Flow-control Devices for Side-pocket Mandrels

ANSI/API SPECIFICATION 19G2
FIRST EDITION, JUNE 2010

EFFECTIVE DATE: DECEMBER 1, 2010

ADDENDUM 1, JANUARY 2019

CONTAINS API MONOGRAM ANNEX AS PART OF U.S. NATIONAL ADOPTION

ISO 17078-2:2007 (Modified), Petroleum and natural gas industries—Drilling and production equipment, Part 2—Flow-control devices for side-pocket mandrels

AMERICAN PETROLEUM INSTITUTE

Date of Issue: January 2019

Affected Publication: API Specification 19G2, *Flow-control Devices for Side-pocket Mandrels*, First Edition, June 2010

Addendum 1

Page 14: Table 1 shall be replaced with the following:

Table 1 — Flow-control device descriptions

Flow-control device group	Flow-control device types	Flow-control device description
I	IPO	Injection-pressure-operated flow-control device
	Balanced IPO	Injection-pressure-operated flow-control device with no “spread”, that is the opening and closing pressures are the same
	IPO with choke	Injection-pressure-operated flow-control device, with a choke installed downstream of the port
II	PPO	Production-pressure-operated flow-control device
	PPO with choke	Production-pressure-operated flow-control device, with a choke installed upstream of the port
III	Pilot	Injection-pressure-operated flow-control device with a pilot section and a full-opening primary flow section
	Differential	Flow-control device that opens and closes depending on the difference between the injection and production pressures
IV	Orifice	Flow-control device that cannot be closed
	Nozzle venturi	Flow-control device that cannot be closed, having a port in the shape of a venturi nozzle
	Shear orifice	Flow-control device that is initially closed; once it is opened, it cannot then be reclosed
	Dump/kill	Flow-control device that is initially closed; once it is opened, it cannot then be reclosed. These valves have very large ports and no reverse-flow check to allow a high-injection rate to kill the well.
V	Dummy	Blank device that is installed in a side-pocket mandrel to prevent flow or pressure communication between the casing annulus and the tubing

Page 32: Table A.2 shall be replaced with the following:

Table A.2 — Testing requirements

Flow-control device group and type (See 6.1.2)		Design validation test and/or product functional test	Annex	Design validation and product functional test requirements for each flow-control device grade					
				V3 Basic grade	V2 Intermediate grade	V1 Highest grade	F3 Basic grade	F2 Intermediate grade	F1 Highest grade
I	IPO Balanced IPO IPO w/ choke	Interface	E	E.2.1	E.2.1	E.2.2	-	-	-
		Insertion	F	F.2	F.2	F.2	-	-	-
		Probe or travel	G	G.2	G.2	G.2	-	G.4.2	G.4.3
		Load rate	G	G.3	G.3	G.3	-	G.5.2	G.5.3
		Flow	H	-	H.2.2	H.2.3	-	-	-
		Back-check	I	I.2.1	I.2.2	I.2.3	I.3.1	I.3.2	I.3.3
		Open and close	J	J.1.2	J.1.2	J.1.2	-	-	-
		Open	J	-	-	-	J.2	J.2	J.2
		Close	J	-	-	-	-	J.3.2	J.3.3
		Actuation life cycle	K	-	-	K.2.2	-	-	-
		Erosion	L	-	L.2.2	L.2.2	-	-	-
		Shelf	M	M.2.1	M.2.1	M.2.1	M.3.2	M.3.2	M.3.2
		Port/seat leakage rate	N	N.2.1	N.2.1	N.2.1	N.3.1	N.3.1	N.3.1
II	PPO PPO w/choke	Interface	E	E.2.1	E.2.1	E.2.2	-	-	-
		Insertion	F	F.2	F.2	F.2	-	-	-
		Probe or travel	G	G.2	G.2	G.2	-	G.4.2	G.4.3
		Load rate	G	G.3	G.3	G.3	-	G.5.2	G.5.3
		Flow	H	-	H.2.2	H.2.3	-	-	-
		Back-check	I	I.2.1	I.2.2	I.2.3	I.3.1	I.3.2	I.3.3
		Open and close	J	J.1.2	J.1.2	J.1.2	-	-	-
		Open	J	-	-	-	J.2	J.2	J.2
		Close	J	-	-	-	-	J.3.2	J.3.3
		Actuation life cycle	K	-	-	K.2.2	-	-	-
		Erosion	L	-	L.2.2	L.2.2	-	-	-
		Shelf	M	M.2.1	M.2.1	M.2.1	M.3.2	M.3.2	M.3.2
		Port/seat leakage rate	N	N.2.1	N.2.1	N.2.1	N.3.1	N.3.1	N.3.1

Table A.2 (*continued*)

