their compliance with the requirements of the applicable API product specification(s) and/or standard(s).

A.8 API Monogram Program: Nonconformance Reporting

API solicits information on products that are found to be nonconforming with API specified requirements, as well as field failures (or malfunctions), which are judged to be caused by either specification deficiencies or nonconformities with API specified requirements. Customers are requested to report to API all problems with API monogrammed products. A nonconformance may be reported using the API Nonconformance Reporting System available at http://compositelist.api.org/ncr.asp.

Annex B
(normative)

Pump Assemblies

B.1 Pump Designation

B.1.1 General

Pump assemblies shall be manufactured and supplied according to the requirements and specifications provided in this specification.

The basic types of pumps and letter designation covered by this specification are shown in Table B.1.

Table B.1—Pump Designations [a]

(1)	(2)	(3)	(4)	(5)
Type of Pump	**Letter Designation**			
	Metal Plunger Pumps			**Soft-packed Plunger Pumps**
	Heavy-wall Barrel	**Thin-wall Barrel**	**Heavy-wall Barrel**	**Thin-wall Barrel**
Rod Pumps				
Stationary Barrel, Top Anchor	RHA	RWA	—	RSA
Stationary Barrel, Bottom Anchor	RHB	RWB	—	RSB
Stationary Barrel, Bottom Anchor	RXB	—	—	—
Traveling Barrel, Bottom Anchor	RHT	RWT	—	RST
Tubing Pumps	TH	—	TP	—

[a] See Figure B.1 for definition of symbols.

Complete pump designations, as shown in Figure B.1, include the following:

a) nominal tubing size;

b) basic bore diameter;

c) type of pump, including type of barrel and location and type of seating assembly;

d) barrel length;

e) plunger length;

f) length of each extension when used.

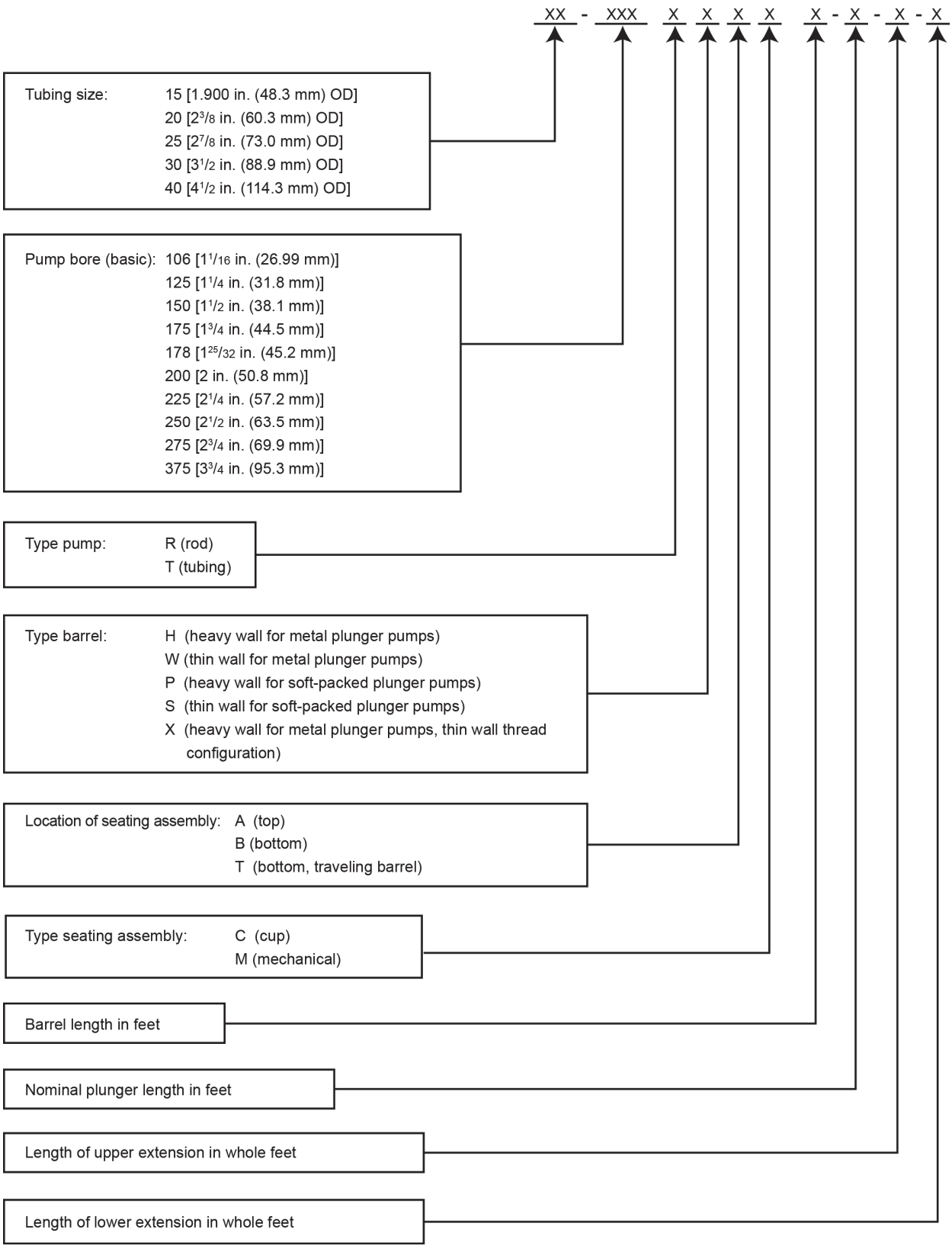


Figure B.1—Pump Designations

EXAMPLE A $1^{1}/_{4}$ in. (31.8 mm) bore rod type pump with a 10 ft (3.048 m) heavy wall barrel and 2 ft (0.610 m) upper extension, 2 ft (0.610 m) lower extension, a 4 ft (1.219 m) plunger, and a bottom cup type seating assembly for operation in $2^{3}/_{8}$ in. (60.3 mm) tubing, would be designated as follows:

20-125 RHBC 10–4–2–2

In addition to the pump designation above, the purchaser must provide the following additional information:

a) barrel material;

b) plunger material;

c) plunger clearance;

d) valve material;

e) fittings materials.

B.1.2 Pump Assemblies

Sucker rod pump assemblies shall be furnished as per this section using component parts defined in Annex C.

Metal plunger pumps are equipped with the following basic components from Annex C:

a) valve rod or pull tube (insert pump only);

b) one piece or assembled metal plungers of basic diameter, less clearance;

c) valves;

d) heavy-wall or thin-wall barrels;

e) seating assemblies:

   i) Cup type assemblies. These assemblies are furnished with compressible sealing elements. The letter “C” is to be used in the pump designation, as described in Figure B.1.

   ii) Mechanical seating assemblies may be furnished when so specified, in which case the letter “M” is used in the pump designation in lieu of the letter “C”. See part numbers S21 and S22 for details of the mechanical seating assemblies.

The design and construction of packing for soft-packed plungers has not been standardized. Specify size, type, and number of packing elements, according to the manufacturer’s catalog.

Pump assemblies as described in this section shall be assembled and functionally tested per Annex D.

Marking of pump assemblies and components shall be per Annex E. Additionally, when API monogrammed assemblies and components are specified, marking shall include the marking requirements of Annex A.

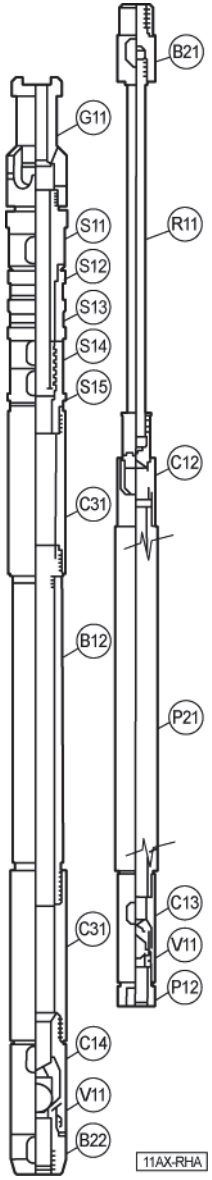


Table B.2—RHA—Rod, Stationary Heavy Wall Barrel, Top Anchor Pump (See Note)

(1)	(2)	(3)	(4)	(5)	(6)
		Standard Pump Size			
		$2^{3}/_{8}$ x $1^{1}/_{4}$ (60.3 x 31.8)	$2^{7}/_{8}$ x $1^{1}/_{2}$ (73.0 x 38.1)	$2^{7}/_{8}$ x $1^{3}/_{4}$ (73.0 x 44.5)	$3^{1}/_{2}$ x $2^{1}/_{4}$ (88.9 x 57.2)
		Complete Pump Designation			
		20-125 RHAC [a b c]	25-150 RHAC [a b c]	25-175 RHAC [a b c]	30-225 RHAC [a b c]
Symbol [f]	Description	Part Number [f]			
B12	Barrel, Heavy Wall	B12-125 [a]	B12-150 [a]	B12-175 [a]	B12-225 [a]
B21	Bushing, Valve Rod	B21-20	B21-25	B21-25	B21-30
B22	Bushing, Barrel Cage	B22-20	B22-25	B22-25	B22-30
C12	Cage, Top Plunger	C12-125	C12-150-25	C12-175	C12-225
C13	Cage, Closed Plunger	C13-125	C13-150	C13-175	C13-225
C14	Cage, Closed Barrel	C14-20	C14-25	C14-25	C14-30
C31	Coupling, Extension	C31-125 [c]	C31-150 [c]	C31-175 [c]	C31-225 [c]
G11	Guide, Valve Rod	G11-20	G11-25	G11-25	G11-30
P12	Plug, Seat	P12-125	P12-150	P12-175	P12-225
P21	Plunger, One Piece [d]	P21-125 [b]	P21-150 [b]	P21-175 [b]	P21-225 [b]
R11	Rod, Valve	R11-20 [e]	R11-25 [e]	R11-25 [e]	R11-30 [e]
S11	Seating Mandrel, Cup (Type HR)	S11-20	S11-25	S11-25	S11-30
S12	Seating Cup (Type HR)	S12-20	S12-25	S12-25	S12-30
S13	Seating Cup Ring (Type HR)	S13-20	S13-25	S13-25	S13-30
S14	Seating Cup Nut (Type HR)	S14-20	S14-25	S14-25	S14-30
S15	Seating Cup Bushing	S15-20	S15-25	S15-25	S15-30
V11	Valve, Ball and Seat				
	Traveling	V11-125	V11-150	V11-175	V11-225
	Standing	V11-175	V11-225	V11-225	V11-250

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] Specify nominal plunger length in feet (meters) and clearance (fit) in thousandths of an inch (hundredths of a millimeter).
[c] Specify length of extension couplings in whole feet (thousandths of meters). Standard lengths are in increments of $^{1}/_{2}$ ft (0.152 m).
[d] A seat must be used between C12 and P21 if an optional F1A pin thread is present on P21 plunger, see component P21.
[e] See part number R11 for valve rod length.
[f] See Annex C for definitions of symbols used for pump components.

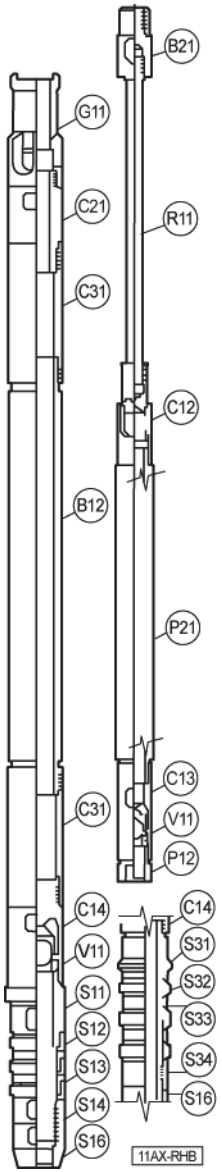


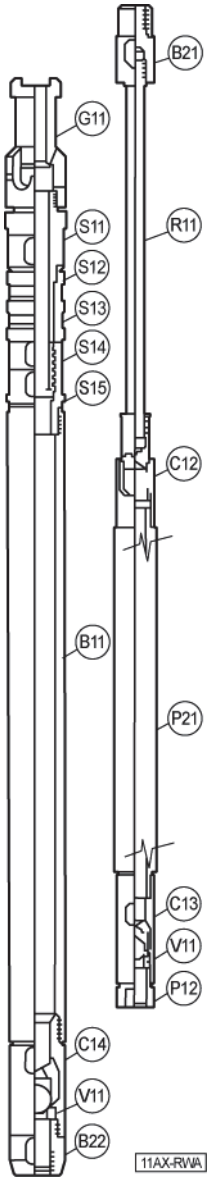
Table B.3—RHB—Rod, Stationary Heavy Wall Barrel, Bottom Anchor Pump (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Standard Pump Size					
		1.900 x $1^{1}/_{16}$ (48.3 x 27.0)	$2^{3}/_{8}$ x $1^{1}/_{16}$ (60.3 x 27.0)	$2^{3}/_{8}$ x $1^{1}/_{4}$ (60.3 x 31.8)	$2^{7}/_{8}$ x $1^{1}/_{2}$ (73.0 x 38.1)	$2^{7}/_{8}$ x $1^{3}/_{4}$ (73.0 x 44.5)	$3^{1}/_{2}$ x $2^{1}/_{4}$ (88.9 x 57.2)
		Complete Pump Designation					
		15-106 RHBC [abc]	20-106 RHBC [abc]	20-125 RHBC [abc]	25-150 RHBC [abc]	25-175 RHBC [abc]	30-225 RHBC [abc]
Symbol [f]	Description	Part Number [f]					
B12	Barrel, Heavy Wall	B12-106 [a]	B12-106 [a]	B12-125 [a]	B12-150 [a]	B12-175 [a]	B12-225 [a]
B21	Bushing, Valve Rod	B21-15	B21-20	B21-20	B21-25	B21-25	B21-30
C12	Cage, Top Plunger	C12-106	C12-100	C12-125	C12-150-25	C12-175	C12-225
C13	Cage, Closed Plunger	C13-106	C13-106	C13-125	C13-150	C13-175	C13-225
C14	Cage, Closed Barrel	C14-15	C14-20	C14-20	C14-25	C14-25	C14-30
C21	Connector, Upper Barrel	C21-15	C21-20	C21-20	C21-25	C21-25	C21-30
C31	Coupling, Extension	C31-106-15 [c]	C31-106 [c]	C31-125 [c]	C31-150 [c]	C31-175 [c]	C31-225 [c]
G11	Guide, Valve Rod	G11-15	G11-20	G11-20	G11-25	G11-25	G11-30
P12	Plug, Seat	P12-106	P12-106	P12-125	P12-150	P12-175	P12-225
P21	Plunger, One Piece [d]	P21-106 [b]	P21-106 [b]	P21-125 [b]	P21-150 [b]	P21-175 [b]	P21-225 [b]
R11	Rod, Valve	R11-20 [e]	R11-20 [e]	R11-20 [e]	R11-25 [e]	R11-25 [e]	R11-30 [e]
S11	Seating Mandrel, Cup (Type HR)	—	S11-20	S11-20	S11-25	S11-25	S11-30
S12	Seating Cup (Type HR)	—	S12-20	S12-20	S12-25	S12-25	S12-30
S13	Seating Cup Ring (Type HR)	—	S13-20	S13-20	S13-25	S13-25	S13-30
S14	Seating Cup Nut (Type HR)	—	S14-20	S14-20	S14-25	S14-25	S14-30
S16	Seating Cup Coupling	S16-15	S16-20	S16-20	S16-25	S16-25	S16-30
S31	Seating Mandrel, Cup (Type O)	S31-15	—	—	—	—	—
S32	Seating Cup (Type O)	S32-15	—	—	—	—	—
S33	Seating Cup Ring (Type O)	S33-15	—	—	—	—	—
S34	Seating Cup Nut (Type O)	S34-15	—	—	—	—	—
V11	Valve, Ball and Seat						
	Traveling	V11-106	V11-106	V11-125	V11-150	V11-175	V11-225
	Standing	V11-150	V11-175	V11-175	V11-225	V11-225	V11-250

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] Specify nominal plunger length in feet (meters), and clearance (fit) in thousandths of an inch (hundredths of a millimeter).
[c] Specify length of extension couplings in whole feet (thousandths of meters). Standard lengths are in increments of $^{1}/_{2}$ ft (0.152 m).
[d] A seat must be used between C12 and P21 if an optional F1A pin thread is present on P21 plunger, see component P21.
[e] See part number R11 for valve rod length.
[f] See Annex C for definitions of symbols used for pump components.

Table B.4—RWA—Rod, Stationary Thin Wall Barrel, Top Anchor Pump (See Note)

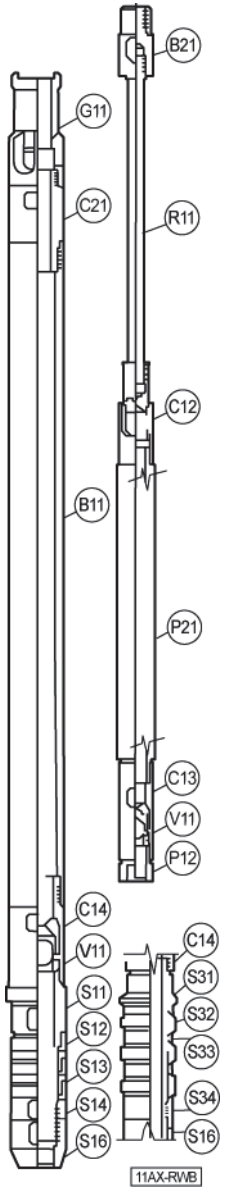


(1)	(2)	(3)	(4)	(5)	(6)
		Standard Pump Size			
		$2^3/_8$ x $1^1/_4$ (60.3 x 31.8)	$2^3/_8$ x $1^1/_2$ (60.3 x 38.1)	$2^7/_8$ x 2 (73.0 x 50.8)	$3^1/_2$ x $2^1/_2$ (88.9 x 63.5)
		Complete Pump Designation			
		20-125 RWAC [a c]	20-150 RWAC [a c]	25-200 RWAC [a c]	30-250 RWAC [a c]
Symbol [e]	Description	Part Number [e]			
B11	Barrel, Thin Wall	B11-125 [a]	B11-150 [a]	B11-200 [a]	B11-250 [a]
B21	Bushing, Valve Rod	B21-20	B21-20	B21-25	B21-30
B22	Bushing, Barrel Cage	B22-20	B22-20	B22-25	B22-30
C12	Cage, Top Plunger	C12-125	C12-150-20	C12-200	C12-250
C13	Cage, Closed Plunger	C13-125	C13-150	C13-200	C13-250
C14	Cage, Closed Barrel	C14-20-125	C14-20	C14-25	C14-30
G11	Guide, Valve Rod	G11-20	G11-20	G11-25	G11-30
P12	Plug, Seat	P12-125	P12-150	P12-200	P12-250
P21	Plunger, One Piece [b]	P21-125 [c]	P21-150 [c]	P21-200 [c]	P21-250 [c]
R11	Rod, Valve	R11-20 [d]	R11-20 [d]	R11-25 [d]	R11-30 [d]
S11	Seating Mandrel, Cup (Type HR)	S11-20	S11-20	S11-25	S11-30
S12	Seating Cup (Type HR)	S12-20	S12-20	S12-25	S12-30
S13	Seating Cup Ring (Type HR)	S13-20	S13-20	S13-25	S13-30
S14	Seating Cup Nut (Type HR)	S14-20	S14-20	S14-25	S14-30
S15	Seating Cup Bushing	S15-20-125	S15-20	S15-25	S15-30
V11	Valve, Ball and Seat				
	Traveling	V11-125	V11-150	V11-200	V11-250
	Standing	V11-175	V11-175	V11-225	V11-250

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] A seat must be used between C12 and P21 if an optional F1A pin thread is present on P21 plunger, see component P21.
[c] Specify nominal plunger length in feet (meters), and clearance (fit) in thousandths of an inch (hundredths of a millimeter).
[d] See part number R11 for valve rod length.
[e] See Annex C for definitions of symbols used for pump components.

Table B.5—RWB—Rod, Stationary Thin Wall Barrel, Bottom Anchor Pump (See Note)

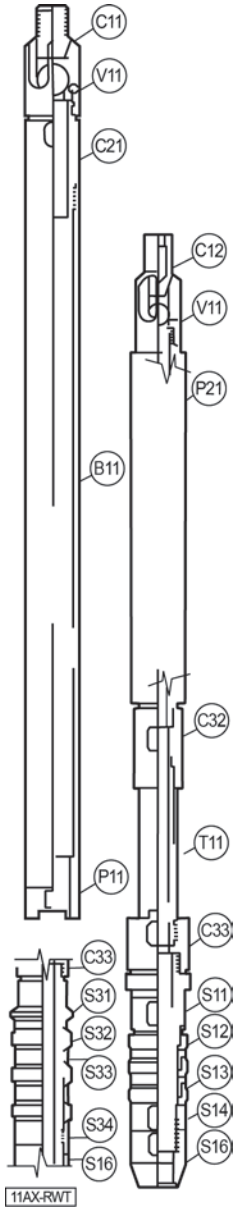


(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Standard Pump Size				
		1.900 x $1^{1}/_{4}$ (48.3 x 31.8)	$2^{3}/_{8}$ x $1^{1}/_{4}$ (60.3 x 31.8)	$2^{3}/_{8}$ x $1^{1}/_{2}$ (60.3 x 38.1)	$2^{7}/_{8}$ x 2 (73.0 x 50.8)	$3^{1}/_{2}$ x $2^{1}/_{2}$ (88.9 x 63.5)
		Complete Pump Designation				
		15-125 RWBC [a c]	20-125 RWBC [a c]	20-150 RWBC [a c]	25-200 RWBC [a c]	30-250 RWBC [a c]
Symbol [e]	Description	Part Number [e]				
B11	Barrel, Thin Wall	B11-125 [a]	B11-125 [a]	B11-150 [a]	B11-200 [a]	B11-250 [a]
B21	Bushing, Valve Rod	B21-15	B21-20	B21-20	B21-25	B21-30
C12	Cage, Top Plunger	C12-125	C12-125	C12-150-20	C12-200	C12-250
C13	Cage, Closed Plunger	C13-125	C13-125	C13-150	C13-200	C13-250
C14	Cage, Closed Barrel	C14-15	C14-20-125	C14-20	C14-25	C14-30
C21	Connector, Upper Barrel	C21-15	C21-20-125	C21-20	C21-25	C21-30
G11	Guide, Valve Rod	G11-15	G11-20	G11-20	G11-25	G11-30
P12	Plug, Seat	P12-125	P12-125	P12-150	P12-200	P12-250
P21	Plunger, One Piece [b]	P21-125 [c]	P21-125 [c]	P21-150 [c]	P21-200 [c]	P21-250 [c]
R11	Rod, Valve	R11-20 [d]	R11-20 [d]	R11-20 [d]	R11-25 [d]	R11-30 [d]
S11	Seating Mandrel, Cup (Type HR)	—	S11-20	S11-20	S11-25	S11-30
S12	Seating Cup (Type HR)	—	S12-20	S12-20	S12-25	S12-30
S13	Seating Cup Ring (Type HR)	—	S13-20	S13-20	S13-25	S13-30
S14	Seating Cup Nut (Type HR)	—	S14-20	S14-20	S14-25	S14-30
S16	Seating Cup Coupling	S16–15	S16-20	S16-20	S16-25	S16-30
S31	Seating Mandrel, Cup (Type O)	S31-15	—	—	—	—
S32	Seating Cup (Type O)	S32-15	—	—	—	—
S33	Seating Cup Ring (Type O)	S33-15	—	—	—	—
S34	Seating Cup Nut (Type O)	S34-15	—	—	—	—
V11	Valve, Ball and Seat					
	Traveling	V11-125	V11-125	V11-150	V11-200	V11-250
	Standing	V11-150	V11-175	V11-175	V11-225	V11-250

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] A seat must be used between C12 and P21 if an optional F1A pin thread is present on P21 plunger, see component P21.
[c] Specify nominal plunger length in feet (meters), and clearance (fit) in thousandths of an inch (hundredths of a millimeter).
[d] See part number R11 for valve rod length.
[e] See Annex C for definitions of symbols used for pump components.

Table B.6—RWT—Rod, Traveling Thin Wall Barrel, Bottom Anchor Pump (See Note)



(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Standard Pump Size				
		1.900 x $1^{1}/_{4}$ (48.3 x 31.8)	$2^{3}/_{8}$ x $1^{1}/_{4}$ (60.3 x 31.8)	$2^{3}/_{8}$ x $1^{1}/_{2}$ (60.3 x 38.1)	$2^{7}/_{8}$ x 2 (73.0 x 50.8)	$3^{1}/_{2}$ x $2^{1}/_{2}$ (88.9 x 63.5)
		Complete Pump Designation				
		15-125 RWT [a c]	20-125 RWT [a c]	20-150 RWT [a c]	25-200 RWT [a c]	30-250 RWT [a c]
Symbol [d]	Description	Part Number [d]				
B11	Barrel, Thin Wall	B11-125 [a]	B11-125 [a]	B11-150 [a]	B11-200 [a]	B11-250 [a]
C11	Cage, Top Open	C11-15	C11-20	C11-20	C11-25	C11-30
C12	Cage, Top Plunger	C12-125	C12-125	C12-150-20	C12-200	C12-250
C21	Connector, Upper Barrel	C21-15	C21-20-125	C21-20	C21-25	C21-30
C32	Coupling, Pull Tube, Upper	C32-125	C32-125	C32-150	C32-200	C32-250
C33	Coupling, Pull Tube, Lower	C33-125-15	C33-125	C33-150-20	C33-200	C33-225
P11	Plug, Pull	P11-125-15	P11-125-15	P11-150-20	P11-200	P11-225
P21	Plunger, One Piece	P21-125 [b]	P21-125 [b]	P21-150 [b]	P21-200 [b]	P21-250 [b]
S11	Seating Mandrel, Cup (Type HR)	—	S11-20	S11-20	S11-25	S11-30
S12	Seating Cup (Type HR)	—	S12-20	S12-20	S12-25	S12-30
S13	Seating Cup Ring (Type HR)	—	S13-20	S13-20	S13-25	S13-30
S14	Seating Cup Nut (Type HR)	—	S14-20	S14-20	S14-25	S14-30
S16	Seating Cup Coupling	S16-15	S16-20	S16-20	S16-25	S16-30
S31	Seating Mandrel, Cup (Type O)	S31-15	—	—	—	—
S32	Seating Cup (Type O)	S32-15	—	—	—	—
S33	Seating Cup Ring (Type O)	S33-15	—	—	—	—
S34	Seating Cup Nut (Type O)	S34-15	—	—	—	—
T11	Tube, Pull	T11-125 [c]	T11-125 [c]	T11-150 [c]	T11-200 [c]	T11-225 [c]
V11	Valve, Ball and Seat					
	Traveling	V11-150	V11-175	V11-175	V11-225	V11-250
	Standing	V11-125	V11-125	V11-150	V11-200	V11-250

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

[b] Specify nominal plunger length in feet (meters), and clearance (fit) in thousandths of an inch (hundredths of a millimeter).

[c] See part number T11 for pull tube length.

[d] See Annex C for definitions of symbols used for pump components.

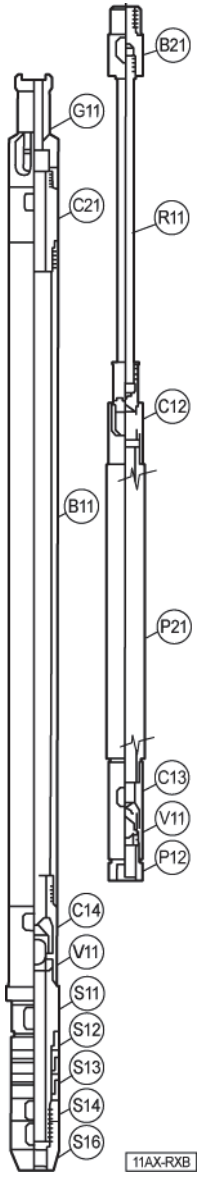


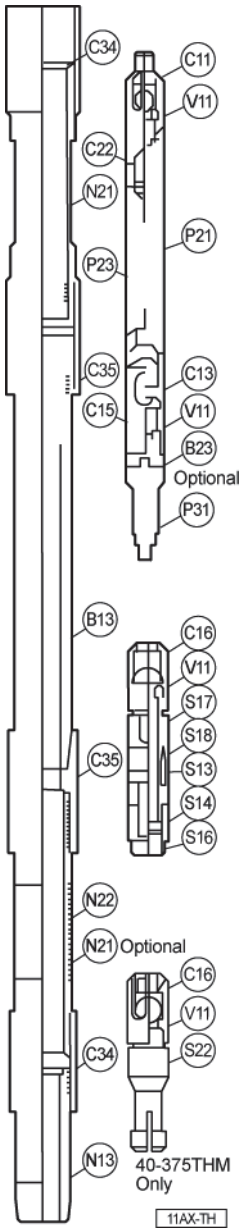
Table B.7—RXB—Rod, Stationary Heavy Wall Barrel, Bottom Anchor Pump (See Note)

(1)	(2)	(3)	(4)	(5)
		Standard Pump Size		
		$2^{3}/_{8}$ x $1^{1}/_{4}$ (60.3 x 31.8)	$2^{3}/_{8}$ x $1^{1}/_{2}$ (60.3 x 38.1)	$2^{7}/_{8}$ x 2 (73.0 x 50.8)
		Complete Pump Designation		
		20-125 RXBC [a c]	20-150 RXBC [a c]	25-200 RXBC [a c]
Symbol [e]	Description	Part Number [e]		
B16	Barrel, Heavy Wall	B16-125 [a]	B16-150 [a]	B16-200 [a]
B21	Bushing, Valve Rod	B21-20	B21-20	B21-25
C12	Cage, Top Plunger	C12-125	C12-150-20	C12-200
C13	Cage, Closed Plunger	C13-125	C13-150	C13-200
C14	Cage, Closed Barrel	C14-20-125	C14-20	C14-25
C21	Connector, Upper Barrel	C21-20-125	C21-20	C21-25
G11	Guide, Valve Rod	G11-20	G11-20	G11-25
P12	Plug, Seat	P12-125	P12-150	P12-200
P21	Plunger, One Piece [b]	P21-125 [c]	P21-150 [c]	P21-200 [c]
R11	Rod, Valve	R11-20 [d]	R11-20 [d]	R11-25 [d]
S11	Seating Mandrel, Cup (Type HR)	S11-20	S11-20	S11-25
S12	Seating Cup (Type HR)	S12-20	S12-20	S12-25
S13	Seating Cup Ring (Type HR)	S13-20	S13-20	S13-25
S14	Seating Cup Nut (Type HR)	S14-20	S14-20	S14-25
S16	Seating Cup Coupling	S16-20	S16-20	S16-25
V11	Valve, Ball and Seat			
	Traveling	V11-125	V11-150	V11-200
	Standing	V11-175	V11-175	V11-225

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] A seat must be used between C12 and P21 if an optional F1A pin thread is present on P21 plunger, see component P21.
[c] Specify nominal plunger length in feet (meters), and clearance (fit) in thousandths of an inch (hundredths of a millimeter).
[d] See part number R11 for valve rod length.
[e] See Annex C for definitions of symbols used for pump components.

Table B.8—TH—Tubing, Heavy Wall Barrel Pump (See Note)

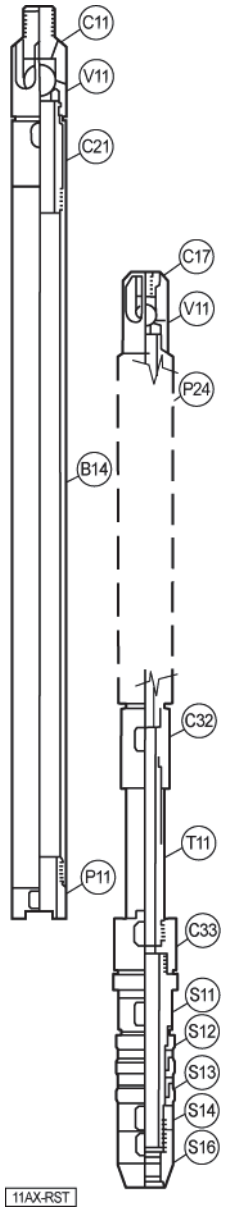


(1)	(2)	(3)	(4)	(5)	(6)
		Standard Pump Size			
		$2^3/_8$ x $1^3/_4$ (60.3 x 44.5)	$2^7/_8$ x $2^1/_4$ (73.0 x 57.2)	$3^1/_2$ x $2^3/_4$ (88.9 x 69.9)	$4^1/_2$ x $3^3/_4$ (114.3 x 95.3)
		Complete Pump Designation			
		20-175 THC [a b c]	25-225 THC [a b c]	30-275 THC [a b c]	40-375 THM [a b c e]
Symbol [f]	Description	Part Number [f]			
B23	Bushing, Optional [d]	—	—	—	B23-40
B13	Barrel, Heavy Wall	B13-175 [a]	B13-225 [a]	B13-275 [a]	B13-375 [a]
C11	Cage, Top Open	C11-20	C11-25	C11-30	C11-40
C13	Cage, Closed Plunger	C13-175	C13-225	C13-275	C13-375
C16	Cage, Standing Valve	C16-175	C16-225	C16-275	C16-375
C34	Coupling, Tubing	C34-20	C34-25	C34-30	C34-40
C35	Coupling, Barrel	C35-20	C35-25	C35-30	C35-40
N12	Nipple, Seating, Mech.	—	—	—	N12-40
N13	Nipple, Seating	N13-20	N13-25	N13-30	—
N21	Nipple, Extension, Upper	N21-20 [c]	N21-25 [c]	N21-30 [c]	N21-40 [c]
N22	Nipple, Extension, Lower	N22-20 [c]	N22-25 [c]	N22-30 [c]	N22-40 [c]
P21	Plunger, One Piece	P21-175 [b]	P21-225 [b]	P21-275 [b]	P21-375 [b]
P31	Puller, Standing Valve	P31-175	P31-225	P31-275	P31-375 [e]
S13	Seating Cup Ring (Type HR)	S13-20	S13-25	S13-30	—
S14	Seating Cup Nut (Type HR)	S14-20	S14-25	S14-30	—
S16	Seating Cup Coupling	S16-20	S16-25	S16-30	—
S17	Seating Mandrel, Cup (Type HR)	S17-20	S17-25	S17-30	—
S18	Seating Cup (Type HR)	S18-20	S18-25	S18-30	—
V11	Valve, Ball and Seat				
	Traveling	V11-175	V11-225	V11-250	V11-375
	Standing	V11-175	V11-225	V11-250	V11-375
S22		—	—	—	S22-40
	Optional Plunger Assembly				
C15	Cage, Closed, Box Plunger	C15-175	C15-225	C15-275	C15-375
C22	Connector, Box Plunger	C22-175	C22-225	C22-275	C22-375
P23	Plunger, Box End	P23-175 [b]	P23-225 [b]	P23-275 [b]	P23-375 [b]

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] Specify nominal plunger length in feet (meters), and clearance (fit) in thousandths of an inch (hundredths of a millimeter).
[c] Specify length of extensions (extension nipples) in feet (meters). Standard lengths are 2 ft and 3 ft (0.610 m and 0.914 m).
[d] For $4^1/_2$ x $3^3/_4$ only use P31-275 Puller in place of P31-375 Puller.
[e] P31-275 optional with use of B23-40 Bushing.
[f] See Annex C for definitions of symbols used for pump components.

Table B.9—RST—Rod, Traveling Thin Wall Barrel, Bottom Anchor, Soft-Packed Plunger Pump (See Note)



(1)	(2)	(3)	(4)	(5)	(6)
		Standard Pump Size			
		$2^3/_8$ x $1^1/_4$ (60.3 x 31.8)	$2^3/_8$ x $1^1/_2$ (60.3 x 38.1)	$2^7/_8$ x 2 (73.0 x 50.8)	$3^1/_2$ x $2^1/_2$ (88.9 x 63.5)
		Complete Pump Designation			
		20-125 RSTC [a b]	20-150 RSTC [a b]	25-200 RSTC [a b]	30-250 RSTC [a b]
Symbol [d]	Description	Part Number [d]			
B14	Barrel, Soft-Packed Rod Pump	B14-125 [a]	B14-150 [a]	B14-200 [a]	B14-250 [a]
C11	Cage, Top Open	C11-20	C11-20	C11-25	C11-30
C17	Cage, Top Plunger	C17-125	C17-150	C17-200	B17-250
C21	Connector, Upper Barrel	C21-20-125	C21-20	C21-25	C21-30
C32	Coupling, Pull Tube, Upper	C32-125	C32-150	C32-200	C32-250
C33	Coupling, Pull Tube, Lower	C33-125	C33-150-20	C33-200	C33-225
P11	Plug, Pull	P11-125-15	P11-150-20	P11-200	P11-225
P24	Plunger, Soft-Packed	P24-125 [b]	P24-150 [b]	P24-200 [b]	P24-250 [b]
S11	Seating Mandrel, Cup (Type HR)	S11-20	S11-20	S11-25	S11-30
S12	Seating Cup (Type HR)	S12-20	S12-20	S12-25	S12-30
S13	Seating Cup Ring (Type HR)	S13-20	S13-20	S13-25	S13-30
S14	Seating Cup Nut (Type HR)	S14-20	S14-20	S14-25	S14-30
S16	Seating Cup Coupling	S16-20	S16-20	S16-25	S16-30
T11	Tube, Pull	T11-125 [c]	T11-150 [c]	T11-200 [c]	T11-225 [c]
V11	Valve, Ball and Seat				
	Traveling	V11-175	V11-175	V11-225	V11-250
	Standing	V11-125	V11-150	V11-200	V11-250

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length in feet (meters). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.
[b] Specify nominal plunger length in nearest whole or half feet (thousandths of meters), and packing requirements. P24 cups or rings or combination, customer option.
[c] See part number T11 for pull tube length.
[d] See Annex C for definitions of symbols used for pump components.

Annex C
(normative)

Pump Components

Sucker rod pump component parts shall conform to the dimensions in this section.

Sucker rod pump component parts shall be constructed of materials in accordance with Annex F.

The Master Part Numbering System is designed to provide a systematic method to easily identify parts and for ordering parts for interchangeability.

In order to provide freedom of design, only those dimensional requirements affecting interchangeability are specified for component parts. Wrench flats are optional, but when parts are provided with flats, the dimensions shall conform to the requirements of Table G.9, Annex G.

All dimensions are given in inches (followed by millimeter values in parentheses) unless otherwise noted.

Where tolerances are not noted, Table C.1 applies.

Table C.1—Default Tolerances

(1)	(2)	(3)
Dimensions in inches	X	± 0.250 in. (6.350 mm)
	X.X	± 0.100 in. (2.540 mm)
	X.XX	± 0.020 in. (0.508 mm)
	X.XXX	± 0.005 in. (0.127 mm)
Dimensions in feet	X	± 1.5 in. (38.1 mm)
	X.X	± 1.5 in. (38.1 mm)

Table C.2—Master Part Numbering System (five pages)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Pump Bore Size, in. (mm)										**Tubing Size,** in. (mm)				
	$1^{1}/_{16}$ (26.7)	**$1^{1}/_{4}$ (31.8)**	**$1^{1}/_{2}$ (38.1)**	**$1^{3}/_{4}$ (44.5)**	**$1^{25}/_{32}$ (45.2)**	**2 (50.8)**	**$2^{1}/_{4}$ (57.2)**	**$2^{1}/_{2}$ (63.5)**	**$2^{3}/_{4}$ (69.9)**	**$3^{3}/_{4}$ (95.3)**	**1.900 (48.3)**	**$2^{3}/_{8}$ (60.3)**	**$2^{7}/_{8}$ (73.0)**	**$3^{1}/_{2}$ (88.9)**	**$4^{1}/_{2}$ (114.3)**
Designation	106	125	150	175	178	200	225	250	275	375	15	20	25	30	40
B															
1. Barrel	-														
1. Thin Wall		B11-125 [a]	B11-150 [a]	—	—	B11-200 [a]	—	B11-250 [a]	—	—	—	—	—	—	—
2. Heavy Wall, Rod	B12-106 [a]	B12-125 [a]	B12-150 [a]	B12-175 [a]	—	—	B12-225 [a]	—	—	—	—	—	—	—	—
3. Heavy Wall, Tubing	—	—	—	B13-175 [a]	—	—	B13-225 [a]	—	B13-275	B13-375	—	—	—	—	—
4. Thin Wall, S.P.[e]	-	B14-125 [a]	B14-150 [a]	—	—	B14-200 [a]	—	B14-250 [a]	—	—	—	—	—	—	—
5. Heavy Wall, S.P.[e]	—	—	—	—	B15-178	—	B15-225	—	B15-275	—	—	—	—	—	—
6. Heavy Wall, Rod	-	B16-125	B16-150	—	—	B16-200	—	—	—	—	—	—	—	—	—
2. Bushing															
1. Valve Rod	—	—	—	—	—	—	—	—	—	—	B21-15	B21-20	B21-25	B21-30	—
											B21M15	B21M20	B21M25	B21M30	—
2. Barrel Cage	—	—	—	—	—	—	—	—	—	—	B22-15	B22-20	B22-25	B22-30	—
3. Plunger	—	—	—	—	—	—	—	—	—	—	—	—	—	—	B23-40
C															
1. Cage															
1. Top Open	—	—	—	—	—	—	—	—	—	—	C11-15	C11-20	C11-25	C11-30	C11-40
2. Top Plunger	C12-106	C12-125	C12-150-20	C12-175	—	C12-200	C12-225	C12-250	—	—	—	—	—	—	—
	—	—	C12-150-25	—	—	—	—	—	—	—	—	—	—	—	—
	C12M106	C12M125	C12M150-20	C12M175	—	C12M200	C12M225	C12M250	—	—					
	—	—	C12M150-25	—	—	—	—	—	—	—					
3. Closed Plunger Pin	C13-106	C13-125	C13-150	C13-175	—	C13-200	C13-225	C13-250	C13-275	C13-375	—	—	—	—	—
4. Closed Barrel	—	—	—	—	—	—	—	—	—	—	C14-15	C14-20	C14-25	C14-30	—
	—	—	—	—	—	—	—	—	—	—	—	C14-20-125	—	—	—
5. Closed Plunger Box	—	—	—	C15-175	—	—	C15-225	—	C15-275	—	—	—	—	—	—

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Pump Bore Size, in. (mm)										**Tubing Size,** in. (mm)				
	$1^{1}/_{16}$ (26.7)	**$1^{1}/_{4}$ (31.8)**	**$1^{1}/_{2}$ (38.1)**	**$1^{3}/_{4}$ (44.5)**	**$1^{25}/_{32}$ (45.2)**	**2 (50.8)**	**$2^{1}/_{4}$ (57.2)**	**$2^{1}/_{2}$ (63.5)**	**$2^{3}/_{4}$ (69.9)**	**$3^{3}/_{4}$ (95.3)**	**1.900 (48.3)**	**$2^{3}/_{8}$ (60.3)**	**$2^{7}/_{8}$ (73.0)**	**$3^{1}/_{2}$ (88.9)**	**$4^{1}/_{2}$ (114.3)**
Designation	106	125	150	175	178	200	225	250	275	375	15	20	25	30	40
6. Standing Valve	—	—	—	C16-175	—	—	C16-225	—	C16-275	C16-375	—	—	—	—	—
7. Top Plunger, S.P.[e]	-	C17-125	C17-150	—	—	C17-200	—	C17-250	—	—	—	—	—	—	—
2. Connector															
1. Upper Barrel	—	—	—	—	—	—	—	—	—	—	C-21-15	C21-20	C21-25	C21-30	—
	—	—	—	—	—	—	—	—	—	—	—	C21-20-125	—	—	—
2. Plunger, Box	—	—	—	C22-175	—	—	C22-225	—	C22-275	C22-375	—	—	—	—	—
3. Coupling															
1. Extension	C31-106-15 [c]	C31-125 [c]	C31-150 [c]	C31-175 [c]	—	—	C31-225 [c]	—	—	—	—	—	—	—	—
	C31-106 [c]	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Pull Tube, Up.	-	C32-125	C32-150	C32-175	—	C32-200	C32-225	C32-250	—	—	—	—	—	—	—
3. Pull Tube, Lr.	-	C33-125	C33-150-20	C33-175	—	C33-200	C33-225	—	—	—	—	—	—	—	—
	-	C33-125-15	C33-150-25	—	—	—	—	—	—	—	—	—	—	—	—
4. Tubing	—	—	—	—	—	—	—	—	—	—	C34-15	C34-20	C34-25	C34-30	C34-40
5. Barrel	—	—	—	—	—	—	—	—	—	—	—	C35-20	C35-25	C35-30	C35-40
6. Barrel Lower, S.P.[e]	—	—	—	—	—	—	—	—	—	—	—	C36-20	C36-25	C36-30	—
7. Barrel, S.P.[e]	—	—	—	—	—	—	—	—	—	—	—	C37-20	C37-25	C37-30	—
G															
1. Guide															
1. Valve Rod	—	—	—	—	—	—	—	—	—	—	G11-15	G11-20	G11-25	G11-30	—
N															
1. Nipple Seating															
1. Cup Type, Rod	—	—	—	—	—	—	—	—	—	—	N11-15	N11-20	N11-25	N11-30	—
2. Mech. Bottom	—	—	—	—	—	—	—	—	—	—	N12-15	N12-20	N12-25	N12-30	N12-40
3. Cup Type, Tubing	—	—	—	—	—	—	—	—	—	—	—	N13-20	N13-25	N13-30	—
4. Mech. Top	—	—	—	—	—	—	—	—	—	—	—	N14-20	N14-25	N14-30	—

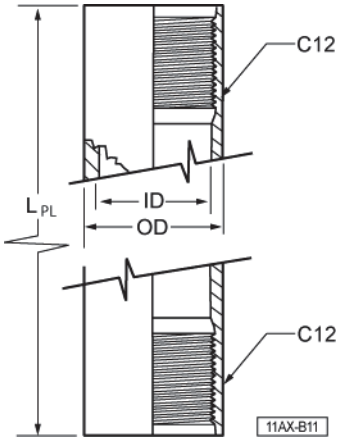
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Pump Bore Size, in. (mm)										**Tubing Size,** in. (mm)				
	$1^{1}/_{16}$ (26.7)	**$1^{1}/_{4}$ (31.8)**	**$1^{1}/_{2}$ (38.1)**	**$1^{3}/_{4}$ (44.5)**	**$1^{25}/_{32}$ (45.2)**	**2 (50.8)**	**$2^{1}/_{4}$ (57.2)**	**$2^{1}/_{2}$ (63.5)**	**$2^{3}/_{4}$ (69.9)**	**$3^{3}/_{4}$ (95.3)**	**1.900 (48.3)**	**$2^{3}/_{8}$ (60.3)**	**$2^{7}/_{8}$ (73.0)**	**$3^{1}/_{2}$ (88.9)**	**$4^{1}/_{2}$ (114.3)**
Designation	106	125	150	175	178	200	225	250	275	375	15	20	25	30	40
2. Nipple Extension															
1. Upper	—	—	—	—	—	—	—	—	—	—	—	N21-20c	N21-25c	N21-30c	N21-40[c]
2. Lower	—	—	—	—	—	—	—	—	—	—	—	N22-20c	N22-25c	N22-30c	N22-40[c]
P															
1. Plug															
1. Pull	-	P11-125	P11-150-20	P11-175	—	P11-200	P11-225	—	—	—	—	—	—	—	—
	-	P11-125-15	P11-150-25	—	—	—	—	—	—	—	—	—	—	—	—
2. Seat	P12-106	P12-125	P12-150	P12-175	—	P12-200	P12-225	P12-250	—	—	—	—	—	—	—
2. Plunger															
1. One Piece, Pin	P21-106 [b]	P21-125 [b]	P21-150 [b]	P21-175 [b]	—	P21-200 [b]	P21-225[b]	P21-250 [b]	P21-275 [b]	P21-375 [b]	—	—	—	—	—
2. Assembled Pin	P22-106 [b]	P22-125 [b]	P22-150 [b]	P22-175 [b]	—	P22-200 [b]	P22-225 [b]	P22-250 [b]	P22-275 [b]	—	—	—	—	—	—
3. One Piece, Box	—	—	—	P23-175 [b]	—	—	P23-225 [b]	—	P23-275 [b]	P23-375 [b]	—	—	—	—	—
4. Soft-packed	P24-106 [b]	P24-125 [b]	P24-150 [b]	—	P24-178 [b]	P24-200 [b]	P24-225 [b]	P24-250 [b]	P24-275 [b]	—	—	—	—	—	—
3. Puller															
1. Standing Valve	—	—	—	P31-175	—	—	P31-225	—	P31-275	P31-375	—	—	—	—	—
R															
1. Rod															
1. Valve	—	—	—	—	—	—	—	—	—	—	—	R11-20 [d]	R11-25 [d]	R11-30 [d]	—
S															
1. Seating Assy., Type HR, Cup															
1. Mandrel, Rod	—	—	—	—	—	—	—	—	—	—	—	S11-20	S11-25	S11-30	—
2. Cup, Rod	—	—	—	—	—	—	—	—	—	—	—	S12-20	S12-25	S12-30	—
3. Ring	—	—	—	—	—	—	—	—	—	—	—	S13-20	S13-25	S13-30	—
4. Nut	—	—	—	—	—	—	—	—	—	—	—	S14-20	S14-25	S14-30	—

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Pump Bore Size, in. (mm)										**Tubing Size,** in. (mm)				
	$1^{1}/_{16}$ (26.7)	**$1^{1}/_{4}$ (31.8)**	**$1^{1}/_{2}$ (38.1)**	**$1^{3}/_{4}$ (44.5)**	**$1^{25}/_{32}$ (45.2)**	**2 (50.8)**	**$2^{1}/_{4}$ (57.2)**	**$2^{1}/_{2}$ (63.5)**	**$2^{3}/_{4}$ (69.9)**	**$3^{3}/_{4}$ (95.3)**	**1.900 (48.3)**	**$2^{3}/_{8}$ (60.3)**	**$2^{7}/_{8}$ (73.0)**	**$3^{1}/_{2}$ (88.9)**	**$4^{1}/_{2}$ (114.3)**
Designation	106	125	150	175	178	200	225	250	275	375	15	20	25	30	40
5. Bushing, Top	—	—	—	—	—	—	—	—	—	—	S15-15	S15-20	S15-25	S15-30	—
	—	—	—	—	—	—	—	—	—	—	—	S15-20-125	—	—	—
6. Coupling, Bottom	—	—	—	—	—	—	—	—	—	—	S16-15	S16-20	S16-25	S16-30	—
7. Mandrel Tubing	—	—	—	—	—	—	—	—	—	—	—	S17-20	S17-25	S17-30	—
8. Cup, Tubing	—	—	—	—	—	—	—	—	—	—	—	S18-20	S18-25	S18-30	—
9. Cup, S.P.[e]	—	—	—	—	—	—	—	—	—	—	—	—	S19-25	S19-30	—
2. Seating Assy., Mech.															
1. Top Lock	—	—	—	—	—	—	—	—	—	—	—	S21-20	S21-25	S21-30	—
	—	—	—	—	—	—	—	—	—	—	—	S21-20-125	—	—	—
2. Bottom Lock	—	—	—	—	—	—	—	—	—	—	S22-15	S22-20	S22-25	S22-30	S22-40
3. Seating Assy., Type O, Cup															
1. Mandrel	—	—	—	—	—	—	—	—	—	—	S31-15	—	—	—	—
2. Cup	—	—	—	—	—	—	—	—	—	—	S32-15	—	—	—	—
3. Ring	—	—	—	—	—	—	—	—	—	—	S33-15	—	—	—	—
4. Nut	—	—	—	—	—	—	—	—	—	—	S34-15	—	—	—	—
T															
1. Tube															
1. Pull	-	T11-125 [d]	T11-150 [d]	T11-175 [d]	—	T11-200 [d]	T11-225 [d]	—	—	—	—	—	—	—	—
V															
1. Valve															
1. Ball and Seat	V11-106	V11-125	V11-150	V11-175	—	V11-200	V11-225	V11-250	V11-250	V11-375	—	—	—	—	—
	V11A106	V11A125	V11A150	V11A175	—	V11A200	V11A225	V11A250	V11A250	V11A375					
		V12-125	V12-150	V12-175	—	V12-200	V12-225	V12-250	V12-250	V12-375					

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Pump Bore Size, in. (mm)										**Tubing Size,** in. (mm)				
	$1^{1}/_{16}$ (26.7)	**$1^{1}/_{4}$ (31.8)**	**$1^{1}/_{2}$ (38.1)**	**$1^{3}/_{4}$ (44.5)**	**$1^{25}/_{32}$ (45.2)**	**2 (50.8)**	**$2^{1}/_{4}$ (57.2)**	**$2^{1}/_{2}$ (63.5)**	**$2^{3}/_{4}$ (69.9)**	**$3^{3}/_{4}$ (95.3)**	**1.900 (48.3)**	**$2^{3}/_{8}$ (60.3)**	**$2^{7}/_{8}$ (73.0)**	**$3^{1}/_{2}$ (88.9)**	**$4^{1}/_{2}$ (114.3)**
Designation	106	125	150	175	178	200	225	250	275	375	15	20	25	30	40
		V12A125	V12A150	V12A175	—	V12A200	V12A225	V12A250	V12A250	V12A375					
		V13-125	V13-150	V13-175	—	V13-200	V13-225	V13-250	V13-250	V13-375					
		V13A125	V13A150	V13A175	—	V13A200	V13A225	V13A250	V13A250	V13A375					
2. Ball	V12-106	V12-125	V12-150	V12-175	—	V12-200	V12-225	V12-250	V12-250	V12-375					
	V12A106	V12A125	V12A150	V12A175	—	V12-175	V12-200	V12A250	V12A250	V12A375					
3. Seat	V13-106	V13-125	V13-150	V13-175	—	V13-200	V13-225	V13-250	V13-250	V13-375					
	V13A106	V13A125	V13A150	V13A175	—	V13A200	V13A225	V13A250	V13A250	V13A375					

[a] Length of barrel.
[b] Length of plunger.
[c] Length of extension couplings or nipples.
[d] Length of valve rod or pull tube.
[e] S.P.—for soft-packed plunger pump.

Table C.3—B11—Barrel, Thin Wall (See Note)



(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	B11-125 [a]	**B11-150** [a]	**B11-200** [a]	**B11-250** [a]
C12	1.3330-16	1.5730-16	2.0870-16	2.5730-16
ID +0.002/–0.000 [b] (+0.05/–0.00)	1.250 (31.75)	1.500 (38.10)	2.000 (50.80)	2.500 (63.50)
OD ±0.010 (±0.25)	1.500 (38.10)	1.750 (44.45)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.250 (±6.35) [a]				

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length (L_{PL}). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

[b] ID tolerance to be +0.003/–0.000 up to 8 in. (+0.076/–0.00 up to 203.2 mm) from barrel face (L_{PL} dimension) on each end.

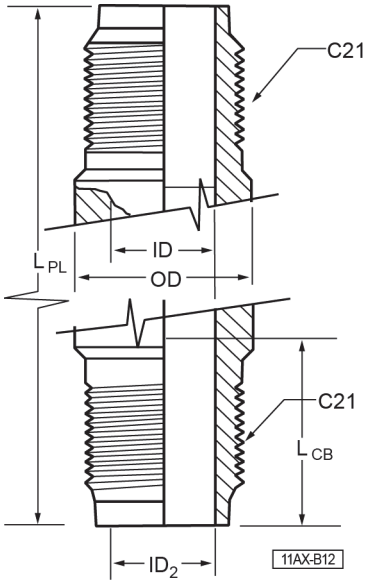


Table C.4—B12 or B12A—Barrel, Heavy Wall (Rod Pump) (See Note)

(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Part Number**				
	B12-106 [a]	**B12-125 [a]**	**B12-150 [a]**	**B12-175 [a]**	**B12-225 [a]**
C21	1.3125-16	1.5730-16	1.8750-16	2.0870-16	2.5730-16
L_{CB} +1.000/–0.750 (+25.40/–19.1)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)
ID +0.002/–0.000 [b] (+0.05/–0.00)	1.0625 (26.99)	1.250 (31.75)	1.500 (38.10)	1.750 (44.45)	2.250 (57.15)
ID_2 +0.062/–0.015 (+1.57/–0.38)	1.088 (27.64)	1.275 (32.39)	1.525 (38.74)	1.775 (45.09)	2.275 (57.79)
B12 OD	1.312 (33.32) +0.010 /−0.002 (+0.25 /−0.05)	1.625 (41.28) +0.010 /−0.025 (+0.25 /−0.64)	1.875 (47.63 +0.010 /−0.010 (+0.25 /−0.25)	2.125 (53.98) +0.010 /−0.025 (+0.25 /−0.64)	2.625(66.68) +0.010 /−0.025 (+0.25 /−0.64)
B12A OD ±0.010 (±0.25)	1.438 (36.53)	1.750 (44.45)	2.250 (57.15)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.250 (±6.35) [a]					

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length (L_{PL}). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

[b] ID tolerance to be +0.003/–0.000 up to 8 in. (+0.076/–0.00 up to 203.2 mm) from barrel face (L_{PL} dimension) on each end.

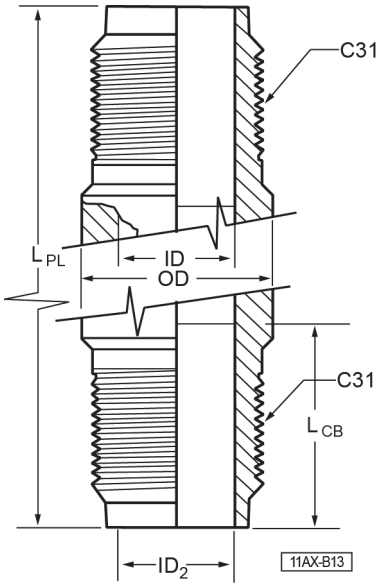


Table C.5—B13—Barrel, Heavy Wall (Tubing Pump) (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	B13-175 [a]	**B13-225** [a]	**B13-275** [a]	**B13-375** [a]
C31	2.2380-11 1/2	2.7380-11 1/2	3.2380-11 1/2	4.2380-11 1/2
ID +0.002/–0.000 [b] (+0.05/–0.00)	1.750 (44.45)	2.2500 (57.15)	2.7500 (69.85)	3.750 (95.25)
OD max./min.	2.260/2.230 (57.40/56.64)	2.760/2.730 (70.10/69.34)	3.260/3.230 (82.80/82.04)	4.260/4.230 (108.20/107.44)
L_{PL} ±0.250 (±6.35) [a]				
L_{CB} +1.000/–0.750 (+25.40/–19.05)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	2.250 (57.15)
ID_2 +0.062/–0.015 (+1.57/–0.38)	1.775 (45.09)	2.275 (57.79)	2.775 (70.49)	3.775 (95.89)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length (L_{PL}). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

[b] ID tolerance to be +0.003/–0.000 up to 8 in. (+0.076/–0.00 up to 203.2 mm) from barrel face (L_{PL} dimension) on each end.

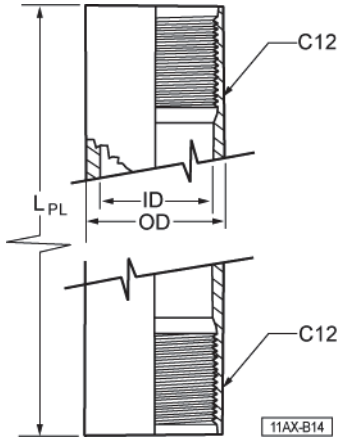


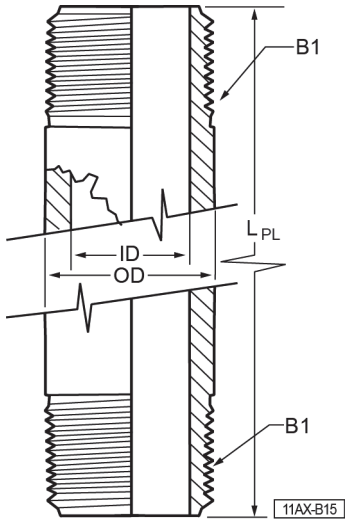
Table C.6—B14—Barrel, Thin Wall (Soft-Packed Rod Pump) (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	B14-125 [a]	**B14-150** [a]	**B14-200** [a]	**B14-250** [a]
C12	1.3330-16	1.5730-16	2.0870-16	2.5730-16
ID +0.0062/–0.0022 (+0.16/–0.06)	1.250 (31.75)	1.500 (38.10)	2.000 (50.80)	2.500 (63.50)
OD ±0.010 (±0.25)	1.500 (38.10)	1.750 (44.45)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.250 (±6.35) [a]				

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length (L_{PL}). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

Table C.7—B15—Barrel, Heavy Wall (Soft-Packed Tubing Pump) (See Note)



(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	B15-178 [a]	**B15-225** [a]	**B15-275** [a]
B1	178-11 1/2	225-11 1/2	275-11 1/2
ID +0.0062/–0.0022 (+0.16/–0.06)	1.781 (45.24)	2.250 (57.15)	2.750 (69.85)
OD ±0.02 (±0.51)	2.250 (57.15)	2.750 (69.85)	3.250 (82.55)
L_{PL} ±0.25 (±6.35) [a]			

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length (L_{PL}). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

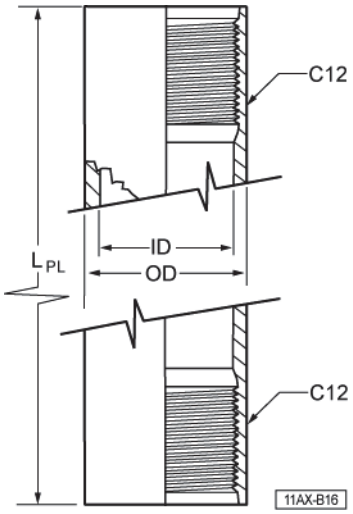


Table C.8—B16 or B16M—Barrel, Heavy Wall (Rod Pump) (See Note)

(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	B16-125 [a]	**B16-150** [a]	**B16-200** [a]
C12	1.3330-16	1.5730-16	2.0870-16
ID +0.002/–0.000 [b] (+0.05/–0.00)	1.250 (31.75)	1.500 (38.10)	2.000 (50.80)
B16 OD ±0.010 (±0.25)	1.625 (41.27)	1.875 (47.62)	2.312 (58.72)
B16M OD ±0.010 (±0.25)	1.750 (44.45)		
L_{PL} ±0.250 (±6.35) [a]			

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Specify barrel length (L_{PL}). Standard lengths are: 2 ft (0.61 m) through 40 ft (12.19 m) in 1 ft (0.305 m) increments.

[b] ID tolerance to be +0.003/–0.000 up to 8 in. (+0.076/–0.00 up to 203.2 mm) from barrel face (L_{PL} dimension) on each end.

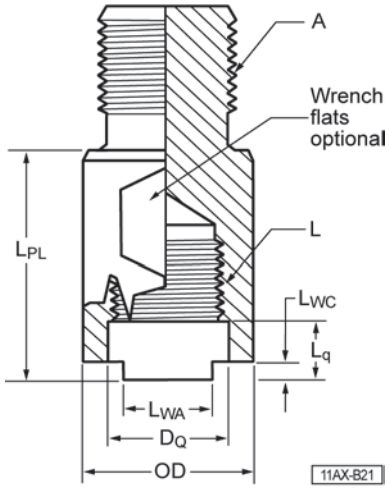


Table C.9—B21 and B21M[c]—Bushing, Valve Rod (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	Part Number			
	B21-15	B21-20	B21-25	B21-30
A [a]	5/8	3/4	3/4	3/4
L [b]	3/8	3/8	1/2	3/4
D_Q +0.003/–0.000 (+0.08/–0.00)	0.690 (17.53)	0.690 (17.53)	0.877 (22.28)	1.065 (27.05)
L_q ±0.031 (±0.79)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)
L_{qm} [c] ±0.031 (±0.79)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)
OD +0.031/–0.010 (+0.79/–0.25)	1.250 (31.8)	1.500 (38.1)	1.625 (41.3)	1.625 (41.3)
L_{PL} ±1.000 (±25.40)	2.750 (69.85)	2.750 (69.85)	2.750 (69.85)	2.750 (69.85)
L_{PLM} [c] ±1.000 (±25.40)	3.500 (88.90)	3.500 (88.90)	3.500 (88.90)	3.500 (88.90)
L_{WA}	0.562 (14.27) +0.000/–0.031 (+0.00/–0.79)	0.688 (17.48) ± 0.031 (±0.79)	0.750 (19.05) ±0.031 (±0.79)	0.875 (22.23) ±0.031 (±0.79)
L_{WC} +0.062/–0.000 (+1.57/–0.00)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Sucker rod thread designation. See API 11B for details. Other sucker rod pin size designations are acceptable per user agreement.

[b] Modified line pipe thread designation. See Table G.5 for details.

[c] B21M is an optional substitution for B21 with L_{qm} and L_{PLM} dimensions being used in place of L_q and L_{PL} dimensions.

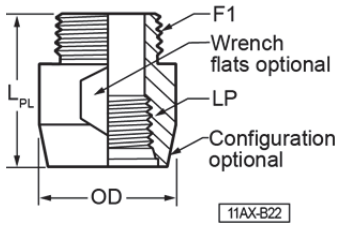


Table C.10—B22—Bushing, Seat, Barrel Cage (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	B22-15	**B22-20**	**B22-25**	**B22-30**
F1	1.2500-14	1.4704-14	1.8024-14	2.1095-11 1/2
LP [a]	3/4 nom.	1 nom	1 1/4 nom	1 1/2 nom
OD max./min.	1.438/1.375 (36.53/34.93)	1.750/1.625 (44.45/41.28)	2.250/2.125 (57.15/53.98)	2.750/2.563 (69.85/65.10)
L_{PL} ± 1.000 (±25.40)	2.250 (57.15)	2.500 (57.15)	2.750 (69.85)	3.000 (76.20)
NOTE All dimensions in inches (followed by equivalent in millimeters).				
[a] Line pipe thread (LP). See API 5B for details.				

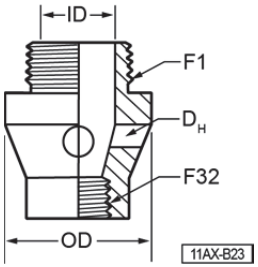


Table C.11—B23—Bushing, Cage to Puller (See Note)

(1)	(2)
Dimensional Symbol	**Part Number**
	B23-40
F1	3.1715-11 1/2
F32	2.1095-11 1/2
OD	3.625 ±0.031 (92.08 ±0.79)
ID	1.750 ±0.031 (44.45 ±0.79)
D_H	1.125 ±0.031 (28.58 ±0.79)
NOTE All dimensions in inches (followed by equivalent in millimeters).	

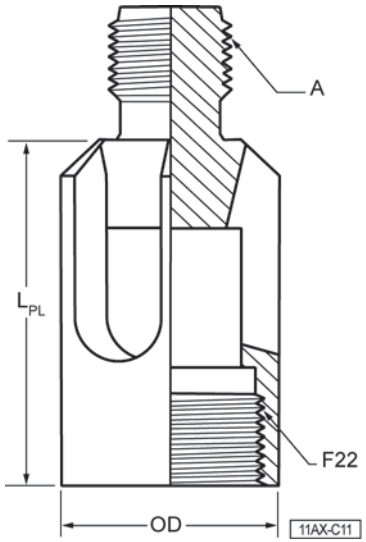


Table C.12—C11—Cage, Top Open (See Note)

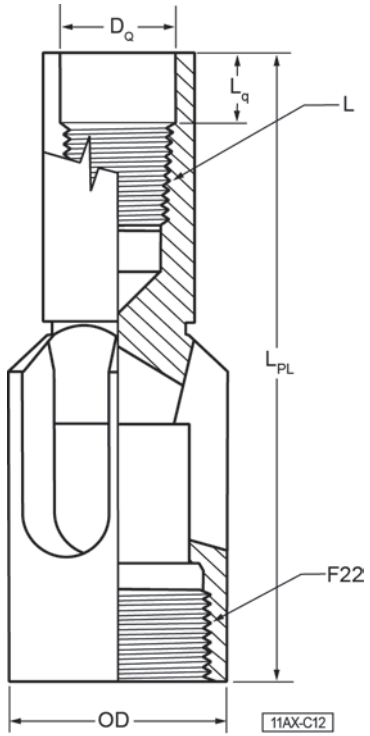
(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	Part Number				
	C11-15	C11-20	C11-25	C11-30	C11-40
A [a]	5/8	3/4	3/4	3/4	1
F22	1.2500-14	1.4704-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
OD ±0.031 (±0.79)	1.438 (36.53)	1.688 (42.88)	2.188 (55.58)	2.625 (66.68)	3.625 (92.08)
L_{PL} ±1.000 (±25.40)	3.000 (76.20)	3.500 (88.90)	4.000 (101.60)	4.500 (114.30)	5.750 (146.05)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate clearance and fluid passage, in accordance with manufacturer's specifications.

[a] Sucker rod thread designation. See API 11B for details. Other sucker rod pin size designations are acceptable per user agreement.

[b] See API 11B dimensional D_F for diameter of contact face.



NOTE Top diameter portion of cage is optional with the manufacturer; however, if it is reduced it shall be of such dimensions to permit free entry into the bore of the upper barrel connector (C21) and the top anchor seating cup bushing (S15).

Table C.13—C12 and C12M [b]—Cage, Top Plunger (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dimensional Symbol	Part Number							
	C12-106	C12-125	C12-150-20	C12-150-25	C12-175	C12-200	C12-225	C12-250
F22	0.875-14	1.0000-14	1.2500-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2
L nom [a]	3/8	3/8	3/8	1/2	1/2	1/2	3/4	3/4
D_Q +0.003/–0.000 (+0.08/–0.00)	0.690 (17.53)	0.690 (17.53)	0.690 (17.53)	0.877 (22.28)	0.877 (22.28)	0.877 (22.28)	1.065 (27.05)	1.065 (27.05)
L_q ±0.031 (±0.79)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)
L_{qm} [b] ±0.031 (±0.79)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)
L_{PL} ±0.031 (±0.79)	4.500 (114.3)	4.500 (114.3)	5.000 (127.0)	5.000 (127.0)	5.375 (136.5)	5.375 (136.5)	6.125 (155.6)	6.375 (161.9)
L_{PLM} [b] ±0.031 (±0.79)	5.250 (133.35)	5.250 (133.35)	5.750 (146.05)	5.750 (146.05)	6.125 (155.58)	6.125 (155.58)	6.875 (174.63)	7.125 (180.98)
OD ±0.031 (±0.79)	1.036 ±0.005	1.200 (30.48)	1.450 (36.83)	1.450 (36.83)	1.700 (43.18)	1.950 (49.53)	2.200 (55.88)	2.450 (62.23)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate ball clearance and fluid passage, in accordance with manufacturer's specifications.

[a] Modified line pipe thread. See Table G.5 for details.

[b] C12M is an optional substitution for C12 with L_{qm} dimension being used in place of L_q dimension and L_{PLM} in place of L_{PL}.

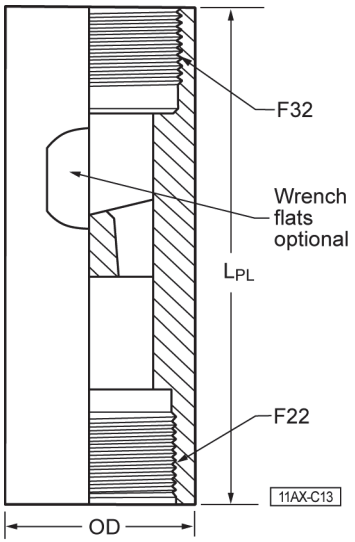


Table C.14—C13—Cage, Closed, Pin Plunger (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dimensional Symbol	**Part Number**								
	C13-106	**C13-125**	**C13-150**	**C13-175**	**C13-200**	**C13-225**	**C13-250**	**C13-275**	**C13-375**
F22	0.8750-14	1.0000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2	2.1095-11 1/2	3.1715-11 1/2
F32	0.8750-14	1.0000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2	2.1095-11 1/2	3.1715-11 1/2
L_{PL} ±0.062 (±1.58)	3.500 (88.9)	3.500 (88.9)	4.125 (104.8)	4.750 (120.7)	5.000 (127.0)	5.250 (133.4)	5.500 (139.7)	5.500 (139.7)	8.000 (203.2)
OD ±0.031 (±0.79)	1.036 ±0.005 (0.13)	1.200 (30.48)	1.450 (36.83)	1.700 (43.18)	1.950 (49.53)	2.200 (55.88)	2.450 (62.23)	2.650 (67.31)	3.650 (92.71)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate ball clearance and fluid passage, in accordance with manufacturer's specifications.

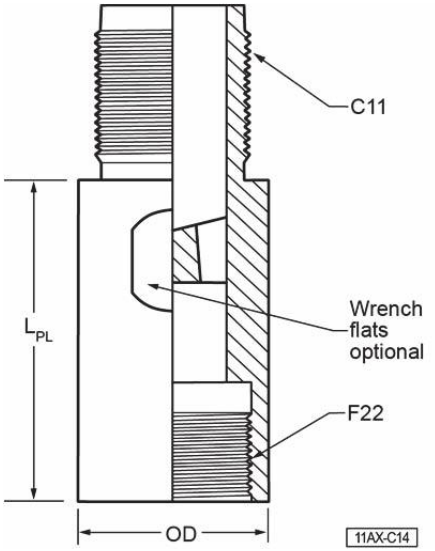


Table C.15—C14—Cage, Closed Barrel (See Note)

(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Part Number**				
	C14-15	**C14-20-125**	**C14-20**	**C14-25**	**C14-30**
C11	1.3330-16	1.3330-16	1.5730-16	2.0870-16	2.5730-16
F22	1.2500-14	1.4704-14	1.4704-14	1.8024-14	2.1095-11 1/2
OD ±0.010 (±0.254)	1.440 (36.58)	1.750 (44.45)	1.750 (44.45)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±1.000 (±25.4)	3.750 (95.25)	3.750 (95.25)	3.750 (95.25)	4.000 (101.60)	4.500 (114.30)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate ball clearance and fluid passage, in accordance with manufacturer's specifications.

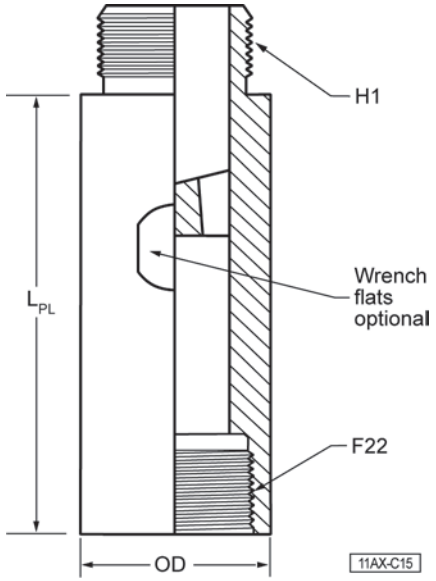


Table C.16—C15—Cage, Closed, Box Plunger (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	C15-175	**C15-225**	**C15-275**	**C15-375**
H1	1.5084-14	1.9864-14	2.3755-11 1/2	3.3825-11 1/2
F22	1.4704-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
OD ±0.031 (±0.79)	1.700 (43.18)	2.200 (55.88)	2.650 (67.31)	3.650 (92.71)
L_{PL} ±1.000 (±25.40)	4.750 (120.65)	5.250 (133.35)	5.250 (133.35)	6.250 (158.75)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate ball clearance and fluid passage, in accordance with manufacturer's specifications.

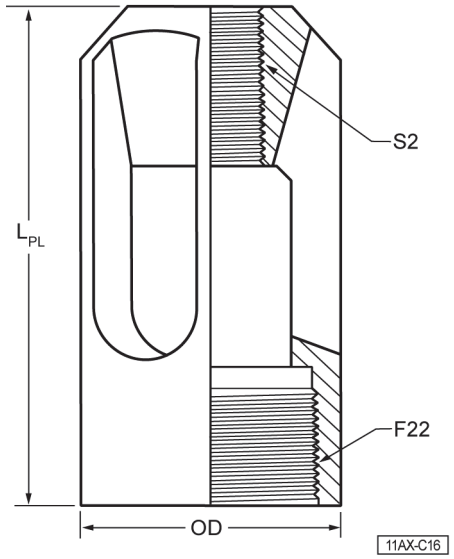


Table C.17—C16—Cage, Standing Valve (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	C16-175	**C16-225**	**C16-275**	**C16-375**
F22	1.4704-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
S2	0.750-10	0.750-10	0.750-10	0.750-10
OD +0.010/-0.030 (+0.25/-0.76)	1.678 (42.62)	2.178 (55.32)	2.625 (66.68)	3.625 (92.08)
L_{PL} ±1.000 (±25.40)	3.750 (95.25)	4.000 (101.60)	4.500 (114.30)	6.250 (158.75)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate ball clearance and fluid passage, in accordance with manufacturer's specifications.

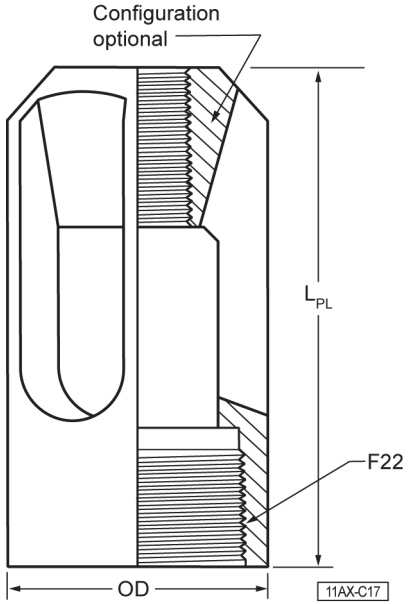


Table C.18—C17—Cage, Top Plunger (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	C17-125	**C17-150**	**C17-200**	**C17-250**
F22	1.0000-14	1.2500-14	1.5604-14	2.1095-11 1/2
OD ±0.031 (±0.79)	1.200 (30.48)	1.450 (36.83)	1.950 (49.53)	2.450 (62.23)
L_{PL} ±0.031 (±0.79)	2.625 (66.7)	2.750 (69.9)	3.375 (85.7)	4.250 (108.0)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions and configuration of ball chamber shall be such as to provide adequate ball clearance and fluid passage, in accordance with manufacturer's specifications.

NOTE 3 Top configuration and thread requirement are optional and shall be in accordance with manufacturer's specifications.

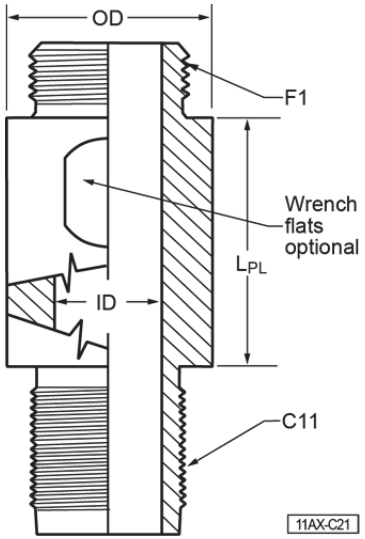


Table C.19—C21—Connector, Upper Barrel (See Note)

(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	Part Number				
	C21-15	C21-20-125	C21-20	C21-25	C21-30
C11	1.3330-16	1.3330-16	1.5730-16	2.0870-16	2.5730-16
F1	1.2500-14	1.4704-14	1.4704-14	1.8024-14	2.1095-11 1/2
ID	0.938 ±0.015 (23.83 ±0.38)	1.000 ±0.062 (25.40 ±1.58)	1.000 ±0.062 (25.40 ±1.58)	1.250 ±0.062 (31.75 ±1.58)	1.500 ±0.062 (38.10 ±1.58)
OD ±0.010 (±0.25)	1.440 (36.58)	1.750 (44.45)	1.750 (44.45)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.031 (±0.79)	2.500 (63.5)	2.500 (63.5)	2.500 (63.5)	3.000 (76.2)	3.000 (76.2)

NOTE All dimensions in inches (followed by equivalent in millimeters).

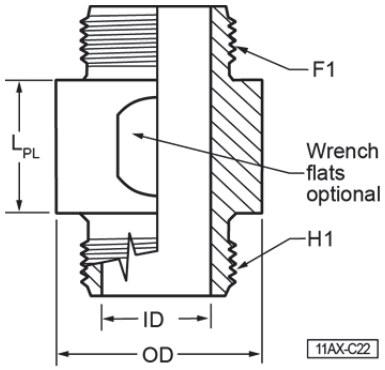


Table C.20—C22—Connector, Box Plunger (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	Part Number			
	C22-175	C22-225	C22-275	C22-375
F1	1.4704-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
H1	1.5084-14	1.9864-14	2.3755-11 1/2	3.3825-11 1/2
ID	1.000 ±0.062 (25.40 ±1.58)	1.250 ±0.062 (31.75 ±1.58)	1.500 ±0.062 (38.10 ±1.58)	2.312 ±0.250 (58.73 ±6.35)
OD ±0.031 (±0.79)	1.700 (43.18)	2.200 (55.88)	2.650 (67.31)	3.650 (92.71)
L_{PL} ±0.500 (±12.70)	1.500 (38.10)	1.500 (38.10)	1.500 (38.10)	1.750 (44.45)

NOTE All dimensions in inches (followed by equivalent in millimeters).

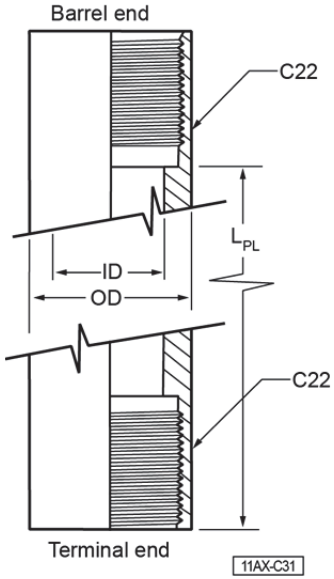


Table C.21—C31—Coupling, Extension (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dimensional Symbol	**Part Number**					
	C31-106-15 [a]	**C31-106** [a]	**C31-125** [a]	**C31-150** [a]	**C31-175** [a]	**C31-225** [a]
C22 [b]	1.3125-16	1.3125-16	1.5730-16	1.8750-16	2.0870-16	2.5730-16
C22 [c]	1.3330-16	1.5730-16	1.5730-16	2.0870-16	2.0870-16	2.5730-16
ID ±0.031 (±0.79)	1.093 (27.76) min.	1.093 (27.76) min.	1.312 (33.32)	1.593 (40.46)	1.812 (46.02)	2.312 (58.72)
OD +0.010/–0.030 (+0.25/–0.76)	1.450 (36.83) max.	1.760 (44.70) max.	1.750 (44.45)	2.250 (57.15)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.250 (±6.35) [a]	Specify length (L_{PL}) in inches (millimeters)					

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Standard coupling lengths are 6, 12, 18, 24, 36 in., etc. (152.4, 304.8, 457.2, 609.6, 914.4 mm, etc.).

[b] Barrel end.

[c] Terminal end.

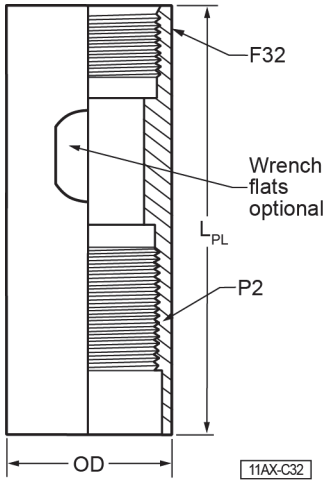


Table C.22—C32—Coupling, Pull Tube, Upper (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dimensional Symbol	**Part Number**					
	C32-125	**C32-150**	**C32-175**	**C32-200**	**C32-225**	**C32-250**
F32	1.0000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2
P2	0.9375-16	1.1250-16	1.3125-16	1.5000-16	1.8750-16	1.8750-16
OD ±0.031 (±0.79)	1.200 (30.48)	1.450 (36.83)	1.700 (43.18)	1.950 (49.53)	2.200 (55.88)	2.450 (62.23)
L_{PL} ±0.031 (±0.79)	4.000 (101.6)	4.000 (101.6)	4.188 (106.4)	4.375 (111.1)	5.375 (136.5)	5.375 (136.5)

NOTE All dimensions in inches (followed by equivalent in millimeters).

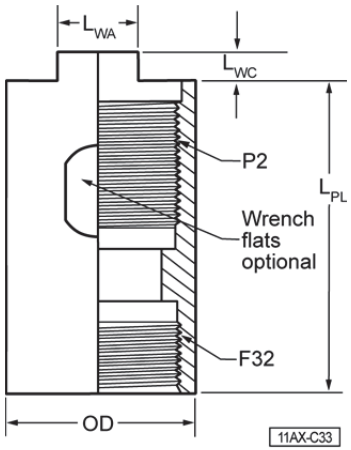


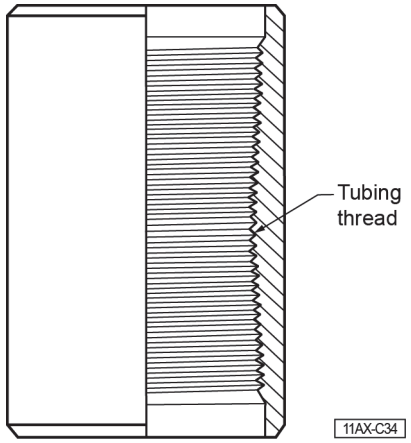
Table C.23—C33—Coupling, Pull Tube, Lower (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dimensional Symbol	**Part Number**						
	C33-125-15	**C33-125**	**C33-150-20**	**C33-150-25**	**C33-175**	**C33-200**	**C33-225[a]**
F32	1.2500-14	1.4704-14	1.4704-14	1.8024-14	1.8024-14	1.8024-14	2.1095-11 1/2
P2	0.9375-16	0.9375-16	1.1250-16	1.1250-16	1.3125-16	1.5000-16	1.8750-16
L_{WA} ±0.031 (±0.79)	0.688 (17.48)	0.688 (17.48)	0.688 (17.48)	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)	0.875 (22.23)
L_{WC} +0.062/-0.000 (+1.57/-0.00)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)
OD	1.440 ±0.010 (36.58 ±0.25)	1.750 ±0.062 (44.45 ±1.58)	1.750 ±0.062 (44.45 ±1.58)	2.200 ±0.062 (55.88 ±1.58)	2.200 ±0.062 (55.88 ±1.58)	2.200 ±0.125 (55.88 ±3.18)	2.700 ±0.125 (68.58 ±3.18)
L_{PL} ±0.500 (±12.70)	2.875 (73.03)	2.875 (73.03)	3.000 (76.20)	3.125 (79.38)	3.250 (82.55)	3.250 (82.55)	3.500 (88.90)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Used on 2 1/4 in. (57.2 mm) and 2 1/2 in. (63.5 mm) bore pumps.

Table C.24—C34—Coupling, Tubing (See Notes)



(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Part Number**				
	C34-15 [b]	**C34-20**	**C34-25**	**C34-30**	**C34-40**
Tubing thread [a]	1.900-10IJ	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU	$4^{1}/_{2}$-8EU

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

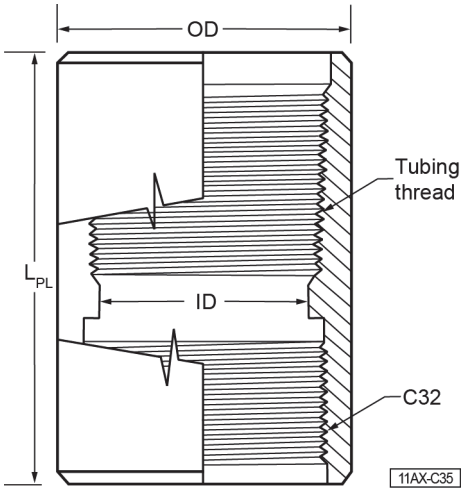
NOTE 2 See API 5CT for dimensions.

NOTE 3 C34 coupling is only to be used for sucker rod pumps, not to be used as tubing coupling.

[a] See API 5B for thread details.

[b] OD of C34-15 coupling shall be 2.110 in. (53.6 mm).

Table C.25—C35—Coupling, Barrel (See Note)

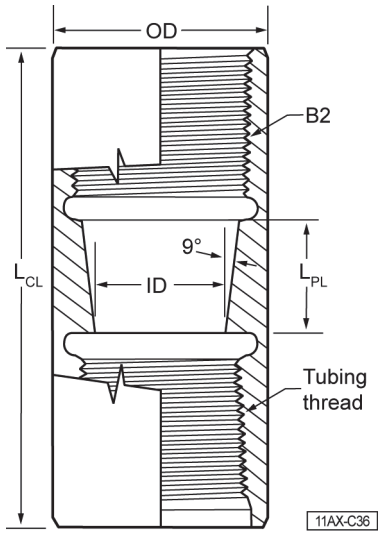


(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	C35-20	**C35-25**	**C35-30**	**C35-40**
Tubing thread [a]	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU	$4^{1}/_{2}$-8EU
C32	2.2380-$11^{1}/_{2}$	2.7380-$11^{1}/_{2}$	3.2380-$11^{1}/_{2}$	4.2380-$11^{1}/_{2}$
ID ±0.031 (±0.79)	1.843 (46.81)	2.343 (59.51)	2.843 (72.21)	3.843 (97.61)
OD ±0.062 (±1.57)	3.000 (76.2)	3.625 (92.1)	4.500 (114.3)	5.563 (141.30)
L_{PL} ±1.000 (±25.40)	5.000 (127.00)	5.250 (133.35)	5.500 (139.70)	6.500 (165.10)

NOTE All dimensions in inches (followed by equivalent in millimeters).

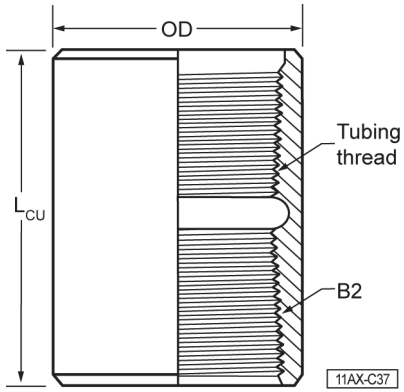
[a] See API 5B for tubing thread details.

Table C.26—C36—Coupling, Barrel, Lower (Soft-Packed Tubing Pump) (See Note)



(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	C36-20	**C36-25**	**C36-30**
Tubing thread [a]	$2^3/_8$-8EU	$2^7/_8$-8EU	$3^1/_2$-8EU
B2	178-$11^1/_2$	225-$11^1/_2$	275-$11^1/_2$
ID ±0.020 (±0.51)	1.391 (35.33)	1.852 (47.04)	2.312 (58.72)
OD ±0.031 (±0.79)	3.000 (76.2)	3.625 (92.1)	4.500 (114.3)
L_{PL} ±0.062 (±1.57)	1.000 (25.4)	1.125 (28.6)	1.250 (31.8)
L_{CL} ±0.062 (±1.57)	6.125 (155.50)	6.500 (165.10)	7.000 (177.80)
NOTE All dimensions in inches (followed by equivalent in millimeters).			
[a] See API 5B for tubing thread details.			

Table C.27—C37—Coupling, Barrel, Upper (Soft-Packed Tubing Pump) (See Note)



(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	C37-20	**C37-25**	**C37-30**
Tubing thread [a]	$2^3/_8$-8EU	$2^7/_8$-8EU	$3^1/_2$-8EU
B2	178-$11^1/_2$	225-$11^1/_2$	275-$11^1/_2$
OD ±0.062 (±1.57)	3.000 (76.2)	3.625 (92.1)	4.500 (114.3)
L_{CU} ±0.062 (±1.57)	4.375 (111.12)	4.500 (114.30)	4.875 (123.82)
NOTE All dimensions in inches (followed by equivalent in millimeters).			
[a] See API 5B for tubing thread details.			

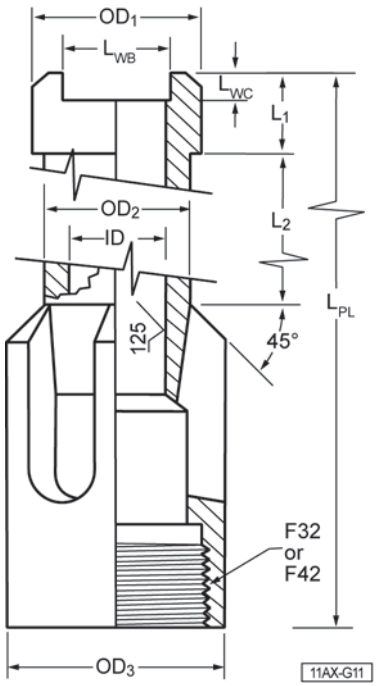


Table C.28—G11—Guide, Valve Rod (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	G11-15	**G11-20**	**G11-25**	**G11-30**
F32, F42	1.2500-14	1.4704-14	1.8024-14	2.1095-11 1/2
ID ±0.062 (±1.57)	0.766 (19.46)	0.766 (19.46)	0.953 (24.21)	1.141 (28.98)
L_1 ±0.031 (±0.79)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)	0.750 (19.1)
L_2 +0.062/–0.000 (+1.57/–0.00)	2.125 (54.0)	2.125 (54.0)	2.375 (60.3)	2.500 (63.5)
OD_1 ±0.005 (± 0.13)	1.250 (31.75)	1.500 (38.10)	1.625 (41.28)	1.625 (41.28)
OD_2 +0.000/–0.031 (+0.00/–0.79)	1.125 (28.6)	1.375 (34.9)	1.500 (38.1)	1.500 (38.1)
OD_3 ±0.031 (±0.79)	1.500 (38.10)	1.750 (44.45)	2.250 (57.15)	2.750 (69.85)
L_{WB} +0.062/–0.000 (+1.57/–0.00)	0.625 (15.88)	0.812 (20.62)	1.000 (25.40)	1.000 (25.40)
L_{WC} +0.062/–0.000 (+1.57/–0.00)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)
L_{PL} ±0.031 (±0.79)	5.500 (139.7)	5.500 (139.7)	6.000 (152.4)	6.250 (158.8)

NOTE All dimensions in inches (followed by equivalent in millimeters).

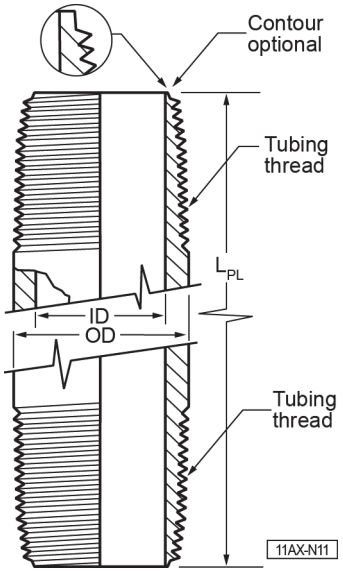


Table C.29—N11—Nipple, Seating, Cup Type (Rod Pump) (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	N11-15	**N11-20**	**N11-25**	**N11-30**
Tubing thread [a]	1.900-10IJ [b]	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU
ID +0.010/–0.000 (+0.25/–0.00)	1.460 (37.08)	1.780 (45.21)	2.280 (57.91)	2.780 (70.61)
L_{PL} min [c] ±0.125 (3.18)	6.000 (152.4)	6.000 (152.4)	6.000 (152.4)	6.000 (152.4)
OD +0.062/–0.015 (+1.57/–0.38)	2.094 [d] (53.19)	2.594 (65.89)	3.094 (78.59)	3.750 (95.25)

NOTE All dimensions in inches (followed by equivalent in millimeters).

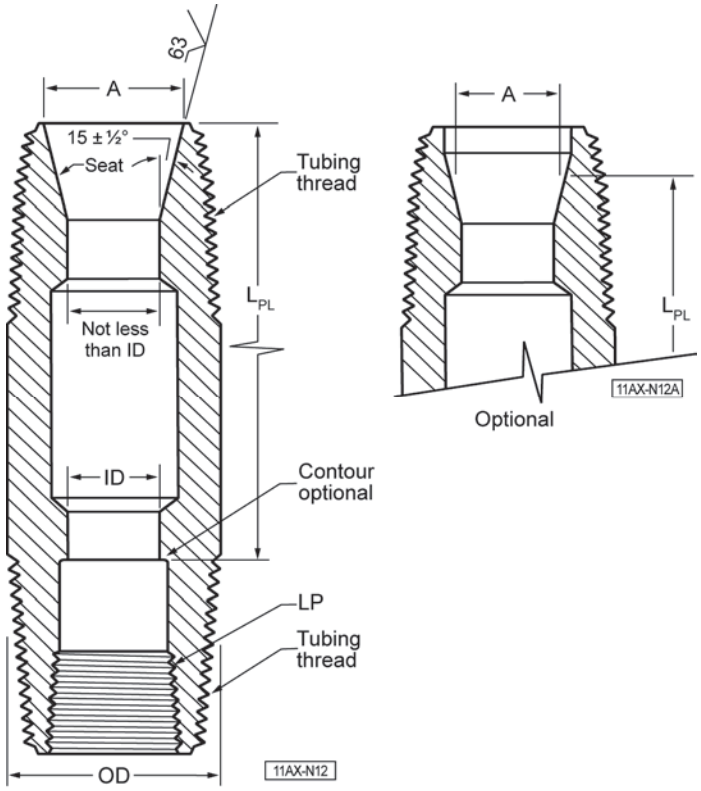
[a] See API 5B for tubing thread details.

[b] Upper connection may be 1.900-10IJ (48.3-10IJ) box thread, thus eliminating need for C34-15 coupling.

[c] Specify nipple length (L_{PL}). Standard lengths are: 6 in. (15.2 cm) through 24 in. (61.0 cm) in 6 in. (15.2 cm) increments.

[d] Thread major diameter shall be extended to allow clearance of C34 coupling counterbore.

Table C.30—N12—Nipple, Seating, Mechanical Bottom (See Note)



(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Part Number**				
	N12-15	**N12-20**	**N12-25**	**N12-30**	**N12-40**
Tubing thread [a]	1.900-10IJ [c]	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU	$4^{1}/_{2}$-8EU
A ±0.005 (±0.13)	1.475 (37.47)	1.688 (42.88)	2.188 (55.58)	2.688 (68.28)	3.688 (93.68)
ID ±0.005 (±0.13)	1.125 (28.58)	1.375 (34.93)	1.750 (44.45)	2.250 (57.15)	3.000 (76.20)
L_{PL} +0.000/–0.016 (+0.00/–0.41)	3.656 (92.86)	4.352 (110.54)	5.102 (129.59)	6.164 (156.57)	6.188 (157.18)
LP nom. [b]	1	$1^{1}/_{2}$	2	$2^{1}/_{2}$	3
OD +0.062/–0.015 (+1.57/–0.38)	2.094 [d] (53.19)	2.594 (65.89)	3.094 (78.59)	3.750 (95.25)	4.750 (120.65)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See API 5B for tubing thread details.

[b] Line pipe threads. See API 5B for details.

[c] Upper connection may be 1.900-10IJ (48.3-10IJ) box thread, thus eliminating need for C34-15 coupling.

[d] Thread major diameter shall be extended to allow clearance of C34 coupling counterbore.

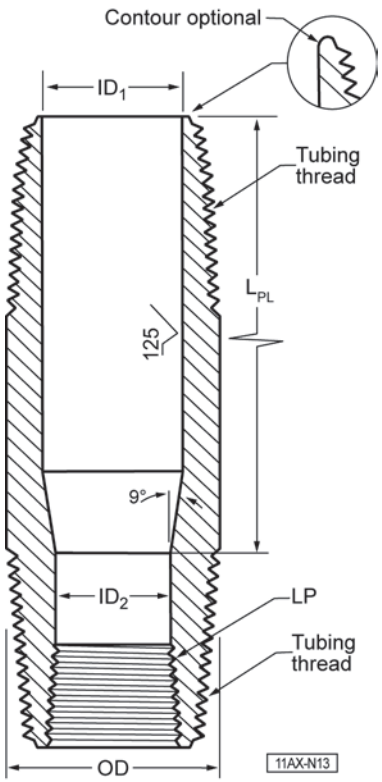


Table C.31—N13—Nipple, Seating, 2 Cup Type (Tubing Pump) (See Note)

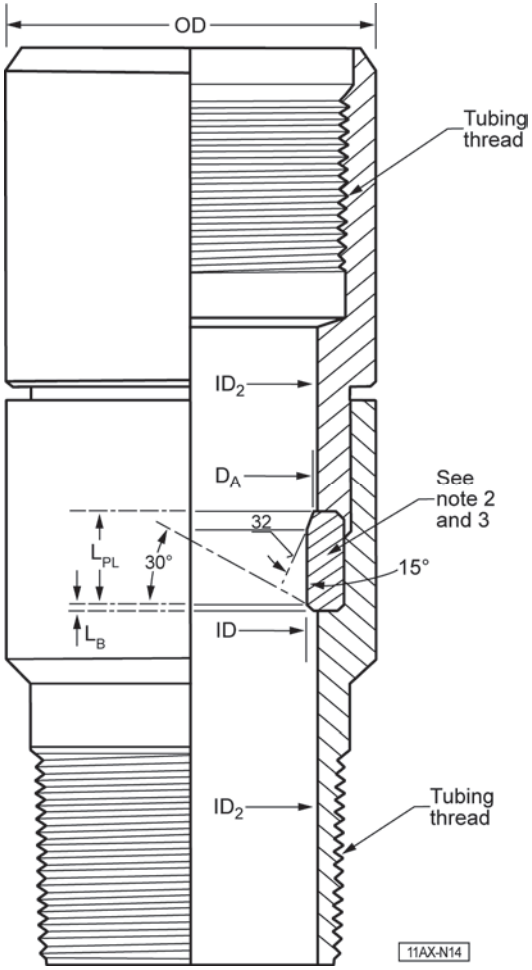
(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	N13-20	**N13-25**	**N13-30**
Tubing thread [a]	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU
ID_1 +0.010/–0.000 (+0.25/–0.00)	1.710 (43.43)	2.210 (56.13)	2.710 (68.83)
ID_2 +0.040/–0.000 (+1.02/–0.00)	1.371 (34.82)	1.832 (46.53)	2.156 (54.76)
L_{PL} ± $^{3}/_{8}$ (±9.5)	5.250 (133.4)	5.750 (146.1)	6.000 (152.4)
OD +0.062/–0.015 (+1.57/–0.38)	2.594 (65.89)	3.094 (78.59)	3.750 (95.25)
LP nom [b]	$1^{1}/_{2}$	2	2

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See API 5B for tubing thread details.

[b] Line pipe threads (LP). See API 5B for details.

Table C.32—N14—Nipple, Seating, Mechanical Top Lock (See Note)



(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	N14-20	**N14-25**	**N14-30**
Tubing thread [a]	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU
D_A ±0.002 (±0.05)	1.875 (47.63)	2.344 (59.54)	2.844 (72.24)
L_B ±0.005 (±0.13)	0.030 (0.76)	0.030 (0.76)	0.030 (0.76)
ID +0.010/–0.000 (+0.25/–0.00)	1.780 (45.21)	2.280 (57.91)	2.780 (70.61)
ID_2 +0.165/–0.000 (+4.19/–0.00)	1.902 (48.29)	2.350 (59.69)	2.867 (72.82)
L_{PL} +0.000/–0.005 (+0.00/–0.13)	0.973 (24.71)	0.918 (23.32)	0.918 (23.32)
OD ±0.062 (±1.57)	3.000 (76.2)	3.625 (92.1)	4.500 (114.30)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Hardness of center piece shall be in range of HRC 40/58.

NOTE 3 These three parts may not be interchangeable between manufacturers, only the assembly is intended to be interchangeable. Care should be taken when replacing interior ring to assure a proper fit.

[a] See API 5B for tubing thread details.

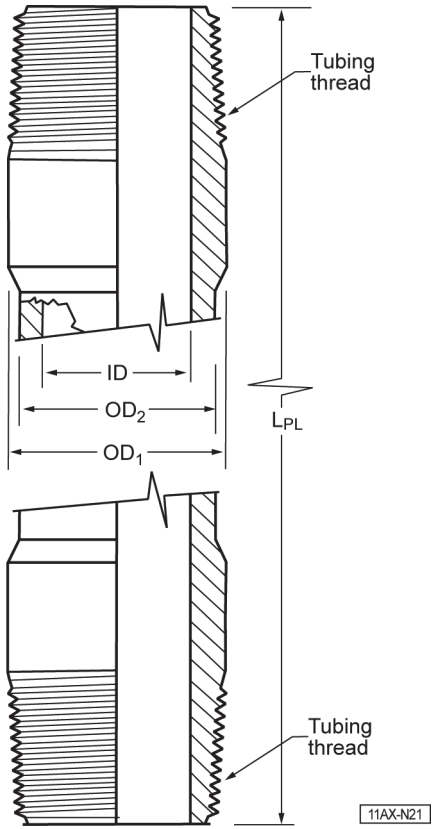


Table C.33—N21—Nipple, Extension, Upper (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	Part Number			
	N21-20	N21-25	N21-30	N21-40
Tubing thread [a]	$2^{3}/_{8}$-8EU	$2^{7}/_{8}$-8EU	$3^{1}/_{2}$-8EU	$4^{1}/_{2}$-8EU
ID +0.165/–0.000 (+4.19/–0.00)	1.902 (48.31)	2.350 (59.69)	2.867 (72.82)	3.835 (97.41)
OD_1 +0.062/–0.015 (+1.57/–0.38)	2.594 (65.89)	3.094 (78.59)	3.750 (95.25)	4.750 (120.65)
OD_2 ±0.031 (±0.79)	2.375 (60.3)	2.875 (73.0)	3.500 (88.9)	4.500 (114.30)
L_{PL} ±0.500 (±12.70)	24, 36 (609.6, 914.4)	24, 36 (609.6, 914.4)	24, 36 (609.6, 914.4)	24, 36 (609.6, 914.4)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See API 5B for tubing thread details.

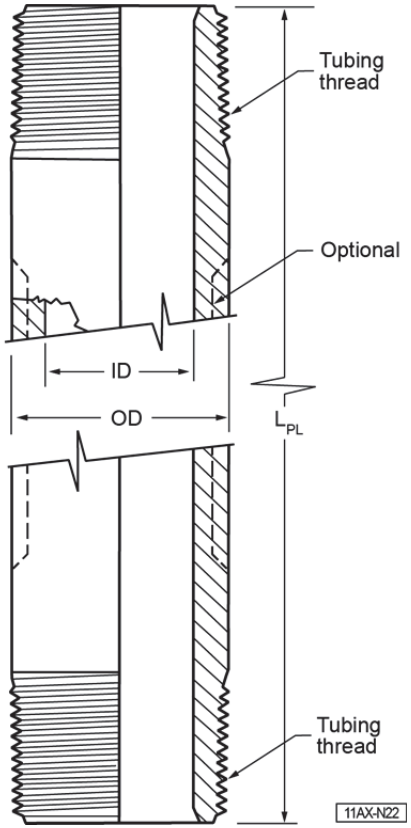


Table C.34—N22—Nipple, Extension, Lower (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	N22-20	**N22-25**	**N22-30**	**N22-40**
Tubing thread [a]	$2^3/_8$-8EU	$2^7/_8$-8EU	$3^1/_2$-8EU	$4^1/_2$-8EU
ID +0.165/–0.000 (+4.19/–0.00)	1.902 (48.31)	2.350 (59.69)	2.867 (72.82)	3.835 (97.41)
OD +0.062/–0.015 (+1.57/–0.38)	2.594 (65.89)	3.094 (78.59)	3.750 (95.25)	4.750 (120.65)
L_{PL} ±0.500 (±12.70)	24, 36 (609.6, 914.4)	24, 36 (609.6, 914.4)	24, 36 (609.6, 914.4)	24, 36 (609.6, 914.4)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See API 5B for tubing thread details.

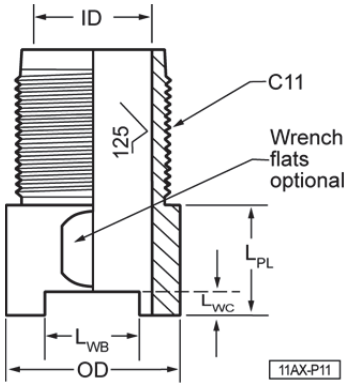


Table C.35—P11—Plug, Pull (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dimensional Symbol	**Part Number**						
	P11-125-15	**P11-125**	**P11-150-20**	**P11-150-25**	**P11-175**	**P11-200**	**P11-225[a]**
C11	1.3330-16	1.5730-16	1.5730-16	2.0870-16	2.0870-16	2.0870-16	2.5730-16
ID +0.031/–0.000 (+0.79/–0.00)	1.000 (25.40)	1.000 (25.40)	1.188 (30.18)	1.188 (30.18)	1.375 (34.93)	1.562 (39.67)	1.937 (49.20)
OD ±0.031 (±0.79)	1.500 (38.1)	1.750 (44.45)	1.750 (44.45)	2.250 (57.15)	2.250 (57.15)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.031 (±0.79)	1.375 (34.9)	1.375 (34.9)	1.375 (34.9)	1.375 (34.9)	1.375 (34.9)	1.375 (34.9)	1.375 (34.9)
L_{WB} +0.062/–0.000 (+1.57/–0.00)	0.812 (20.62)	0.812 (20.62)	0.812 (20.62)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)
L_{WC} +0.031/–0.000 (+0.79/–0.00)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Used on $2^1/_4$ in. (57.2 mm) and $2^1/_2$ in. (63.5 mm) bore pumps.

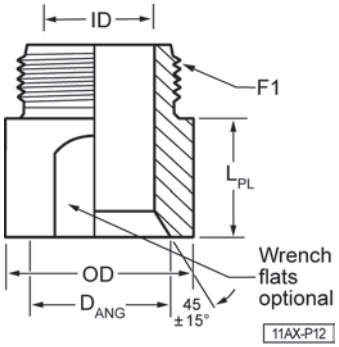


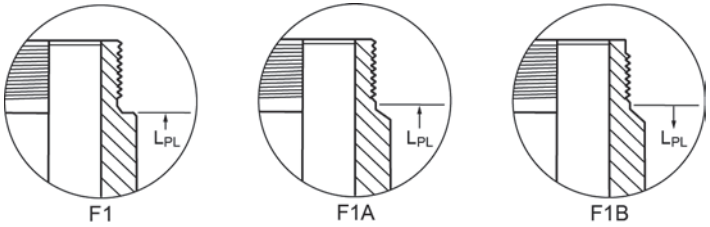
Table C.36—P12—Plug Seat (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dimensional Symbol	**Part Number**						
	P12-106	**P12-125**	**P12-150**	**P12-175**	**P12-200**	**P12-225**	**P12-250**
F1	0.875-14	1.000-14	1.250-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2
OD ±0.031 (±0.79)	1.000 (25.4)	1.188 (30.2)	1.438 (36.5)	1.688 (42.9)	1.938 (49.2)	2.188 (55.6)	2.438 (61.9)
ID ±0.062 (±1.57)	0.562 (14.27)	0.625 (15.88)	0.875 (22.23)	1.000 (25.40)	1.000 +0.093/–0.062 (25.40 +2.36/–1.57)	1.250 +0.093/–0.062 (31.75 +2.36/–1.57)	1.500 (38.10)
D_{ANG} +0.031/-0.0 (+0.79/-1.57)	0.844 (21.43)	0.938 (23.82)	1.125 (28.57)	1.375 (34.92)	1.500 (38.10)	1.750 (44.45)	2.000 (50.80)
L_{PL} ±0.031 (±0.79)	1.000 (25.4)	1.000 (25.4)	1.000 (25.4)	1.000 (25.4)	1.000 (25.4)	1.000 (25.4)	1.000 (25.4)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Taper design and other dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.

Table C.37—P21—Plunger, One Piece (See Note)



(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dimensional Symbol	**Part Number**								
	P21-106	**P21-125**	**P21-150**	**P21-175**	**P21-200**	**P21-225**	**P21-250**	**P21-275**	**P21-375**
F1, F1A, or F1B [c]	0.8750-14	1.000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2	2.1095-11 1/2	3.1715-11 1/2
OD [a b]	1.0625 (26.99)	1.2500 (31.75)	1.5000 (38.10)	1.7500 (44.45)	2.000 (50.80)	2.2500 (57.15)	2.5000 (63.50)	2.7500 (69.85)	3.7500 (95.25)
L_{SL}	Specify seal length (L_{SL}) in whole feet increments [2 ft (0.610m) min seal length]. L_{SL} to be centrally located within L_{PL}.								
L_{PL}	Seal length (L_{SL}) plus 3 in. (76.2mm).								
L_{OA}	L_{PL} plus (F1 thread length x 2).								

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Straightness shall be 0.001 in. (0.03 mm) TIR or less per foot of length measured over the seal length, up to a maximum of 0.007 in. (0.18 mm) TIR for plungers 7 ft (2.134 m) and longer in length.

NOTE 3 A seat must be used between C12 and P21 if an optional F1A pin thread is present on P21 plunger.

[a] OD shall be basic size minus the specified clearance (fit) with a tolerance of +0.0000/–0.0005 in. (+0.000/–0.013 mm).

[b] Optional circumferential grooves on the outside diameter at depths and increments defined by the manufacturer are allowed.

[c] Optional with manufacturer and/or end user.

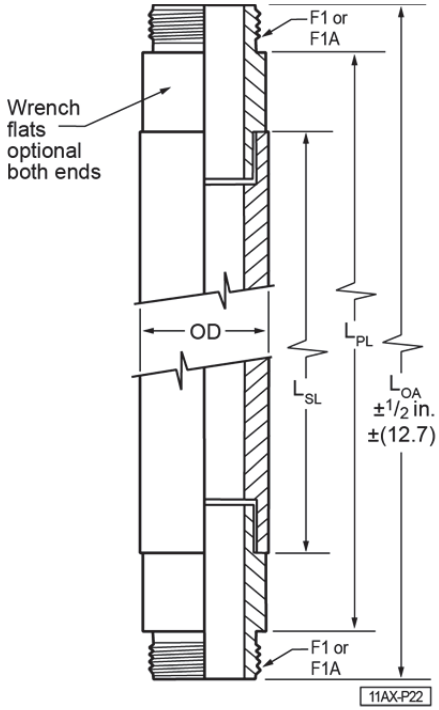


Table C.38—P22—Plunger, Assembled (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dimensional Symbol	**Part Number**						
	P22-125	**P22-150**	**P22-175**	**P22-200**	**P22-225**	**P22-250**	**P22-275**
F1 or F1A [c]	1.000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2	2.1095-11 1/2
OD [a b]	1.2500 (31.75)	1.5000 (38.10)	1.7500 (44.45)	2.000 (50.80)	2.2500 (57.15)	2.5000 (63.50)	2.7500 (69.85)
L_{SL}	Specify seal length (L_{SL}) in whole feet increments.						
L_{PL}	Seal length (L_{SL}) plus 3 in. (76.2 mm).						
L_{OA}	L_{PL} plus (F1 thread length x 2).						

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Construction of assembled plungers is optional with the manufacturer; however, they must be made of metal and must be compatible with one piece plungers.

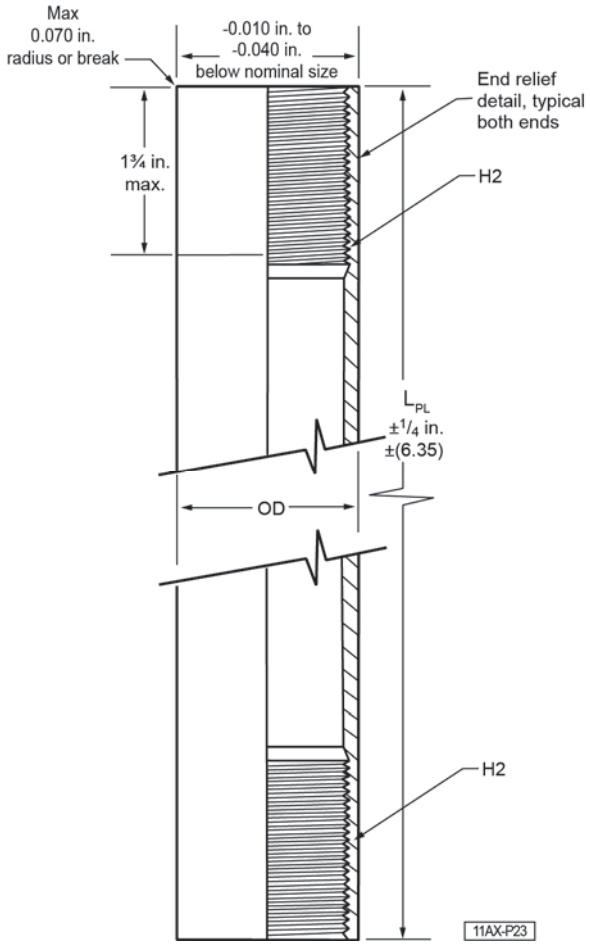
NOTE 3 Straightness shall be 0.001 in. (0.03 mm) TIR or less per foot of length measured over the seal length, up to a maximum of 0.007 in. (0.18 mm) TIR for plungers 7 ft (2.134 m) and longer in length.

[a] OD shall be basic size minus the specified clearance (fit) with a tolerance of +0.0000/–0.0005 in. (+0.000/–0.013 mm).

[b] Optional circumferential grooves on the outside diameter at depths and increments defined by the manufacturer are allowed.

[c] Optional with manufacturer and/or end user.

Table C.39—P23—Plunger, Box End (Tubing Pump) (See Note)



(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	P23-175	**P23-225**	**P23-275**	**P23-375**
H2	1.5084-14	1.9864-14	2.3755-11 1/2	3.3825-11 1/2
OD [a b]	1.7500 (44.45)	2.2500 (57.15)	2.7500 (69.850)	3.7500 (95.250)
L_{PL}	Specify nominal length in whole feet (thousandths of meters).			

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Straightness shall be 0.001 in. (0.03 mm) TIR or less per foot of length measured over the seal length, up to a maximum of 0.007 in. (0.18 mm) TIR for plungers 7 ft (2.134 m) and longer in length.

NOTE 3 End relief is optional, however if used it must comply with dimensions shown.

[a] OD shall be basic size minus the specified clearance (fit) with a tolerance of +0.0000/–0.0005 in. (+0.000/–0.013 mm). For the end relief the OD shall be basic size –0.010 in./–0.040 in. (–0.25/–1.02 mm).

[b] Optional circumferential grooves on the outside diameter at depths and increments defined by the manufacturer are allowed.

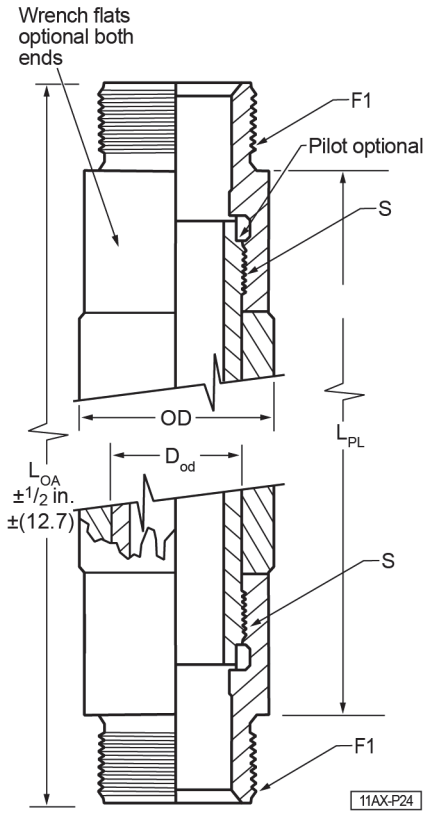


Table C.40—P24—Plunger, Soft-Packed (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dimensional Symbol	**Part Number**						
	P24-125	**P24-150**	**P24-178**	**P24-200**	**P24-225**	**P24-250**	**P24-275**
F1	1.000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2	2.1095-11 1/2
OD (nom.)	1.250 (31.8)	1.500 (38.1)	1.781 (45.2)	2.000 (50.8)	2.250 (57.2)	2.500 (63.5)	2.750 (69.9)
S	0.7500-16	0.8750-14	1.1894-14	1.3750-14	1.5604-14	1.7500-14	2.0035-11 1/2
D_{od} +0.000/–0.005 (+0.00/–0.13)	0.750 (19.05)	0.875 (22.23)	1.187 (30.15)	1.375 (34.93)	1.562 (39.67)	1.750 (44.45)	2.000 (50.80)
L_{PL}	Specify nominal plunger length in nearest whole or half feet (thousandths of meters).						
	Actual plunger length (L_{OA}) shall be nominal length (L_{PL}) plus 3-in. (76.2 mm).						
Actual plunger length (L_{OA})							
Nominal Length (L_{PL}) ft (m)	2.000 (0.610)	3.000 (0.914)	4.000 (1.219)	etc.			
Length over all (L_{OA}) in. (mm)	27.00 (685.8)	39.00 (990.6)	51.00 (1295.4)	etc.			

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 The design and construction of packing for soft-packed plungers have not been standardized. Specify size, type, and number of packing elements according to manufacturer's catalog.

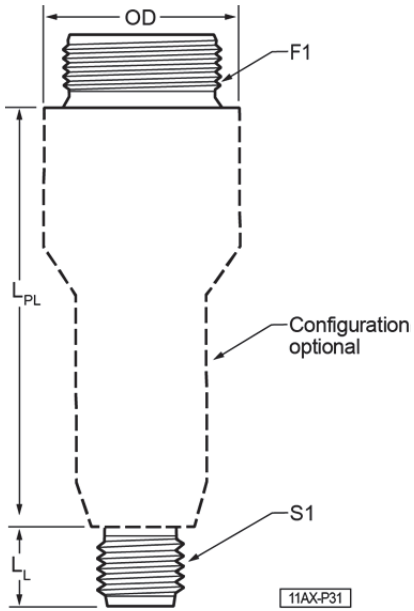


Table C.41—P31—Puller, Standing Valve (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	P31-175	**P31-225**	**P31-275**	**P31-375**
F1	1.4704-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
S1	0.750-10	0.750-10	0.750-10	0.750-10
L_{PL} ±2.000 (±50.80)	5.500 (139.70)	6.000 (152.40)	7.000 (177.80)	9.000 (228.60)
L_L max./min.	0.938/0.625 (23.83/15.88)	0.938/0.625 (23.83/15.88)	0.938/0.625 (23.83/15.88)	0.938/0.625 (23.83/15.88)
OD ±0.031 (±0.79)	1.688 (42.88)	2.188 (55.58)	2.625 (66.68)	3.625 (92.08)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.

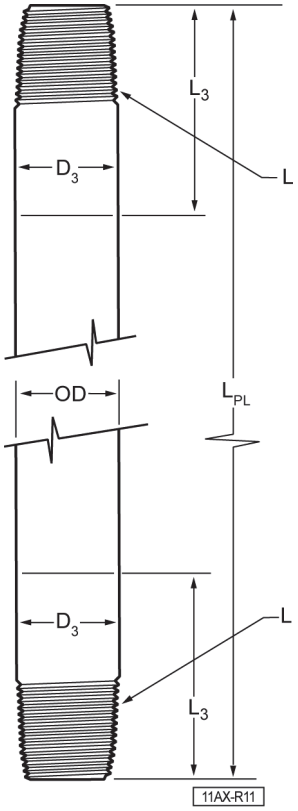


Table C.42—R11—Rod, Valve (See Note)

(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	R11-20	**R11-25**	**R11-30**
L nom [a]	$^{3}/_{8}$	$^{1}/_{2}$	$^{3}/_{4}$
L_3 +1.500/–0.062 (+38.1/–1.57)	1.75 (44.5)	2.00 (50.8)	2.00 (50.8)
D_3 +0.000/–0.005 (+0.00/–0.13)	0.688 (17.48)	0.875 (22.23)	1.063 (27.00)
OD +0.007/–0.005 (+0.18/–0.13)	0.688 (17.5)	0.875 (22.23)	1.063 (27.0)
L_{PL} ±0.125 (±3.18)	Specify length (L_{PL}) in inches (meters). See Table C.43.		

NOTE All dimensions in inches (followed by equivalent in millimeters).

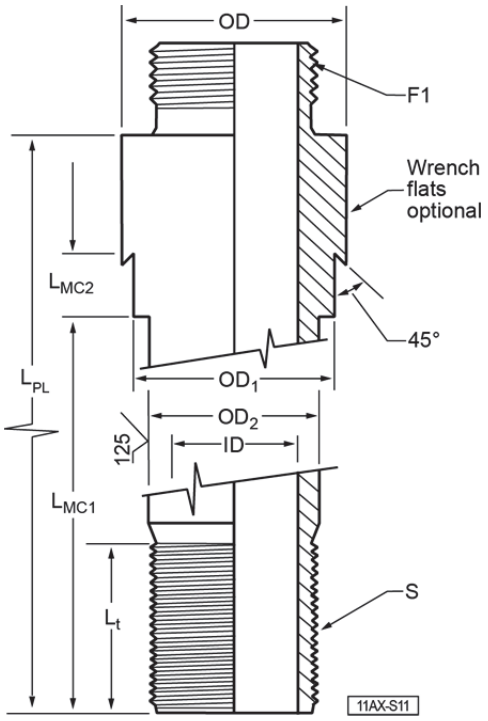
[a] Modified API modified line pipe thread. See Table G.5 and Table G.6 for details.

Table C.43—Valve Rod Length PL

(1)	(2)	(3)	(4)	(5)
Nominal Barrel Length [a] Minus Nominal Plunger Length, ft (m)	**For Pumps Run in 1.900, $2^3/_8$, and $2^7/_8$ in. (48.3, 60.3, and 73.0 mm) OD Tubing**		**For Pumps Run in $3^1/_2$ in. (88.9 mm) OD Tubing**	
	Top Anchor	**Bottom Anchor**	**Top Anchor**	**Bottom Anchor**
	in. (m)	in. (m)	in. (m)	in. (m)
1 (0.305)	13 (0.330)	7 (0.178)	12 (0.305)	6 (0.152)
2 (0.610)	25 (0.635)	19 (0.483)	24 (0.610)	18 (0.457)
3 (0.914)	37 (0.940)	31 (0.787)	36 (0.914)	30 (0.762)
4 (1.219)	49 (1.245)	43 (1.092)	48 (1.219)	42 (1.067)
5 (1.524)	61 (1.549)	55 (1.397)	60 (1.524)	54 (1.372)
6 (1.829)	73 (1.854)	67 (1.702)	72 (1.829)	66 (1.676)
7 (2.134)	85 (2.159)	79 (2.007)	84 (2.134)	78 (1.981)
8 (2.438)	97 (2.464)	91 (2.311)	96 (2.438)	90 (2.286)
9 (2.743)	109 (2.769)	103 (2.616)	108 (2.743)	102 (2.591)
10 (3.048)	121 (3.073)	115 (2.921)	120 (3.048)	114 (2.896)
11 (3.353)	133 (3.378)	127 (3.226)	132 (3.353)	126 (3.200)
12 (3.658)	145 (3.683)	139 (3.531)	144 (3.658)	138 (3.505)
13 (3.962)	157 (3.988)	151 (3.835)	156 (3.962)	150 (3.810)
14 (4.267)	169 (4.293)	163 (4.140)	168 (4.267)	162 (4.115)
15 (4.572)	181 (4.597)	175 (4.445)	180 (4.572)	174 (4.420)
16 (4.877)	193 (4.902)	187 (4.750)	192 (4.877)	186 (4.724)
17 (5.182)	205 (5.207)	199 (5.055)	204 (5.182)	198 (5.029)
18 (5.486)	217 (5.512)	211 (5.359)	216 (5.486)	210 (5.334)
19 (5.791)	229 (5.817)	223 (5.664)	228 (5.791)	222 (5.639)
20 (6.096)	241 (6.121)	235 (5.969)	240 (6.096)	234 (5.944)
21 (6.401)	253 (6.426)	247 (6.274)	252 (6.401)	246 (6.248)
22 (6.706)	265 (6.731)	259 (6.579)	264 (6.706)	258 (6.553)
23 (7.010)	277 (7.036)	271 (6.883)	276 (7.010)	270 (6.858)
24 (7.315)	289 (7.341)	283 (7.188)	288 (7.315)	282 (7.163)
25 (7.620)	301 (7.645)	295 (7.493)	300 (7.620)	294 (7.468)
26 (7.925)	313 (7.950)	307 (7.800)	312 (7.925)	306 (7.772)
27 (8.230)	325 (8.255)	319 (8.103)	324 (8.230)	318 (8.077)
28 (8.534)	337 (8.560)	331 (8.407)	336 (8.534)	330 (8.382)
29 (8.839)	349 (8.865)	343 (8.712)	348 (8.839)	342 (8.687)
30 (9.144)	361 (9.169)	355 (9.017)	360 (9.144)	354 (8.992)

[a] Including extensions on heavy wall barrels.

Table C.44—S11—Seating Mandrel, Cup (Type HR) (Rod Pump and Fittings) (See Note)



(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	S11-20	**S11-25**	**S11-30**
F1	1.4704 -14	1.8024-14	2.1095-11 1/2
S	1.1894-14	1.5604-14	2.0035-11 1/2
L_{PL} ±0.062 (±1.57)	7.625 (193.7)	8.125 (206.4)	8.125 (206.4)
ID min.	0.875 (22.2)	1.188 (30.2)	1.438 (36.5)
OD max.	1.901 (48.29)	2.344 (59.54)	2.844 (72.24)
OD min.	1.840 (46.74)	2.330 (59.18)	2.830 (71.88)
OD_1 +0.000/–0.016 (+0.00/–0.41)	1.406 (35.71)	1.844 (46.84)	2.344 (59.54)
OD_2 +0.000/–0.010 (+0.00/–0.25)	1.187 (30.15)	1.562 (39.67)	2.000 (50.80)
L_{MC1} ±0.062 (±1.57)	4.375 (111.1)	4.875 (123.8)	5.000 (127.0)
L_{MC2} +0.016/–0.000 (+0.41/–0.00)	0.672 (17.07)	0.703 (17.86)	0.703 (17.86)
L_t min.	2.250 (57.2)	2.375 (60.3)	2.375 (60.3)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.

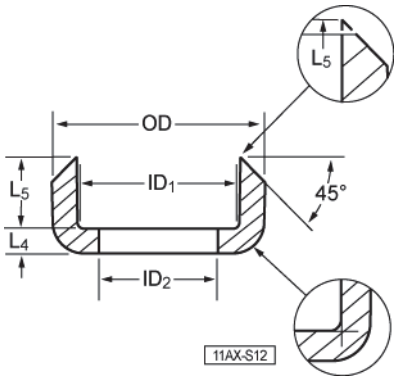


Table C.45—S12—Seating Cup (Type HR) (Rod Pump) (See Note)

(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	S12-20	**S12-25**	**S12-30**
ID_1 +0.016/–0.000 (+0.41/–0.00)	1.411 (35.84)	1.850 (46.99)	2.350 (59.69)
ID_2 +0.005/–0.000 (+0.13/–0.00)	1.187 (30.15)	1.562 (39.67)	2.000 (50.80)
OD [a] ±0.005 (±0.13)	1.800 (45.72)	2.310 (58.67)	2.810 (71.37)
Industry designation	1.781 + 30	2.250 + 70	2.750 + 70
L_4 +0.030/–0.015 (+0.76/–0.38)	0.165 (4.19)	0.185 (4.70)	0.185 (4.70)
L_5 +0.000/–0.016 (+.00/–0.41)	0.656 (16.66)	0.688 (17.48)	0.688 (17.48)
Seating nipple reference	N11-20	N11-25	N11-30

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions not shown are optional with the manufacturer.

[a] Manufacturer's mold draft angle on OD shall not exceed 8 degrees per side.

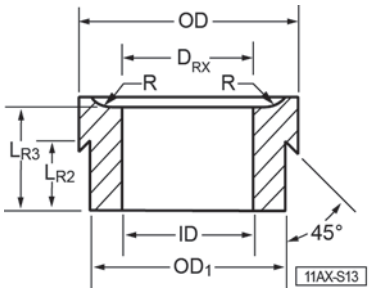


Table C.46—S13—Seating Cup Ring (Type HR) (See Note)

(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	S13-20	**S13-25**	**S13-30**
ID +0.006/–0.000 (+0.15/–0.00)	1.192 (30.28)	1.567 (39.80)	2.005 (50.93)
OD_1 +0.000/–0.016 (+0.00/–0.41)	1.406 (35.71)	1.844 (46.84)	2.344 (59.54)
L_{R2} +0.016/–0.000 (+0.41/–0.00)	0.672 (17.07)	0.703 (17.86)	0.703 (17.86)
L_{R3} +0.016/–0.000 (+0.41/–0.00)	0.938 (23.83)	1.109 (28.17)	1.156 (29.36)
R ±0.010 (±0.25)	0.250 (6.35)	0.281 (7.14)	0.281 (7.14)
D_{RX} ±0.010 (±0.25)	1.250 (31.75)	1.688 (42.88)	2.188 (55.58)
OD +0.010/–0.031 (+0.25/–0.33)	1.688 (42.88)	2.188 (55.58)	2.625 (66.67)
NOTE All dimensions in inches (followed by equivalent in millimeters).			

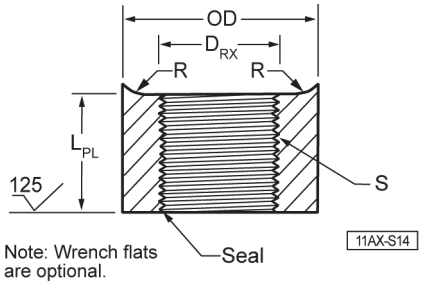


Table C.47—S14—Seating Cup Nut (Type HR) (See Note)

(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	S14-20	**S14-25**	**S14-30**
S	1.1894-14	1.5604-14	2.0035-11 1/2
L_{PL} ±0.031 (±0.79)	1.000 (25.4)	1.125 (28.6)	1.250 (31.8)
R ±0.010 (±0.25)	0.250 (6.35)	0.281 (7.14)	0.281 (7.14)
D_{RX} ±0.010 (±0.25)	1.250 (31.75)	1.688 (42.88)	2.188 (55.58)
OD +0.010/–0.031 (+0.25/–0.33)	1.688 (42.88)	2.188 (55.58)	2.625 (66.67)

NOTE All dimensions in inches (followed by equivalent in millimeters).

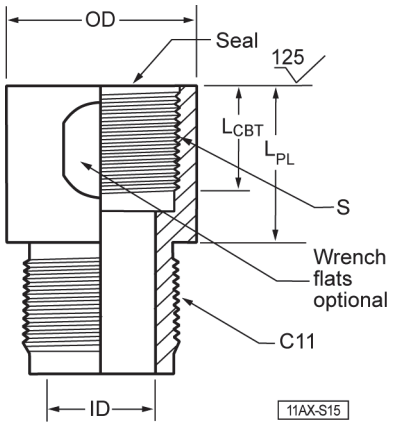


Table C.48—S15—Seating Cup Bushing, Top Anchor (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	S15-20-125	**S15-20**	**S15-25**	**S15-30**
C11	1.3330-16	1.5730-16	2.0870-16	2.5730-16
S	1.1894-14	1.1894-14	1.5604-14	2.0035-11 1/2
L_{CBT} min.	1.125 (28.6)	1.125 (28.6)	1.250 (31.8)	1.250 (31.8)
ID ±.0625 (±1.59)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.500 (38.10)
OD ±.010 (± 0.25)	1.750 (44.45)	1.750 (44.45)	2.250 (57.15)	2.750 (69.85)
L_{PL} ±0.031 (± 0.79)	1.875 (47.6)	1.875 (47.6)	2.000 (50.8)	2.000 (50.8)

NOTE All dimensions in inches (followed by equivalent in millimeters).

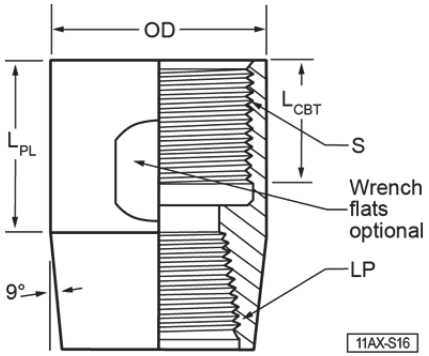


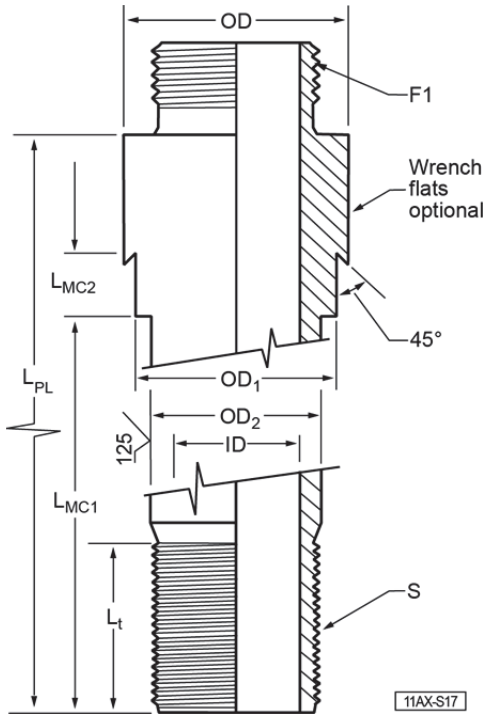
Table C.49—S16—Seating Coupling, Bottom Anchor (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	S16-15	**S16-20**	**S16-25**	**S16-30**
S	1.1894-14	1.1894-14	1.5604-14	2.0035-11 1/2
LP nom	3/4	1	1 1/4	1 1/2
L_{CBT} min.	1.125 (28.57)	1.125 (28.6)	1.250 (31.8)	1.250 (31.8)
OD +0.010/–0.031 (+0.25/–0.33)	1.438 (36.53)	1.688 (42.88)	2.188 (55.58)	2.625 (66.67)
L_{PL} ±0.062 (±1.57)	1.750 (44.45)	2.188 (55.58)	2.250 (57.15)	1.938 (49.23)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Line pipe thread (LP). See API 5B for details.

Table C.50—S17—Seating Mandrel, Cup (Type HR) (Tubing Pump) (See Note)



(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	S17-20	**S17-25**	**S17-30**
F1	1.4704-14	1.8024-14	2.1095-11 1/2
S	1.1894-14	1.5604-14	2.0035-11 1/2
L_{PL} ±0.062 (±1.57)	6.50 (165.1)	6.813 (173.1)	6.813 (173.1)
ID min.	0.875 (22.2)	1.188 (30.2)	1.438 (36.5)
OD max.	1.688 (42.9)	2.188 (55.6)	2.688 (68.3)
OD_1 +0.000/–0.016 (+0.00/–0.41)	1.406 (35.71)	1.844 (46.84)	2.344 (59.54)
OD_2 0.000/–0.010 (+0.00/–0.25)	1.187 (30.15)	1.562 (39.67)	2.000 (50.80)
L_{MC1} ±0.031 (±0.79)	3.313 (84.2)	3.500 (88.9)	3.625 (92.1)
L_{MC2} +0.016/–0.000 (+0.41/–0.00)	0.672 (17.07)	0.703 (17.86)	0.703 (17.86)
L_t min.	2.250 (57.2)	2.375 (60.3)	2.375 (60.3)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.

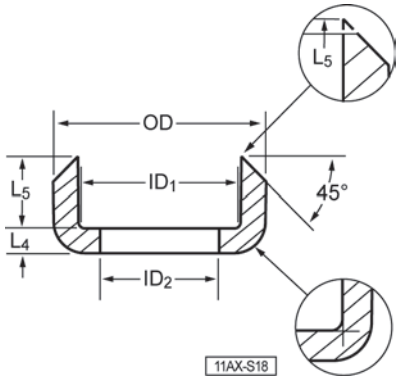


Table C.51—S18—Seating Cup (Type HR) (Tubing Pump) (See Note)

(1)	(2)	(3)	(4)
Dimensional Symbol	**Part Number**		
	S18-20	**S18-25**	**S18-30**
ID_1 +0.016/–0.000 (+0.41/–0.00)	1.411 (35.84)	1.850 (46.99)	2.350 (59.69)
ID_2 +0.005/–0.000 (+0.13/–0.00)	1.187 (30.15)	1.562 (39.67)	2.000 (50.80)
OD [a b] ±0.005 (±0.13)	1.730 (43.94)	2.230 (56.64)	2.730 (69.34)
L_4 +0.030/–0.015 (+0.76/–0.38)	0.165 (4.19)	0.185 (4.70)	0.185 (4.70)
L_5 +0.000/–0.016 (+0.00/–0.41)	0.656 (16.66)	0.688 (17.48)	0.688 (17.48)
Seating nipple reference	N13-20	N13-25	N13-30

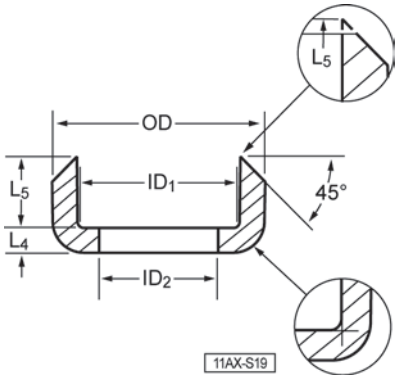
NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions not shown are optional with the manufacturer.

[a] Unless otherwise specified outside diameter of cups furnished to this specification shall be as shown, for −0.010 in. (+0.76 mm) cups (traditional nomenclature).

[b] Manufacturer's mold draft angle on OD shall not exceed 8 degrees per side.

Table C.52—S19—Seating, Cup (Type HR) (Soft-Packed Tubing Pump) (See Note)



(1)	(2)	(3)
Dimensional Symbol	**Part Number**	
	S19-25	**S19-30**
ID_1 +0.016/–0.000 (+0.41/–0.00)	1.850 (46.99)	2.350 (59.69)
ID_2 +0.005/–0.000 (+0.13/–0.00)	1.562 (39.67)	2.000 (50.80)
OD [a c] ±0.005 (±0.13)	2.270 (57.66)	2.770 (70.36)
L_4 +0.030/–0.015 (+0.76/–0.38)	0.185 (4.70)	0.185 (4.70)
L_5 +0.000/–0.016 (+0.00/–0.41)	0.688 (17.48)	0.688 (17.48)
Barrel reference [b]	B15-225	B15-275

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Dimensions not shown are optional with the manufacturer.

[a] Unless otherwise specified outside diameter of cups furnished to this specification shall be as shown, for +0.030 in. (+0.76 mm) cups (traditional nomenclature).

[b] Note: This series of seating cups seat in the barrel or a seating nipple with the same inside diameter as the barrel.

[c] Manufacturer's mold draft angle on OD shall not exceed 8 degrees per side.

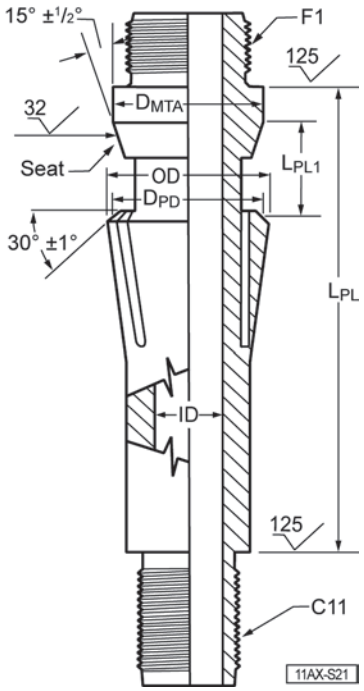


Table C.53—S21—Seating Assembly, Mechanical Top Lock (See Note)

(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Part Number**			
	S21-20-125	**S21-20**	**S21-25**	**S21-30**
C11	1.3330-16	1.5730-16	2.0870-16	2.5730-16
F1	1.4704-14	1.4704-14	1.8024-14	2.1095-11 1/2
D_{MTA} +0.000/–0.005 (+0.00/–0.13)	1.875 (47.63)	1.875 (47.63)	2.344 (59.54)	2.844 (72.24)
ID ±.063 (±1.60)	1.000 (25.40)	1.000 (25.40)	1.250 (31.75)	1.500 (38.10)
L_{PL1} +0.020/–0.000 (+0.51/–0.00)	0.931 (23.65)	0.931 (23.65)	0.887 (22.53)	0.887 (22.53)
L_{PL} ±0.062 (±1.57)	8.50 (215.9)	8.50 (215.9)	9.00 (228.6)	9.00 (228.6)
D_{PD} ±0.031 (±0.79)	1.780 (45.21)	1.780 (45.21)	2.280 (57.91)	2.780 (70.61)
OD min.	1.963 (49.86)	1.963 (49.86)	2.420 (61.47)	2.925 (74.30)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 These parts may not be interchangeable between manufacturers, only the assembly is intended to be interchangeable.

NOTE 3 Dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.

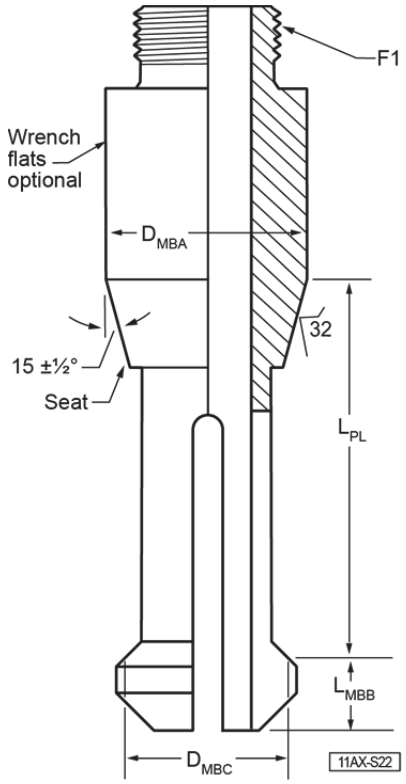


Table C.54—S22—Seating Assembly, Mechanical Bottom Lock (See Note)

(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Part Number**				
	S22-15	**S22-20**	**S22-25**	**S22-30**	**S22-40**
F1	1.2500-14	1.4704-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
D_{MBA} +0.000/–0.010 (+0.00/–0.25)	1.475 (37.47)	1.688 (42.88)	2.188 (55.58)	2.688 (68.28)	3.656 (92.86)
L_{MBB} ±0.250 (±6.35)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.250 (31.75)	1.250 (31.75)
L_{PL} +0.000/–0.016 (+0.00/–0.41)	3.656 (92.86)	4.352 (110.54)	5.102 (129.59)	6.164 (156.57)	6.188 (157.18)
D_{MBC} ±0.031 (±0.79)	1.125 (28.58)	1.375 (34.93)	1.750 (44.45)	2.250 (57.15)	3.000 (76.20)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 These parts may not be interchangeable between manufacturers, only the assembly is intended to be interchangeable.

NOTE 3 Dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.

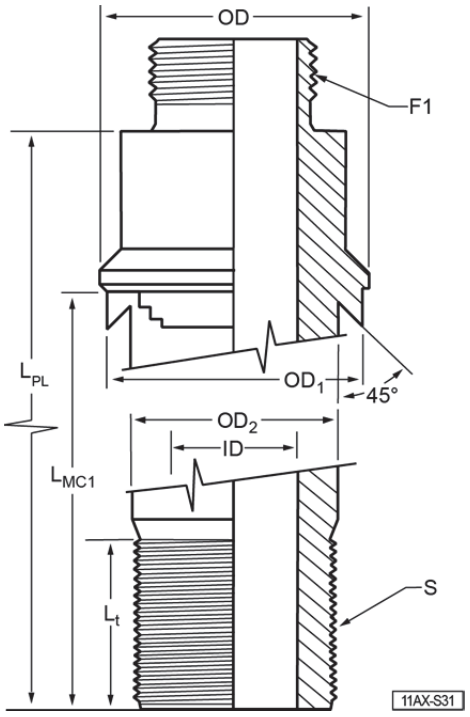


Table C.55—S31—Seating Mandrel, Cup (Type O)

(1) Dimensional Symbol	(2) Part Number S31-15
F1	1.2500-14
S	1.1894-14
L_{PL} ±0.062 (±1.57)	7.625 (193.68)
ID min.	0.875 (22.23)
OD	1.516/1.505 (38.51/38.23)
OD_1 +0.000/–0.010 (+0/–0.254)	1.438 (36.53)
OD_2 +0.000/–0.010 (+0/–0.254)	1.187 (30.15)
L_{MC1} ±0.031 (±0.78)	4.250 (107.95)
L_t min.	2.250 (57.15)
NOTE 1 All dimensions in inches (followed by equivalent in millimeters). NOTE 2 Dimensions not shown are optional, and shall be per manufacturer's drawings and/or specifications.	

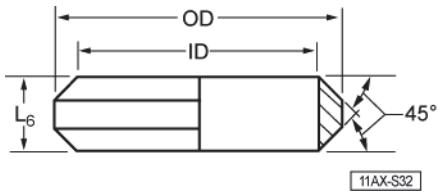


Table C.56—S32—Seating Cup (Type O)

(1) Dimensional Symbol	(2) Part Number S32-15
ID +0.010/–0.000 (+0.254/–0)	1.188 (30.18)
OD ±0.005 (±0.13)	1.490 (37.85)
L_6 ± 0.031 (± 0.78)	0.625 (15.88)
Seating nipple reference	N11-15

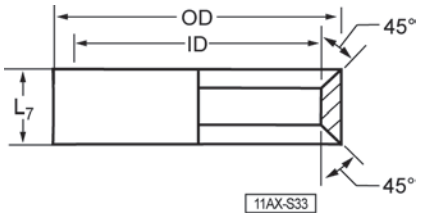


Table C.57—S33—Seating Cup Ring (Type O)

(1)	(2)
Dimensional Symbol	**Part Number**
	S33-15
ID ±0.010 (±0.254)	1.200 (30.48)
OD +0.000/–0.010 (+0/–0.254)	1.438 (36.53)
L_7 ±0.031 (±0.78)	0.375 (9.53)

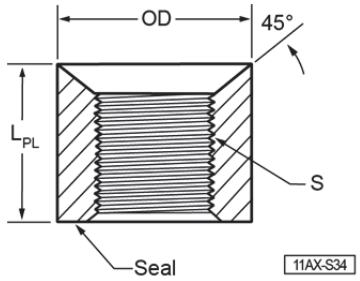


Table C.58—S34—Seating Cup Nut (Type O)

(1)	(2)
Dimensional Symbol	**Part Number**
	S34-15
S	1.1894-14
OD +0.000/–0.005 (+0/–0.13)	1.438 (36.53)
L_{PL} ±0.031 (±0.78)	1.00 (25.4)

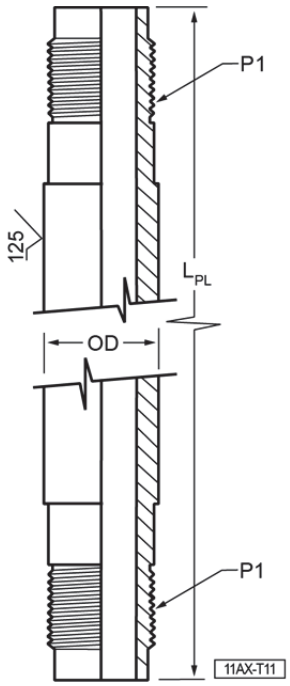


Table C.59—T11—Tube, Pull (See Note)

(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Part Number**				
	T11-125	**T11-150**	**T11-175**	**T11-200**	**T11-225** [a]
P1	0.9375-16	1.1250-16	1.3125-16	1.5000-16	1.8750-16
OD +0.010/–0.009 (+0.25/–0.23)	0.938 (23.8)	1.125 (28.6)	1.313 (33.4)	1.500 (38.1)	1.875 (47.6)
L_{PL} ±0.125 (±3.18)	Specify length (L_{PL}) as actual length in inches (meters). See Table C.60.				

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Used on $2\frac{1}{4}$ in. (57.2 mm) and $2\frac{1}{2}$ in. (63.5 mm) bore pumps.

NOTE Inside diameter shall be in accordance with manufacturer's specifications.

Table C.60—Pull Tube Length, PL

(1)	(2)	(3)	(4)
	Actual Length		
Nominal Barrel Length [a] Minus Nominal Plunger Length ft (m)	**For 1 1/4 in. (31.8 mm) Bore Pumps** in. (m)	**For 1 1/2, 1 3/4, and 2 in. (38.1, 44.5, and 50.8 mm) Bore Pumps** in. (m)	**For 2 1/4 and 2 1/2 in. (57.2 and 63.5 mm) Bore Pumps** in. (m)
1 (0.305)	—	—	—
2 (0.610)	15 (0.381)	14 (0.356)	12 (0.305)
3 (0.914)	27 (0.686)	26 (0.660)	24 (0.610)
4 (1.219)	39 (0.991)	38 (0.965)	36 (0.914)
5 (1.524)	51 (1.295)	50 (1.270)	48 (1.219)
6 (1.829)	63 (1.600)	62 (1.575)	60 (1.524)
7 (2.134)	75 (1.905)	74 (1.880)	72 (1.829)
8 (2.438)	87 (2.210)	86 (2.184)	84 (2.134)
9 (2.743)	99 (2.515)	98 (2.489)	96 (2.438)
10 (3.048)	111 (2.819)	110 (2.794)	108 (2.743)
11 (3.353)	123 (3.124)	122 (3.099)	120 (3.048)
12 (3.658)	135 (3.429)	134 (3.404)	132 (3.353)
13 (3.962)	147 (3.734)	146 (3.708)	144 (3.658)
14 (4.267)	159 (4.039)	158 (4.013)	156 (3.962)
15 (4.572)	171 (4.343)	170 (4.318)	168 (4.267)
16 (4.877)	183 (4.648)	182 (4.623)	180 (4.572)
17 (5.182)	195 (4.953)	194 (4.928)	192 (4.877)
18 (5.486)	207 (5.258)	206 (5.232)	204 (5.182)
19 (5.791)	219 (5.563)	218 (5.537)	216 (5.486)
20 (6.096)	231 (5.867)	230 (5.842)	228 (5.791)
21 (6.401)	243 (6.172)	242 (6.147)	240 (6.096)
22 (6.706)	255 (6.477)	254 (6.452)	252 (6.401)
23 (7.010)	267 (6.782)	266 (6.756)	264 (6.706)
24 (7.315)	279 (7.087)	278 (7.061)	276 (7.010)
25 (7.620)	291 (7.391)	290 (7.366)	288 (7.315)
26 (7.925)	303 (7.696)	302 (7.671)	300 (7.620)
27 (8.230)	315 (8.001)	314 (7.976)	312 (7.925)
28 (8.534)	327 (8.306)	326 (8.280)	324 (8.230)
29 (8.839)	339 (8.611)	338 (8.585)	336 (8.534)
30 (9.144)	351 (8.915)	350 (8.890)	348 (8.839)

[a] Including extensions on heavy wall barrels.

Table C.61—V11—Valve, Ball and Seat (See Notes)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dimensional Symbol	**Part Number**							
Standard Assembly Number	V11-106	V11-125	V11-150	V11-175	V11-200	V11-225	V11-250	V11-375
Standard Ball Number [b]	V12-106	V12-125	V12-150	V12-175 [a]	V12-200 [a]	V12-225	V12-250	V12-375
Standard Seat Number [b]	V13-106	V13-125	V13-150	V13-175	V13-200	V13-225	V13-250	V13-375
Alternate Assembly Number	V11A106	V11A125	V11A150	V11A175	V11A200	V11A225	V11A250	V11A375
Alternate Ball Number [b]	V12A106	V12A125	V12A150	V12A175	V12-175 [a]	V12-200 [a]	V12A250	V12A375
Alternate Seat Number [b]	V13A106	V13A125	V13A150	V13A175	V13A200	V13A225	V13A250	V13A375

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Ball and seat valves are designed to operate in F22 boxes.

NOTE 3 Each assembly consists of one ball and one seat as shown above.

NOTE 4 The use of alternate (smaller) size balls can damage standard cages during pumping due to the increased ball to ball guide clearance. Alternate ball use requires a seat with a matching alternate seat contact area. Standard ball use requires a seat with a matching standard seat contact area.

[a] V12-175 and V12-200 are used as standard and alternate assemblies as shown.

[b] See Table C.62 for ball and Table C.63 for seat dimensions.

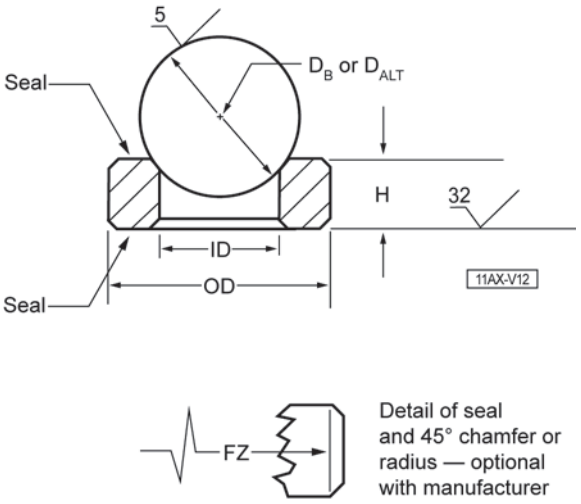


Table C.62—V12—Ball (See Notes)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dimensional Symbol	**Part Number**							
Standard Ball Number	V12-106	V12-125	V12-150	V12-175	V12-200	V12-225	V12-250	V12-375
D_B	0.625 (15.88)	0.750 (19.05)	0.938 (23.83)	1.125 (28.58)	1.250 (31.75)	1.375 (34.93)	1.688 (42.88)	2.250 (57.15)
Alternate Ball Number	V12A106	V12A125	V12A150	V12A175	V12-175	V12-200	V12A250	V12A375
D_{ALT}	0.5625 (14.29)	0.6875 (17.46)	0.875 (22.23)	1.000 (25.40)	1.125 (28.58)	1.250 (31.75)	1.500 (38.10)	2.000 (50.80)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Ball and seat valves are designed to operate in F22 boxes.

NOTE 3 Additional ball specifications: ball roundness range to be 0.0001 in. (0.003 mm), maximum; ball surface roughness: 5RA, maximum; ball OD tolerance shall be ± 0.001 in. (± 0.025 mm) for all balls less than 2-in. diameter and ± 0.002 in. (± 0.050 mm) for all balls 2 in. diameter and over.

Table C.63—V13—Seat (See Notes)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dimensional Symbol	**Part Number**							
Standard Seat Number [b c]	V13-106	V13-125	V13-150	V13-175	V13-200	V13-225	V13-250	V13-375
Alternate Seat Number [b c]	V13A106	V13A125	V13A150	V13A175	V13A200	V13A225	V13A250	V13A375
H +0.020/–0.010 (+0.51/–0.25)	0.500 (12.70)	0.500 (12.70)	0.500 (12.70)	0.500 (12.70)	0.500 (12.70)	0.500 (12.70)	0.500 (12.70)	0.750 (19.05)
FZ +0.000/–0.031 (+0.00/–0.78)	0.767 (19.48)	0.892 (22.66)	1.11 (28.22)	1.331 (33.81)	1.421 (36.09)	1.631 (41.43)	1.921 (48.79)	2.950 (74.93)
OD +0.000/–0.005 (+0.00/–0.13)	0.793 (20.14)	0.918 (23.32)	1.168 (29.67)	1.388 (35.26)	1.478 (37.54)	1.720 (43.69)	2.010 (51.05)	3.072 (78.03)
ID ±0.050 (±1.27)	0.460 (11.68)	0.550 (13.97)	0.670 (17.02)	0.825 (20.96)	0.960 (24.38)	1.060 (26.92)	1.310 (33.27)	1.790 ±0.090 [a] (45.47 ±2.29)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Ball and seat valves are designed to operate in F22 boxes.

[a] For V13-375 tolerance for ID is ±0.090 (±2.29) as shown in the table.

[b] Standard seats shall be lapped for standard size balls, alternate seats shall be lapped for alternate size balls; refer to Table C.62 for ball sizes.

[c] Dual lapped seats are available which incorporate two seat contact areas which will match either ball size, however these are not part of this specification. Seek manufacturer's recommendations before using.

Annex D
(normative)

Measurement, Testing, and Gauging

D.1 General

The following measuring, testing and gauging requirements shall be conducted in addition to the requirements of 6.2.4.

D.2 Component Parts

D.2.1 General

Component parts shall be dimensionally inspected for conformance to manufacturer's drawings and written specifications that shall meet or exceed the requirements of this specification.

D.2.2 Barrels

Barrels shall be additionally inspected, with a frequency of 100 %, according to the following:

Barrel inside surface finish shall be visually inspected on all barrels per manufacturer's specifications.

The inside diameter sealing surface of barrels shall be inspected with appropriate equipment, and in such a manner, that assures the specified tolerances are maintained through the entire length of the barrel. Appropriate equipment shall consist of an air micrometer or three point mechanical micrometer.

Barrels shall be drift tested. The drift plunger shall be 4 ft (1.219 m) or longer. The outside diameter (OD) of the drift plunger shall be –0.0010 in. to –0.0015 in., (–0.025 mm to –0.038 mm) from nominal barrel inside diameter (ID). This drift test is a functional test that verifies the straightness and functionality of the barrel. Barrels shall be supported within 3 ft (914 mm) of each end and at 8 ft (2438 mm) increments along the length of the barrel during this testing. Soft-packed barrels are excluded from drift testing.

D.2.3 Plungers

Plungers shall be additionally inspected, with a frequency of 100 %, according to the following:

Plunger outside surface finish shall be visually inspected per manufacturer's specifications.

The outside diameter sealing surface of plungers shall be inspected, with appropriate equipment, and in such a manner that assures the specified tolerances are maintained along the entire length of the plunger. Appropriate equipment shall be capable of measuring to a 0.0005 in. (0.013 mm) dimension.

D.2.4 Ball and Seat Assemblies

Ball and seat assemblies shall be additionally inspected, with a frequency of 100 %, according to the following:

All ball and seat assemblies shall be vacuum tested, with dry sealing surfaces, at 19 in. (483 mm) Hg minimum vacuum with no leakage for a minimum of 3 seconds after vacuum source is isolated. Ball shall be randomly rotated in the seat during the test.

D.3 Pump Assemblies

Pump assemblies as described in Section 5 shall be assembled and functionally tested per the pump manufacturer's written procedures.

Annex E
(normative)

Marking

E.1 Marking

E.1.1 Product Marking

Parts and assemblies conforming to the requirements given herein shall be marked as follows as a minimum.

Component Part and Subassembly Marking:

a) Manufacturer's name or mark;

b) API Specification 11AX;

c) Manufacturer's part number;

d) Material identification symbol as per Annex F;

e) Date of manufacture (month and year):

— Month of manufacture: the month of manufacture shall be designated by the numerals 01 through 12, chronologically, with January represented as number 01. Alternately, numerals 1 through 12 may be used.

— The year of manufacture: the year of manufacture shall be designated by the last two numerals of the year.

Example: $1^1/_4$ in. (31.75 mm) thin-wall barrel (B11-125), chrome plate on brass, manufactured in April 2011:

Manufacturer's Name or Mark	Spec	Manufacturer's Part No.	Material ID Symbol	Date of Manufacture
XXXX	11AX	XXXXXXX	A5	0411 or 411

E.1.2 Assembly Marking

The minimum required information to be supplied with the pump assembly shall be as follows:

a) Manufacturer's name or mark;

b) API Specification 11AX;

c) Pump designation, per Annex B;

d) Date of assembly (month and year):

— Month of manufacture: the month of manufacture shall be designated by the numerals 01 through 12, chronologically, with January represented as number 01. Alternately, numerals 1 through 12 may be used.

— The year of manufacture: the year of manufacture shall be designated by the last two numerals of the year.

Example: $2^3/_8 \times 1^1/_4$ in. (60.3 × 31.75 mm) rod, stationary thin-wall barrel, bottom anchor pump, 20-ft (6.1-m) barrel, 4-ft (1.22-m) plunger, assembled in May 2010:

Manufacturer's Name or Mark	Spec	Pump Designation	Date of Assembly
XXXX	11AX	20-125 RWBC-20-4	0510 or 510

E.2 Method of Marking

The complete marking shall be permanently affixed to each product by stamp, etch, or stencil. Valves (V11, V12, V13), seating cups (S12, S18, S19, S32), and cup rings (S33) shall be marked by label, tag, or other legible medium that can be attached to the shipped product.

E.3 Additional Industry Markings

Where applicable additional industry markings which include API Monogram and license number may be applied to the product.

Annex F
(normative)

Materials

Materials for parts manufactured to this specification are specified below. The manufacturer shall maintain documentation data in its product design file to support such conformance. An equivalent international material series number may be used.

The following tables present material requirements for pump components.

Table F.1—Pump Barrel Materials, Plated Barrels*

Identification Symbol	Description	Inside Surface Condition	Base Core Hardness	Base Material	Base Material Minimum Yield Strength, ksi
A1	Chrome plate on steel	0.003 in. (0.076 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS G10XX0 UNS G15XX0 Steel	60
A2	Chrome plate on low alloy steel	0.003 in. (0.076 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS G4XXX0 low alloy steel	50
A3	Chrome plate on 4/6 chrome steel	0.003 in. (0.076 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS S50100 steel, 4 % to 6 % chrome	70
A4	Chrome plate on Ni/Cu alloy	0.003 in. (0.076 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS N0440X	55
A5	Chrome plate on brass	0.003 in. (0.076 mm) min. thickness, 900 to 1160 HV_{100}	HRB 80 to HRB 100	UNS C443XX Inhibited Admiralty Brass	50
A6	Chrome plate on austenitic stainless steel	0.003 in. (0.076 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS S30400 Austenitic stainless steel	35
B1	Heavy chrome plate on steel	0.006 in. (0.152 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS G10XX0 UNS G15XX0 Steel	60
B2	Heavy chrome plate on low alloy steel	0.006 in. (0.152 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS G4XXX0 low alloy steel	50
B3	Heavy chrome plate on 4/6 chrome steel	0.006 in. (0.152 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS S50100 steel, 4 % to 6 % chrome	70
B4	Heavy chrome plate on Ni/Cu alloy	0.006 in. (0.152 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS N0440X	55
B5	Heavy chrome plate on brass	0.006 in. (0.152 mm) min. thickness, 900 to 1160 HV_{100}	HRB 80 to HRB 100	UNS C443XX (Inhibited Admiralty Brass)	50
B6	Heavy chrome plate on austenitic stainless steel	0.006 in. (0.152 mm) min. thickness, 900 to 1160 HV_{100}	HRB 90 to HRC 23	UNS S30400 Austenitic stainless steel	35

Identification Symbol	Description	Inside Surface Condition	Base Core Hardness	Base Material	Base Material Minimum Yield Strength, ksi
C1	Nickel Carbide Composite coating on steel	0.0013 in. (0.033 mm) min. thickness	HRB 90 to HRC 23	UNS G10XX0 UNS G15XX0 Steel	60
C2	Nickel Carbide composite coating on low alloy steel	0.0013 in. (0.033 mm) min. thickness	HRB 90 to HRC 23	UNS G4XXX0 low alloy steel	50
C3	Nickel Carbide composite coating on 4/6 chrome	0.0013 in. (0.033 mm) min. thickness	HRB 90 to HRC 23	UNS S50100 steel, 4 % to 6 % chrome	70
C5	Nickel Carbide composite coating on brass	0.0013 in. (0.033 mm) min. thickness	HRB 80 to HRB 100	UNS C443XX (Inhibited Admiralty Brass)	50
D1	Nickel Carbide composite coating on steel	0.003 in. (0.076 mm) min. thickness	HRB 90 to HRC 23	UNS G10XX0 UNS G15XX0 Steel	60
D2	Nickel Carbide composite coating on low alloy steel	0.003 in. (0.076 mm) min. thickness	HRB 90 to HRC 23	UNS G4XXX0 low alloy steel	50
D3	Nickel Carbide composite coating on 4/6 chrome	0.003 in. (0.076 mm) min. thickness	HRB 90 to HRC 23	UNS S50100 steel, 4 % to 6 % chrome	70
D5	Nickel Carbide composite coating on brass	0.003 in. (0.076 mm) min. thickness	HRB 80 to HRB 100	UNS C443XX (Inhibited Admiralty Brass)	50

NOTE "Thickness" is per side as used in this table.

*Previously Table A in the Twelfth Edition of this specification.

Table F.2—Pump Barrel Materials, Case Hardened*

Identification Symbol	Description	Inside Surface Condition	Base Core Hardness	Base Material	Base Material Minimum Yield Strength, ksi
G1	Carbonitrided Steel	690 Knoop min. for 0.005 in. per side with 466 Knoop min. at 0.010 in. per side	HRC 23 max.	UNS G10XX0	60
G3	Carbonitrided 4/6 chrome steel	690 Knoop min. for 0.005 in. per side with 466 Knoop min. at 0.010 in. per side	HRC 23 max.	UNS S50100	70
H1	Carbonitrided Steel	510 Knoop min. for .005 in. per side with 351 Knoop min. at .010 in. per side	HRC 23 max.	UNS G10XX0	60
J1	Carburized Steel	690 Knoop min. for 0.005 in. per side with 466 Knoop min. at 0.010 in. per side	HRC 23 max.	UNS G10XX0	60
K1	Induction Case Hardened	690 Knoop min. for 0.005 in. per side with 466 Knoop min. at 0.010 in. per side	HRC 23 max.	UNS G10XX0	60
L2	Nitrided low alloy steel	690 Knoop min. at surface with 466 Knoop min. at 0.005 in. per side	HRC 23 max.	UNS G4XXX0	50

NOTE Recommended Load for Knoop hardness testing is 500 grams.

*Previously Table B in the Twelfth Edition of this specification.

Table F.3—Pump Barrel, Pull Tube and Coupling Extension Materials, Nonhardened*

Identification Symbol	Description	Inside Surface Condition	Base Core Hardness	Base Material	Base Material Minimum Yield Strength, ksi
N1	Non-Hardened Steel	HRB 90 to HRC 23	HRB 90 to HRC 23	UNS G10XX0 UNS G15XX0 Steel	60
N2	Non-Hardened low alloy steel	HRB 90 to HRC 23	HRB 90 to HRC 23	UNS G4XXX0 low alloy steel	50
N4	Ni/Cu alloy	HRB 90 to HRC 23	HRB 90 to HRC 23	UNS N0440X	55
N5	Brass	HRB 80 to HRB 100	HRB 80 to HRB 100	UNS C443XX (Inhibited Admiralty Brass)	50
N6	Austenitic stainless steel	HRB 90 to HRC 23	HRB 90 to HRC 23	UNS S30400 Austenitic stainless steel	35

*Previously Table C in the Twelfth Edition of this specification.

Table F.4—Pump Materials for Balls and Seats*

Symbol	Description	Hardness	Material
A1 B1 C1 D1	Stainless Steel	Ball: HRC 58-65 Seat: HRC 52-56	UNS S41XX0 UNS S42XX0 UNS S43XX0 UNS S44XX0
A2	Cobalt Alloy, Cast	Ball: HRC 56-63 Seat: HRC 50-56	Cobalt, chromium, and tungsten alloy
A3	Cobalt Alloy, Powder Metal	Ball: HRC 53-60 Seat: HRC 51-57	Cobalt, chromium, and tungsten alloy
A4	Tungsten Carbide	Ball: HRA 88-89 Seat: HRA 88-89.5	Tungsten with Cobalt binder
A5	Nickel Carbide	Ball: HRA 89-90.5 Seat: HRA 87.5-89	Tungsten with nickel binder
A6	Titanium Carbide	Ball: HRA 89-90.5 Seat: HRA 89-90.5	Tungsten and titanium carbide with cobalt binder

*Previously Table D in the Twelfth Edition of this specification.

Table F.5—Pump Materials for Cages, Hard Lined*

Identification Symbol	Description	Hardness	Material	Base Material Minimum Yield Strength, ksi
A1 B1 C1 D1	Steel	HRB 90 to HRC 23	UNS G10XX0 [b] UNS G11XX0 [b] UNS G12XX0 [b] UNS G15XX0 [b]	50
A2 B2 C2	Low alloy steel	HRB 90 to HRC 23	UNS G41XX0 UNS G43XX0 UNS G51XX0	50
A3	Low alloy steel	HRB 90 to HRC 23	UNS G86XX0 [b]	50
A4 B4	Ni/Cu Alloy, 400 series Ni/Cu Alloy, 500 series	HRB 83 to HRC 23	UNS N04400 [b] UNS N05500	50
A6 B6 C6 D6	Stainless Steel	HRB 79 to HRC 23	UNS S302X0 [c] UNS S303X0 [c] UNS S304X0 [c] UNS S316X0 [c]	35

[a] Hard lined ball guides, HRC 37-45, thickness 0.050 in. to 0.125 in. per side.

[b] Free machining grades of material are acceptable for A1, B1, C1, D1 (UNS G1XXX4), A3 (UNS G86XX4) and A4 (UNS N04405).

[c] Low carbon grades of material are acceptable for A6, B6, C6 (UNS S30XX3), and D6 (UNS S316X3).

*Previously Table E in the Twelfth Edition of this specification.

Table F.6—Pump Materials for Pump Cages, Valve Rods, and Fittings*

Identification Symbol	Description	Hardness	Material	Base Material Minimum Yield Strength, ksi
A1 B1 C1 D1	Steel	HRB 90 to HRC 23	UNS G10XX0 [a] UNS G11XX0 [a] UNS G12XX0 [a] UNS G15XX0 [a]	50
A2 B2 C2	Low alloy steel	HRB 90 to HRC 23	UNS G41XX0 UNS G43XX0 UNS G51XX0	50
A3	Low alloy steel	HRB 90 to HRC 23	UNS G86XX0 [a]	50
A4 B4	Ni/Cu Alloy, 400 series Ni/Cu Alloy, 500 series	HRB 83 to HRC 23	UNS N04400 [a] UNS N05500	50
A5 B5 C5	Brass	HRB 60 to HRB 90	UNS C36000 UNS C44300 UNS C46400	40
A6 B6 C6 D6	Stainless Steel	HRB 79 to HRC 23	UNS S302X0 [b] UNS S303X0 [b] UNS S304X0 [b] UNS S316X0 [b]	35

[a] Free machining grades of material are acceptable for A1, B1, C1, D1 (UNS G1XXX4), A3 (UNS G86XX4), and A4 (UNS N04405).

[b] Low carbon grades of material are acceptable for A6, B6, C6 (UNS S30XX3), and D6 (UNS S316X3).

*Previously Table F in the Twelfth Edition of this specification.

Table F.7—Pump Materials for Seating Cups*

Symbol	Description	Hardness	Material
A1	Seating Cup	Shore Durometer D65/92	Plastic
A2	Seating Cup	Per Manufacturer's Specification	Composition

*Previously Table G in the Twelfth Edition of this specification.

Table F.8—Pump Plunger Materials, Spray Metal Coated*

Identification Symbol	Description	Outside Surface Condition	Base Core Hardness	Base Material	Base Material Minimum Yield Strength [a], ksi
B1 B2 B3	Spray Metal	0.008 in. (0.203 mm) min. thickness, 484 Vickers 200 min. hardness	HRB 70 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G86XX0	50
C1 C2 C3	Spray Metal	0.008 in. (0.203 mm) min. thickness, 595 Vickers 200 min. hardness	HRB 70 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G86XX0	50
D1 D2 D3	Spray Metal with Ni/Cu alloy ends	0.008 in. (0.203 mm) min. thickness, 595 Vickers 200 min. hardness	HRB 70 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G86XX0	50
E1 E2 E3	Spray Metal with Nickel plated pin ends and entire length of inside diameter	0.008 in. (0.203 mm) min. thickness, 484 Vickers 200 min. hardness; Nickel plating on pins and inside diameter 0.0013 in. (0.033 mm) min. thickness	HRB 70 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G86XX0	50
F1 F2 F3	Spray Metal with Nickel plated pin ends and entire length of inside diameter	0.008 in. (0.203 mm) min. thickness, 595 Vickers 200 min. hardness; Nickel plating on pins and inside diameter 0.0013 in. (0.033 mm) min. thickness	HRB 70 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G86XX0	50

NOTE "Thickness" is per side as used in this table.

[a] Base material yield strength is before spray metal coating.

*Previously Table H in the Twelfth Edition of this specification.

Table F.9—Pump Plunger Materials, Plated*

Identification Symbol	Description	Outside Surface Condition	Base Core Hardness	Base Material	Base Material Minimum Yield Strength, ksi
A1 A2 A3	Chrome Plated	0.006 in. (0.152 mm) min. thickness, 832 to 1160 HV100	HRB 90 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G8XXX0	50
B1 B2 B3	Double chrome Plated	0.012 in. (0.305 mm) min. thickness, 832 to 1160 HV100	HRB 90 to HRC 23	UNS G10XX0 UNS G4XXX0 UNS G8XXX0	50

NOTE "Thickness" is per side as used in this table.

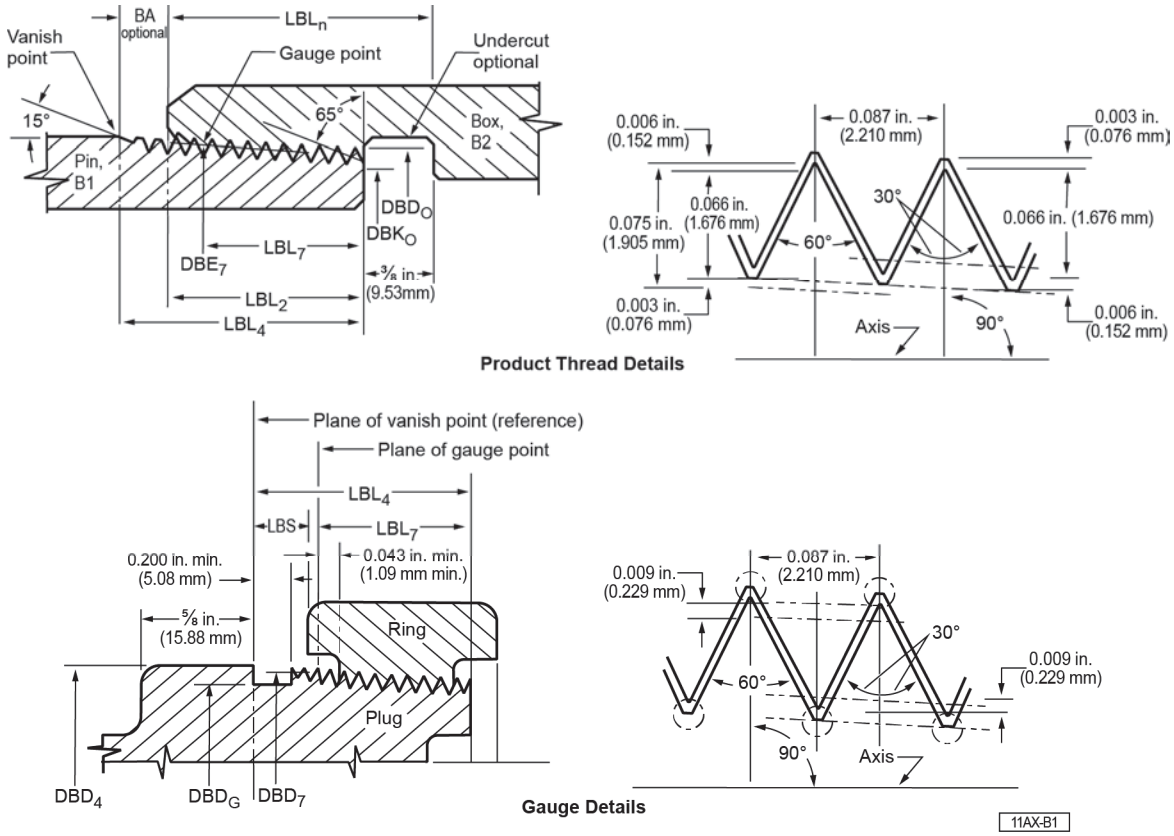
*Previously Table I in the Twelfth Edition of this specification.

Annex G
(normative)

Threaded Connections

This section contains details for threaded connections used in API subsurface pumps and fittings.

Table G.1—B Thread Connection Details for Product and Gauges (See Notes)

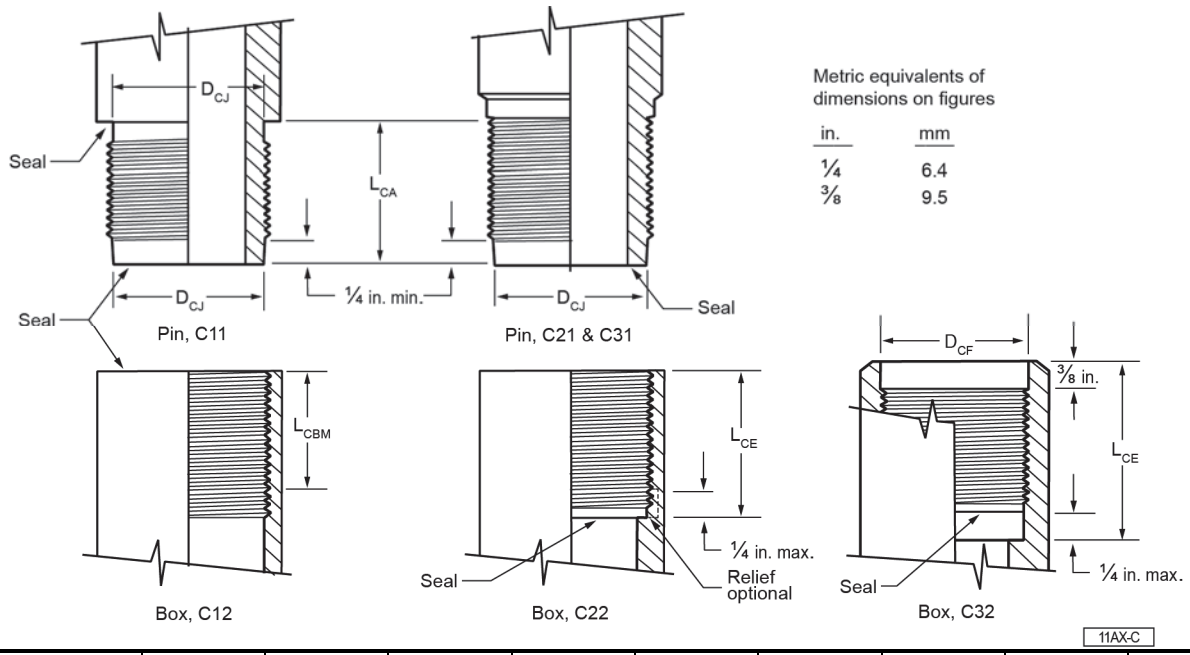


(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	**Definition**	**Thread Size**		
		178-11 1/2	**225-11 1/2**	**275-11 1/2**
DBD_G	Diameter of notch on plug gauge	2.050 (52.07)	2.550 (64.77)	3.050 (77.47)
DBD_O	Major thread diameter at end of barrel	2.2137 (56.228)	2.6687 (67.785)	3.1687 (80.49)
DBD_4	Diameter of collar on plug gauge	2.250 (57.15)	2.750 (69.85)	3.250 (82.55)
DBD_7	Major diameter of plug gauge at gauge point	2.23835 (56.854)	2.73835 (69.554)	3.23835 (82.254)
DBE_7	Pitch diameter at gauge point	2.18043 (55.383)	2.68043 (68.083)	3.18043 (80.783)
DBK_O	Thread root diameter at end of barrel	2.0815 (52.87)	2.5365 64.43)	3.0365 (77.13)
LBL_N	Total depth of box (including undercut, if any)	1.875 (47.63)	1.875 (47.63)	1.875 (47.63)
LBL_2	Length of effective thread (on barrel)	1.1262 (28.61)	1.3885 (35.27)	1.3885 (35.27)
LBL_4	Total length of thread (to vanish point)	1.375 (34.93)	1.625 (41.28)	1.625 (41.28)
LBL_7	Length from gauge point to end of barrel	0.9402 (23.88)	1.1902 (30.23)	1.1902 (30.23)
LBS	Gauge standoff	0.300 (7.620)	0.300 (7.620)	0.300 (7.620)
Included taper of thread cone (in./ft) (mm/m)	0.375 (31.3)	0.750 (62.5)	0.750 (62.5)	

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Tolerances are the same as for corresponding API line pipe threads and gauges. See API 5B.

Table G.2—C Thread Connection (See Notes)



Metric equivalents of dimensions on figures

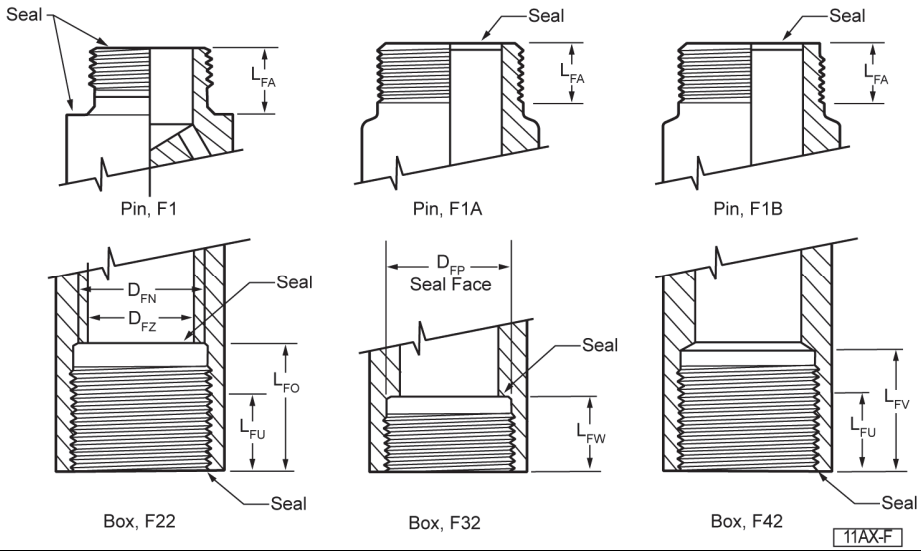
in.	mm
¼	6.4
⅜	9.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dimensional Symbol	**Thread Size** [a]								
	1.3330-16	**1.5730-16**	**1.8750-16**	**2.0870-16**	**2.2380-11 1/2**	**2.5730-16**	**2.7380-11 1/2**	**3.2380-11 1/2**	**4.2380-11 1/2**
L_{CA} min.	1.25 (31.8)	1.50 (38.1)	1.50 (38.1)	1.50 (38.1)	1.50 (38.1)	1.50 (38.1)	1.50 (38.1)	1.50 (38.1)	1.50 (38.1)
L_{CBM} min.	1.00 (25.4)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	1.25 (31.8)	—
L_{CE} ± 0.031 (± 0.79)	1.188 (30.2)	1.438 (36.5)	1.438 (36.5)	1.438 (36.5)	1.875 (47.6)	1.438 (36.5)	1.875 (47.6)	1.875 (47.6)	1.875 (47.6) min.
D_{CF} +0.010/–0.000 (+0.25/–0.00)	1.346 (34.19)	1.589 (40.36)	1.891 (48.03)	2.094 (53.19)	2.258 (57.35)	2.591 (65.81)	2.758 (70.05)	3.258 (82.75)	4.258 (108.15)
D_{CJ} +0.000/–0.010 (+0.00/–0.25)	1.247 (31.67)	1.485 (37.72)	1.787 (45.39)	1.999 (50.77)	2.118 (53.80)	2.483 (63.07)	2.618 (66.50)	3.118 (79.20)	4.118 (104.60)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See Table G.8 for thread dimensions.

Table G.3—F Thread Connection (See Notes)

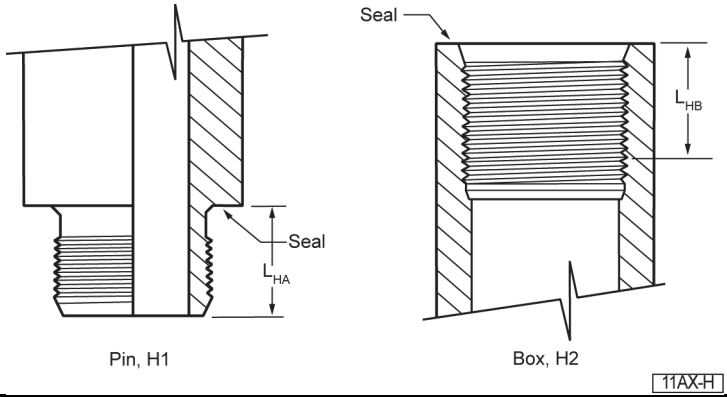


Dimensional Symbol		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Thread Size [a]							
		0.8750-14	1.000-14	1.2500-14	1.4704-14	1.5604-14	1.8024-14	2.1095-11 1/2	3.1715-11 1/2
L_{FA}		0.750 (19.05) ±0.016 (±0.41)	0.750 (19.05) ±0.016 (±0.41)	0.750 (19.05) ±0.016 (±0.41)	0.812 (20.62) ±0.016 (±0.41)	0.875 (22.23) ±0.016 (±0.41)	0.875 (22.23) ±0.016 (±0.41)	0.938 (23.83) ±0.016 (±0.41)	1.125 (28.58) ±0.016 (±0.41)
D_{FN}		0.7977 (20.260) +0.0085 (+0.216) –0.0000 (–0.000)	0.9227 (23.437) +0.0085 (+0.216) –0.0000 (–0.000)	1.1727 (29.787) +0.0077 (+0.196) –0.0000 (–0.000)	1.3931 (35.385) +0.0077 (+0.196) –0.0000 (–0.000)	1.4831 (37.671) +0.0077 (+0.196) –0.0000 (–0.000)	1.7251 (43.818) +0.0077 (+0.196) –0.0000 (–0.000)	2.0154 (51.191) +0.0094 (+0.239) –0.0000 (–0.000)	3.0770 (78.156) +0.0094 (+0.239) –0.0000 (–0.000)
L_{FO}		1.125 (28.58) ±0.016 (±0.41)	1.125 (28.58) ±0.016 (±0.41)	1.125 (28.58) ±0.016 (±0.41)	1.188 (30.18) ±0.016 (±0.41)	1.250 (31.75) ±0.016 (±0.41)	1.250 (31.75) ±0.016 (±0.41)	1.312 (33.32) ±0.016 (±0.41)	1.750 (44.45) ±0.016 (±0.41)
L_{FU}	min.	0.766 (19.46)	0.766 (19.46)	0.766 (19.46)	0.828 (21.03)	0.890 (22.61)	0.890 (22.61)	0.953 (24.21)	1.188 (30.18)
	max.	0.875 (22.23)	0.875 (22.23)	0.875 (22.23)	0.938 (23.83)	1.000 (25.40)	1.000 (25.40)	1.062 (26.97)	1.312 (33.32)
L_{FV}	min.	0.938 (23.83)	0.938 (23.83)	0.938 (23.83)	1.000 (25.40)	1.062 (26.97)	1.062 (26.97)	1.125 (28.58)	1.375 (34.93)
	max.	1.000 (25.40)	1.000 (25.40)	1.000 (25.40)	1.125 (28.58)	1.188 (30.18)	1.188 (30.18)	1.250 (31.73)	1.625 (41.28)
L_{FW}	min.	0.625 (15.88)	0.625 (15.88)	0.625 (15.88)	0.688 (17.48)	0.750 (19.05)	0.750 (19.05)	0.812 (20.62)	1.000 (25.40)
	max.	0.688 (17.48)	0.688 (17.48)	0.688 (17.48)	0.750 (19.05)	0.812 (20.62)	0.812 (20.62)	0.875 (22.23)	1.062 (26.97)
D_{FZ}	min.	0.768 (19.51)	0.892 (22.66)	1.111 (28.22)	1.331 (33.81)	1.421 (36.09)	1.631 (41.43)	1.921 (48.79)	2.950 (74.93)
	max.	0.807 (20.50)	0.922 (23.42)	1.172 (29.77)	1.393 (35.38)	1.483 (37.67)	1.725 (43.82)	2.015 (51.18)	3.077 (78.16)
D_{FP}	min.	0.775 (19.69)	0.900 (22.86)	1.150 (29.21)	1.370 (34.80)	1.460 (37.08)	1.700 (43.18)	1.980 (50.29)	3.050 (77.47)
	max.	0.890 (22.61)	1.020 (25.91)	1.270 (32.26)	1.485 (37.72)	1.580 (40.13)	1.820 (46.23)	2.130 (54.10)	3.195 (81.15)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See Table G.8 for thread dimensions.

Table G.4—H Thread Connection (See Notes)

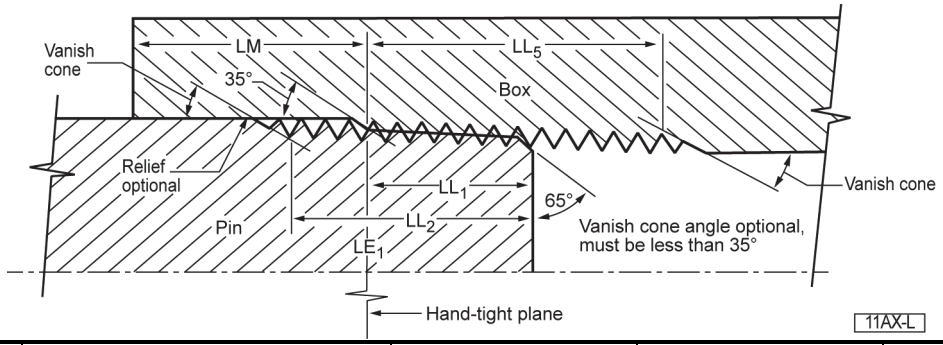


(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	Thread Size [a]			
	1.5084-14	1.9864-14	2.3755-11 1/2	3.3825-11 1/2
L_{HA}	0.875 ±0.031 (22.23 ±0.79)	0.938 ±0.031 (23.83 ±0.79)	1.000 ±0.031 (25.40 ±0.79)	1.250 ±0.031 (31.75 ±0.79)
L_{HB}	0.938 min. (23.83 min.)	1.000 min. (25.40 min.)	1.062 min. (26.97 min.)	1.312 min. (33.32 min.)

NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] See Table G.8 for thread dimensions.

Table G.5—L Thread Connection (Modified API Line Pipe) (See Notes)



(1)	(2)	(3)	(4)	(5)
Dimensional Symbol	Definition	Thread Size		
		3/8	1/2	3/4
LE_1	Pitch: Diameter at hand-tight plane	0.62701 (15.926)	0.77843 (19.772)	0.98887 (25.117)
LL_1	Length: End of rod to hand-tight plane	0.407 (10.34)	0.534 (13.56)	0.553 (14.05)
LL_2	Length: Effective threads, pin	0.5746 (14.595)	0.7479 (18.997)	0.7599 (19.301)
LL_5	Length: Effective threads, box, min.	0.6858 (17.419)	0.8907 (22.624)	0.9027 (22.929)
LM	Length: Face to hand-tight plane	0.7932 (20.147)	0.8190 (20.803)	0.8190 (20.803)
TPI	Threads per inch	18	14	14

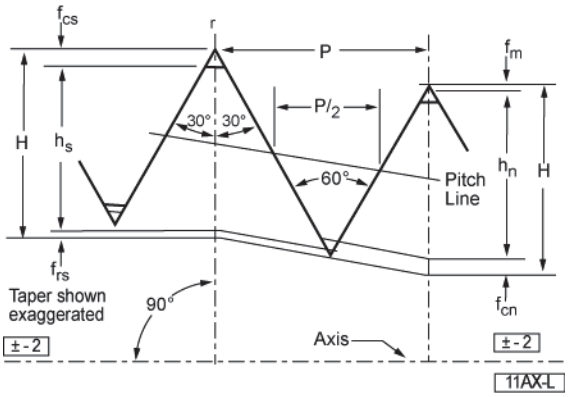
NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Included taper, all sizes, 0.0625 in./in. (62.5 mm/m).

NOTE 3 This connection is a modification of standard API line pipe threads by the addition of approximately three threads at the small end of both box and pin members.

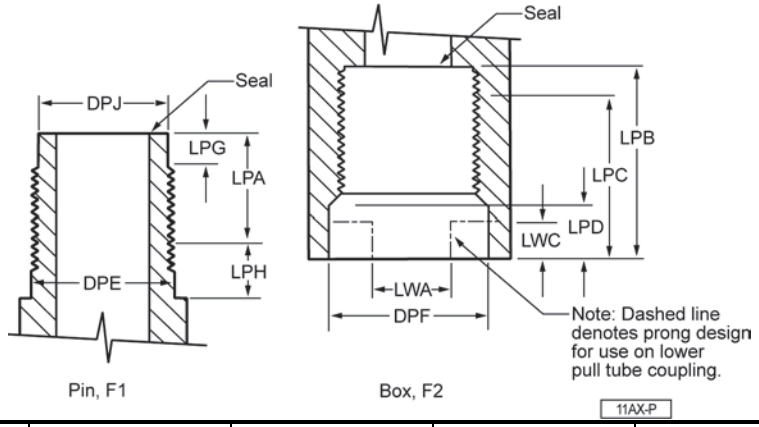
[a] See API 5B for tolerances and other details.

Table G.6—Thread Height Dimensions (Modified API Line Pipe) (See Note)



(1)	(2)	(3)
Thread Element	**18 Threads per Inch p = 0.0556 (1.412)**	**14 Threads per Inch p = 0.0714 (1.814)**
$H = 0.866p$	0.0481 (1.222)	0.0619 (1.571)
$h_s = h_n = 0.760p$	0.0422 (1.072)	0.0543 (1.379)
$f_{rs} = f_m = 0.033p$	0.0018 (0.047)	0.0024 (0.060)
$f_{cs} = f_{cn} = 0.073p$	0.0041 (0.103)	0.0052 (0.132)
NOTE All dimensions in inches (followed by equivalent in millimeters).		

Table G.7—P Thread Connection (See Note)



(1)	(2)	(3)	(4)	(5)	(6)
Dimensional Symbol	**Thread Size [a]**				
	0.9375-16	**1.1250-16**	**1.3125-16**	**1.5000-16**	**1.8750-16**
LPA min.	1.000 (25.40)	1.125 (28.58)	1.250 (31.75)	1.375 (34.93)	1.625 (41.28)
LPB max.	1.688 (42.88)	1.812 (46.02)	1.938 (49.23)	2.062 (52.37)	2.312 (58.72)
LPC min.	1.500 (38.10)	1.625 (41.28)	1.750 (44.45)	1.875 (47.63)	2.125 (53.98)
LPD min.	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)
DPE+0.000/–0.005 (+0.00/–0.13)	0.939 (23.85)	1.127 (28.63)	1.314 (33.38)	1.502 (38.15)	1.877 (47.68)
DPF+0.005/–0.000 (+0.13/–0.00)	0.939 (23.85)	1.127 (28.63)	1.314 (33.38)	1.502 (38.15)	1.877 (47.68)
LPG min.	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)
LPH min.	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)	0.750 (19.05)
DPJ [b]					
LWA max.	0.688 (17.48)	0.688 (17.48)	0.750 (19.05)	0.750 (19.05)	0.875 (22.23)
LWC min.	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)	0.250 (6.35)
NOTE All dimensions in inches (followed by equivalent in millimeters).					

[a] See Table G.8 for thread dimensions.
[b] See Table G.8 for pin relief dimensions.

Table G.8—S Details of All Straight Threads Used in API Subsurface Pumps and Fittings (American National Standard Threads, Class 3 Fit, Except as Noted) (See Notes)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Basic Major Diameter	Number Threads Per Inch	Pin Thread Dimensions			Box Thread Dimensions			Relief Diameters [e]	
		Major Diameter	Pitch Diameter	Minor Diameter [a] (Maximum)	Minor Diameter	Pitch Diameter	Major Diameter [a] (Minimum)	Pin (Maximum)	Box (Minimum)
0.7500 [b]	10	0.7500 (19.050) +0.0000 (+0.000) –0.0128 (–0.325)	0.6850 (17.399) +0.0000 (+0.000) –0.0045 (–0.114)	0.6273 (15.933)	0.6417 (16.299) +0.0136 (+0.345) –0.0000 (–0.000)	0.6850 (17.399) +0.0045 (+0.114) –0.0000 (–0.000)	0.7500 (19.050)	0.615 (15.62)	0.769 (19.53)
0.7500 [c]	16	0.7500 (19.050) +0.0000 (+0.000) –0.0090 (–0.229)	0.7094 (18.019) +0.0000 (+0.000) –0.0032 (–0.081)	0.6733 (17.102)	0.6823 (17.330) +0.0080 (+0.203) –0.0000 (–0.000)	0.7094 (18.019) +0.0032 (+0.081) –0.0000 (–0.000)	0.7500 (19.050)	0.665 (16.89)	0.763 (19.38)
0.8750 [c]	14	0.8750 (22.225) +0.0000 (+0.000) –0.0098 (–0.249)	0.8286 (21.046) +0.0000 (+0.000) –0.0036 (–0.091)	0.7874 (20.000)	0.7977 (20.262) +0.0085 (+0.216) –0.0000 (–0.000)	0.8286 (21.046) +0.0036 (+0.091) –0.0000 (–0.000)	0.8750 (22.225)	0.778 (19.76)	0.889 (22.58)
0.9375	16	0.9375 (23.813) +0.0000 (+0.000) –0.0090 (–0.229)	0.8969 (22.781) +0.0000 (+0.000) –0.0036 (–0.091)	0.8608 (21.864)	0.8698 (22.093) +0.0068 (+0.173) –0.0000 (–0.000)	0.8969 (22.781) +0.0036 (+0.091) –0.0000 (–0.000)	0.9375 (23.813)	0.852 (21.64)	0.951 (24.16)
1.0000	14	1.0000 (25.400) +0.0000 (+0.000) –0.0098 (–0.249)	0.9536 (24.221) +0.0000 (+0.000) –0.0036 (–0.091)	0.9124 (23.175)	0.9227 (23.437) +0.0085 (+0.216) –0.0000 (–0.000)	0.9536 (24.221) +0.0036 (+0.091) –0.0000 (–0.000)	1.0000 (25.400)	0.903 (22.94)	1.014 (25.76)
1.1250	16	1.1250 (28.575) +0.0000 (+0.000) –0.0090 (–0.229)	1.0844 (27.544) +0.0000 (+0.000) –0.0040 (–0.102)	1.0483 (26.627)	1.0573 (26.855) +0.0068 (+0.173) –0.0000 (–0.000)	1.0844 (27.544) +0.0040 (+0.102) –0.0000 (–0.000)	1.1250 (28.575)	1.039 (26.39)	1.138 (28.91)
1.1894	14	1.1870 (30.150) +0.0000 (+0.000) –0.0100 (–0.254)	1.1430 (29.032) +0.0000 (+0.000) –0.0040 (–0.102)	1.1018 (27.986)	1.1121 (28.247) +0.0077 (+0.196) –0.0000 (–0.000)	1.1430 (29.032) +0.0040 (+0.102) –0.0000 (–0.000)	1.1894 (30.211)	1.092 (27.74)	1.204 (30.58)
1.2500	14	1.2500 (31.750) +0.0000 (+0.000) –0.0098 (–0.249)	1.2036 (30.571) +0.0000 (+0.000) –0.0040 (–0.102)	1.1624 (29.525)	1.1727 (29.787) +0.0077 (+0.196) –0.0000 (–0.000)	1.2036 (30.571) +0.0040 (+0.102) –0.0000 (–0.000)	1.2500 (31.750)	1.153 (29.29)	1.265 (32.13)
1.3125	16	1.3125 (33.338) +0.0000 (+0.000) –0.0090 (–0.229)	1.2719 (32.306) +0.0000 (+0.000) –0.0040 (–0.102)	1.2358 (31.389)	1.2448 (31.618) +0.0068 (+0.173) –0.0000 (–0.000)	1.2719 (32.306) +0.0040 (+0.102) –0.0000 (–0.000)	1.3125 (33.338)	1.227 (31.17)	1.326 (33.68)
1.3330	16	1.3330 (33.858) +0.0000 (+0.000) –0.0090 (–0.229)	1.2924 (32.827) +0.0000 (+0.000) –0.0040 (–0.102)	1.2563 (31.910)	1.2653 (32.139) +0.0068 (+0.173) –0.0000 (–0.000)	1.2924 (32.827) +0.0040 (+0.102) –0.0000 (–0.000)	1.3330 (33.858)	1.247 (31.67)	1.346 (34.19)
1.3750	14	1.3750 (34.925) +0.0000 (+0.000) –0.0098 (–0.249)	1.3286 (33.746) +0.0000 (+0.000) –0.0040 (–0.102)	1.2874 (32.700)	1.2977 (32.962) +0.0077 (+0.196) –0.0000 (–0.000)	1.3286 (33.746) +0.0040 (+0.102) –0.0000 (–0.000)	1.3750 (34.925)	1.278 (32.46)	1.390 (35.31)
1.4704	14	1.4704 (37.348) +0.0000 (+0.000) –0.0098 (–0.249)	1.4240 (36.170) +0.0000 (+0.000) –0.0040 (–0.102)	1.3828 (35.123)	1.3931 (35.385) +0.0077 (+0.196) –0.0000 (–0.000)	1.4240 (36.170) +0.0040 (+0.102) –0.0000 (–0.000)	1.4704 (37.348)	1.373 (34.87)	1.484 (37.69)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Basic Major Diameter	Number Threads Per Inch	Pin Thread Dimensions			Box Thread Dimensions			Relief Diameters [e]	
		Major Diameter	Pitch Diameter	Minor Diameter [a] (Maximum)	Minor Diameter	Pitch Diameter	Major Diameter [a] (Minimum)	Pin (Maximum)	Box (Minimum)
1.5000	16	1.5000 (38.100) +0.0000 (+0.000) –0.0090 (–0.229)	1.4594 (37.069) +0.0000 (+0.000) –0.0040 (–0.102)	1.4233 (36.152)	1.4323 (36.380) +0.0068 (+0.173) –0.0000 (–0.000)	1.4594 (37.069) +0.0040 (+0.102) –0.0000 (–0.000)	1.5000 (38.100)	1.414 (35.92)	1.513 (38.43)
1.5084	14	1.5084 (38.313) +0.0000 (+0.000) –0.0098 (–0.249)	1.4620 (37.135) +0.0000 (+0.000) –0.0062 (–0.157)	1.4208 (36.088)	1.4311 (36.350) +0.0077 (+0.196) –0.0000 (–0.000)	1.4620 (37.135) +0.0062 (+0.157) –0.0000 (–0.000)	1.5084 (38.313)	1.409 (35.79)	1.525 (38.74)
1.5604	14	1.5604 (39.634) +0.0000 (+0.000) –0.0098 (–0.249)	1.5140 (38.456) +0.0000 (+0.000) –0.0062 (–0.157)	1.4728 (37.409)	1.4831 (37.671) +0.0077 (+0.196) –0.0000 (–0.000)	1.5140 (38.456) +0.0062 (+0.157) –0.0000 (–0.000)	1.5604 (39.634)	1.461 (37.11)	1.577 (40.06)
1.5730	16	1.5730 (39.954) +0.0000 (+0.000) –0.0090 (–0.229)	1.5324 (38.923) +0.0000 (+0.000) –0.0061 (–0.155)	1.4963 (38.006)	1.5053 (38.235) +0.0068 (+0.173) –0.0000 (–0.000)	1.5324 (38.923) +0.0061 (+0.155) –0.0000 (–0.000)	1.5730 (39.954)	1.485 (37.72)	1.589 (40.36)
1.7500	14	1.7500 (44.450) +0.0000 (+0.000) –0.0098 (–0.249)	1.7036 (43.271) +0.0000 (+0.000) –0.0062 (–0.157)	1.6624 (42.225)	1.6727 (42.487) +0.0077 (+0.196) –0.0000 (–0.000)	1.7036 (43.271) +0.0062 (+0.157) –0.0000 (–0.000)	1.7500 (44.450)	1.651 (41.94)	1.767 (44.88)
1.8024	14	1.8024 (45.781) +0.0000 (+0.000) –0.0098 (–0.249)	1.7560 (44.602) +0.0000 (+0.000) –0.0062 (–0.157)	1.7148 (43.556)	1.7251 (43.818) +0.0077 (+0.196) –0.0000 (–0.000)	1.7560 (44.602) +0.0062 (+0.157) –0.0000 (–0.000)	1.8024 (45.781)	1.703 (43.26)	1.819 (46.20)
1.8750	16	1.8750 (47.625) +0.0000 (+0.000) –0.0090 (–0.229)	1.8344 (46.594) +0.0000 (+0.000) –0.0061 (–0.155)	1.7983 (45.677)	1.8073 (45.905) +0.0068 (+0.173) –0.0000 (–0.000)	1.8344 (46.594) +0.0061 (+0.155) –0.0000 (–0.000)	1.8750 (47.625)	1.787 (45.39)	1.891 (48.03)
1.9864	14	1.9864 (50.455) +0.0000 (+0.000) –0.0098 (–0.249)	1.9400 (49.276) +0.0000 (+0.000) –0.0062 (–0.157)	1.8988 (48.230)	1.9091 (48.491) +0.0077 (+0.196) –0.0000 (–0.000)	1.9400 (49.276) +0.0062 (+0.157) –0.0000 (–0.000)	1.9864 (50.455)	1.887 (47.93)	2.003 (50.88)
2.0035	$11^1/_2$	[d]2.0000 (50.800) +0.0000 (+0.000) –0.0115 (–0.292)	1.9470 (49.454) +0.0000 (+0.000) –0.0092 (–0.234)	1.8968 (48.179)	1.9094 (48.499) +0.0094 (+0.239) –0.0000 (–0.000)	1.9470 (49.454) +0.0092 (+0.234) –0.0000 (–0.000)	2.0035 (50.889)	1.881 (47.78)	2.026 (51.46)
2.0870	16	2.0870 (53.010) +0.0000 (+0.000) –0.0090 (–0.229)	2.0464 (51.979) +0.0000 (+0.000) –0.0067 (–0.170)	2.0103 (51.062)	2.0193 (51.290) +0.0068 (+0.173) –0.0000 (–0.000)	2.0464 (51.979) +0.0067 (+0.170) –0.0000 (–0.000)	2.0870 (53.010)	1.999 (50.77)	2.094 (53.19)
2.1095	$11^1/_2$	2.1095 (53.581) +0.0000 (+0.000) –0.0115 (–0.292)	2.0530 (52.146) +0.0000 (+0.000) –0.0069 (–0.175)	2.0028 (50.871)	2.0154 (51.191) +0.0094 (+0.239) –0.0000 (–0.000)	2.0530 (52.146) +0.0069 (+0.175) –0.0000 (–0.000)	2.1095 (53.581)	1.989 (50.52)	2.129 (54.08)
2.2380	$11^1/_2$	2.2380 (56.845) +0.0000 (+0.000) –0.0115 (–0.292)	2.1815 (55.410) +0.0000 (+0.000) –0.0069 (–0.175)	2.1313 (54.135)	2.1439 (54.455) +0.0094 (+0.239) –0.0000 (–0.000)	2.1815 (55.410) +0.0069 (+0.175) –0.0000 (–0.000)	2.2380 (56.845)	2.118 (53.80)	2.258 (57.35)
2.3755	$11^1/_2$	2.3755 (60.338) +0.0000 (+0.000) –0.0115 (–0.292)	2.3190 (58.903) +0.0000 (+0.000) –0.0069 (–0.175)	2.2688 (57.628)	2.2814 (57.948) +0.0094 (+0.239) –0.0000 (–0.000)	2.3190 (58.903) +0.0069 (+0.175) –0.0000 (–0.000)	2.3755 (60.338)	2.255 (57.28)	2.395 (60.83)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Basic Major Diameter	Number Threads Per Inch	Pin Thread Dimensions			Box Thread Dimensions			Relief Diameters [e]	
		Major Diameter	Pitch Diameter	Minor Diameter [a] (Maximum)	Minor Diameter	Pitch Diameter	Major Diameter [a] (Minimum)	Pin (Maximum)	Box (Minimum)
2.5625	$11^1/_2$	2.5625 (65.088) +0.0000 (+0.000) –0.0115 (–0.292)	2.5060 (63.652) +0.0000 (+0.000) –0.0092 (–0.234)	2.4558 (62.377)	2.4684 (62.697) +0.0094 (+0.239) –0.0000 (–0.000)	2.5060 (63.652) +0.0092 (+0.234) –0.0000 (–0.000)	2.5625 (65.088)	2.440 (61.98)	2.585 (65.66)
2.5730	16	2.5730 (65.354) +0.0000 (+0.000) –0.0090 (–0.229)	2.5324 (64.323) +0.0000 (+0.000) –0.0090 (–0.229)	2.4963 (63.406)	2.5053 (63.635) +0.0068 (+0.173) –0.0000 (–0.000)	2.5324 (64.323) +0.0090 (+0.229) –0.0000 (–0.000)	2.5730 (65.354)	2.483 (63.07)	2.591 (65.81)
2.7380	$11^1/_2$	2.7380 (69.545) +0.0000 (+0.000) –0.0115 (–0.292)	2.6815 (68.110) +0.0000 (+0.000) –0.0069 (–0.175)	2.6313 (66.835)	2.6439 (67.155) +0.0094 (+0.239) –0.0000 (–0.000)	2.6815 (68.110) +0.0069 (+0.175) –0.0000 (–0.000)	2.7380 (69.545)	2.618 (66.50)	2.758 (70.05)
3.1715	$11^1/_2$	3.1715 (80.556) +0.0000 (+0.000) –0.0115 (–0.292)	3.1150 (79.121) +0.0000 (+0.000) –0.0099 (–0.251)	3.0648 (77.846)	3.0774 (78.166) +0.0094 (+0.239) –0.0000 (–0.000)	3.1150 (79.121) +0.0099 (+0.251) –0.0000 (–0.000)	3.1715 (80.556)	3.052 (77.52)	3.192 (81.08)
3.1875	$11^1/_2$	3.1875 (80.963) +0.0000 (+0.000) –0.0115 (–0.292)	3.1310 (79.527) +0.0000 (+0.000) –0.0099 (–0.251)	3.0808 (78.252)	3.0934 (78.572) +0.0094 (+0.239) –0.0000 (–0.000)	3.1310 (79.527) +0.0099 (+0.251) –0.0000 (–0.000)	3.1875 (80.963)	3.064 (77.83)	3.210 (81.53)
3.2380	$11^1/_2$	3.2380 (82.245) +0.0000 (+0.000) –0.0115 (–0.292)	3.1815 (80.810) +0.0000 (+0.000) –0.0069 (–0.175)	3.1313 (79.535)	3.1439 (79.855) +0.0094 (+0.239) –0.0000 (–0.000)	3.1815 (80.810) +0.0069 (+0.175) –0.0000 (–0.000)	3.2380 (82.245)	3.118 (79.20)	3.258 (82.75)
3.3825	$11^1/_2$	3.3825 (85.916) +0.0000 (+0.000) –0.0115 (–0.292)	3.3260 (84.480) +0.0000 (+0.000) –0.0099 (–0.251)	3.2758 (83.205)	3.2884 (83.525) +0.0094 (+0.239) –0.0000 (–0.000)	3.3260 (84.480) +0.0099 (+0.251) –0.0000 (–0.000)	3.3825 (85.916)	3.263 (82.88)	3.403 (86.44)
3.6875	$11^1/_2$	3.6875 (93.663) +0.0000 (+0.000) –0.0115 (–0.292)	3.6310 (92.227) +0.0000 (+0.000) –0.0099 (–0.251)	3.5808 (90.952)	3.5934 (91.272) +0.0094 (+0.239) –0.0000 (–0.000)	3.6310 (92.227) +0.0099 (+0.251) –0.0000 (–0.000)	3.6875 (93.663)	3.564 (90.53)	3.710 (94.23)
4.2380	$11^1/_2$	4.2380 (107.645) +0.0000 (+0.000) –0.0115 (–0.292)	4.1815 (106.210) +0.0000 (+0.000) –0.0099 (–0.251)	4.1313 (104.935)	4.1439 (105.255) +0.0094 (+0.239) –0.0000 (–0.000)	4.1815 (106.210) +0.0099 (+0.251) –0.0000 (–0.000)	4.238 (107.645)	4.118 (104.60)	4.258 (108.15)

NOTE 1 All dimensions in inches (followed by equivalent in millimeters).

NOTE 2 Unified Screw Threads in accordance with National Bureau of Standards Handbook H28 are acceptable and will not affect interchangeability or strength of product.

[a] Tolerances not given, as these dimensions are not gauged and do not affect interchangeability.

[b] From American National Coarse Thread Series, Class 3 Fit.

[c] From American National Fine Thread Series, Class 3 Fit.

[d] Deviation from standard major diameter to accommodate dimension OD_2 of seating mandrel.

[e] Relief diameters shown are recommended unless otherwise specified elsewhere in this specification. The maximum and minimum relief diameters are given without regard for manufacturing method or concentricity of thread to relief. Each manufacturer shall adjust these values and apply a tolerance that conforms with good practice and is in keeping with his facilities and methods.

Table G.9—X Wrench Flat Dimensions (See Note)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dimension	**Size Designation**							
	125	**150**	**175[b]**	**200**	**225[b]**	**250**	**275[b]**	**375[b]**
Distance Between Flats	1.062 (26.97) +0.000 (+0.00) –0.016 (–0.41)	1.312 (33.32) +0.000 (+0.00) –0.025 (–0.64)	1.500 (38.10) +0.000 (+0.00) –0.025 (–0.64)	1.688 (42.88) +0.000 (+0.00) –0.025 (–0.64)	2.000 (50.80) +0.000 (+0.00) –0.025 (–0.64)	2.188 (55.58) +0.000 (+0.00) –0.031 (–0.79)	2.375 (60.33) +0.000 (+0.00) –0.031 (–0.79)	3.375 (85.73) +0.000 (+0.00) –0.031 (–0.79)
Length of Flats, min.[a]	0.688 (17.48)	0.812 (20.62)	0.938 (23.83)	0.938 (23.83)	1.125 (28.58)	1.125 (28.58)	1.188 (30.18)	1.250 (31.75)

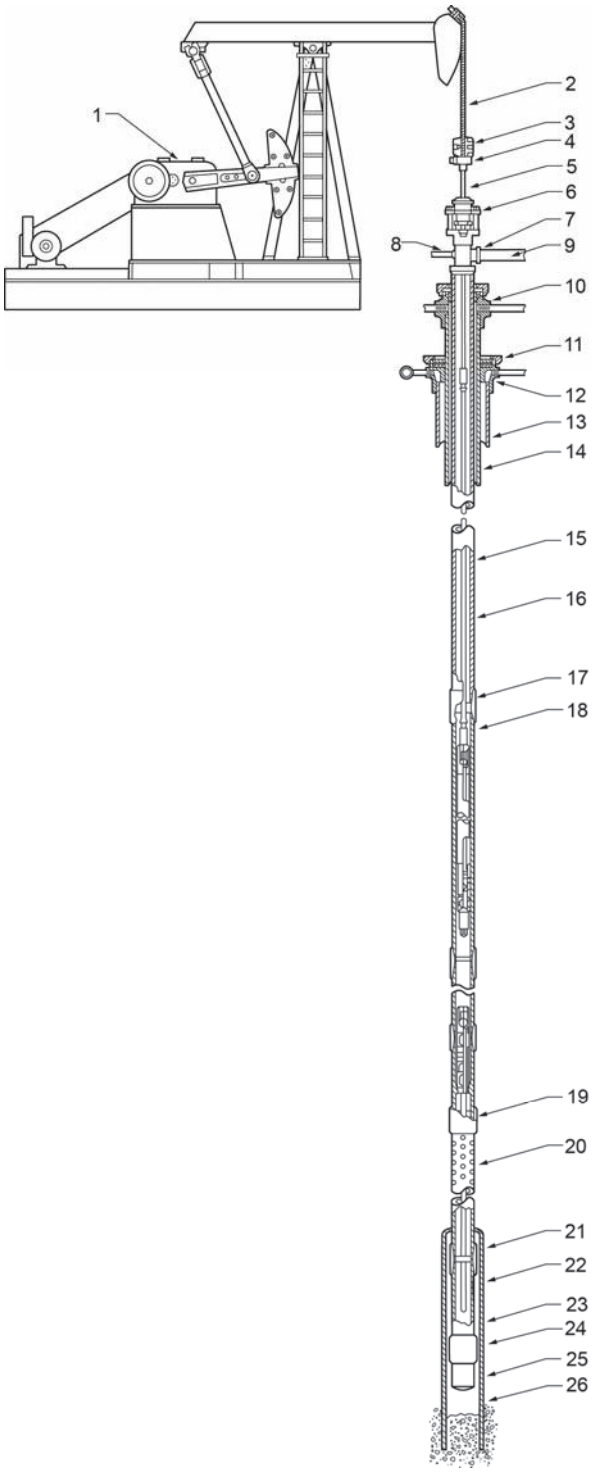
NOTE All dimensions in inches (followed by equivalent in millimeters).

[a] Minimum length of flats specified herein is the actual length of flat surface independent of any fillets or chamfers. Where full length flats are impractical, at least one end of the flats shall extend to the end of the part, thus allowing overhang of a wrench of standard thickness. The configuration of the ends of the flats are optional with the manufacturer.

[b] Wrench flats for pump bore size designations 175, 225, 275, and 375 are also applicable to tubing size designations 20, 25, 30, and 40.

Annex H
(informative)

Sucker Rod Pumping System Illustration



Key

1	pumping unit
2	wire line (bridle)
3	polished rod clamp
4	wire line hanger (carrier bar)
5	polished rod
6	stuffing box
7	pumping tee
8	bleeder
9	flow line
10	tubing head
11	casing head
12	polished rod sub-coupling
13	surface pipe
14	oil string (casing)
15	sucker rod
16	tubing
17	barrel coupling
18	sucker rod coupling
19	tubing coupling
20	perforated nipple
21	tubing coupling
22	gas anchor
23	mud anchor
24	tubing coupling
25	bull plug
26	bottom end of oil string (casing)

Bibliography

[1] *National Bureau of Standards Handbook H28* [3], 1957

[2] ASTM A370 [4], *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

[3] ASTM A751, *Standard Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products*

[4] ASTM D2583, *Test Method for Indention Hardness of Rigid Plastics by Means of a Barcol Impressor*

[5] ASTM E18, *Standard Methods of Tests for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials*

[6] ASTM E165, *Standard Practice for Liquid Penetrant Inspection Method*

[7] ASTM E384, *Standard Test Method for Microhardness of Materials*

[3] NIST, National Institute of Standards and Technology, 100 Bureau Drive, Gaithersburg, Maryland 20899. www.nist.gov

[4] ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428, www.astm.org.

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