Flow-control device group and type (See 6.1.2)		Design validation test and/or product functional test	Annex	Design validation and product functional test requirements for each flow-control device grade					
				V3 Basic grade	V2 Intermediate grade	V1 Highest grade	F3 Basic grade	F2 Intermediate grade	F1 Highest grade
III	Pilot Differential	Interface	E	E.2.1	E.2.1	E.2.2	-	-	-
		Insertion	F	F.2	F.2	F.2	-	-	-
		Flow	H	-	H.2.2	H.2.3	-	-	-
		Back-check	I	I.2.1	I.2.2	I.2.3	I.3.1	I.3.2	I.3.3
		Open and close	J	J.1.2	J.1.2	J.1.2	-	-	-
		Open	J	-	-	-	J.2	J.2	J.2
		Close	j	-	-	-	-	J.3.2	J.3.3
		Actuation life cycle	K	-	-	K.2.2	-	-	-
		Erosion	L	-	L.2.2	L.2.2	-	-	-
		Shelf	M	M.2.1	M.2.1	M.2.1	M.3.2	M.3.2	M.3.2
		Port/seat leakage rate	N	N.2.1	N.2.1	N.2.1	N.3.1	N.3.1	N.3.1
IV	Orifice Nozzle venturi Shear orifice Dump/kill	Interface	E	E.2.1	E.2.1	E.2.2	-	-	-
		Insertion	F	F.2	F.2	F.2	-	-	-
		Flow	H	-	H.2.2	H.2.3	-	-	-
		Back-check	I	I.2.1	I.2.2	I.2.3	I.3.1	I.3.2	I.3.3
		Open and close	J	J.1.2	J.1.2	J.1.2	-	-	-
		Erosion	L	-	L.2.2	L.2.2	-	-	-
		Port/seat leakage rate	N	-	-	-	N.3.1	N.3.1	N.3.1
V	Dummy	Interface	E	E.2.1	E.2.1	E.2.2	-	-	-

Page 41, Section F.2.3: The opening paragraph and list shall be replaced with the following:

In this procedure, only steps e) through i) shall be followed for shear orifice and dump kill devices of class IV flow-control devices.

Page 46: Section G.4.2.1 shall be replaced with the following:

The probe or travel test requirements for product functional testing grade F2 shall be as defined below.

Page 55: Section H.2.1 shall be replaced with the following:

There are no dynamic flow validation requirements for grade V3.

Page 56: Section H.3 shall be replaced with the following:

There are no flow test requirements for any product functional testing grade.

Page 88: Section J.3.1 shall be replaced with the following:

There are no close test requirements for product functional testing grade F3.

Page 100: Section M.3.2.1 shall be replaced with the following:

The shelf test requirements for product functional testing grades F3, F2, and F1 shall be as defined in M.3.2.2 to M.3.2.5.

Flow-control Devices for Side-pocket Mandrels

Upstream Segment

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17078-2 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

ISO 17078 consists of the following parts, under the general title *Petroleum and natural gas industries — Drilling and production equipment*:

— *Part 1: Side-pocket mandrels*

— *Part 2: Flow-control devices for side-pocket mandrels*

— *Part 3: Running, pulling and kick-over tools, and latches for side-pocket mandrels*

A part 4 dealing with practices for side-pocket mandrels and related equipment is under development.

Introduction

This part of ISO 17078 has been developed by users/purchasers and suppliers/manufacturers of subsurface flow-control devices used in side-pocket mandrels (hereafter called flow-control devices) intended for use in the worldwide petroleum and natural gas industry. This part of ISO 17078 is intended to provide requirements and information to all parties who are involved in the specification, selection, manufacture, testing and use of flow-control devices. Further, this part of ISO 17078 addresses supplier/manufacturer requirements that set the minimum parameters with which suppliers/manufacturers shall comply to claim conformity with this part of ISO 17078.

This part of ISO 17078 has been structured to support varying requirements in environmental service classes, design validation, product functional testing and quality control grades. These variations allow the user/purchaser to select the grade for a specific application.

Well environmental service classes. There are four environmental service classes for flow-control devices that provide the user/purchaser with a range of choices from which to select products to meet varying environmental conditions.

Design validation grades. There are three design validation grades for flow-control devices that provide the user/purchaser with a range of technical and performance requirements. This ensures that the products supplied according to this part of ISO 17078 meet the requirements and that the user/purchaser is able to compare these requirements with its preference or application and determine whether additional requirements are placed on the supplier/manufacturer.

It is important that users of this part of ISO 17078 be aware that requirements in addition to those outlined herein can be needed for individual applications. This part of ISO 17078 is not intended to inhibit a supplier/manufacturer from offering, or the user/purchaser from accepting, alternative equipment or 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 supplier/manufacturer to identify any variations from this part of ISO 17078 and provide details.

Product functional testing grades. There are three product functional testing grades for flow-control devices that provide the user/purchaser with a range of choices for confirming that individual products manufactured under this part of ISO 17078 meet the design specifications.

Quality control grades. There are two quality control grades that provide the user/purchaser with the choice of requirements to meet specific preferences or applications. Additional quality upgrades can be specified by the user/purchaser as supplemental requirements.

In addition to this document, ISO 17078-1 provides requirements for side-pocket mandrels used in the petroleum and natural gas industry. ISO 17078-3, to be published, is intended to provide requirements for running, pulling and kick-over tools, and latches used in conjunction with side-pocket mandrel flow-control devices.

NOTE For the purposes of this provision, API 19G1 is equivalent to ISO 17078-1.

Petroleum and natural gas industries — Drilling and production equipment —

Part 2:
Flow-control devices for side-pocket mandrels

1 Scope

This part of ISO 17078 provides requirements for subsurface flow-control devices used in side-pocket mandrels (hereafter called flow-control devices) intended for use in the worldwide petroleum and natural gas industry. This includes requirements for specifying, selecting, designing, manufacturing, quality-control, testing and preparation for shipping of flow-control devices. Additionally, it includes information regarding performance testing and calibration procedures.

The installation and retrieval of flow-control devices is outside the scope of this part of ISO 17078. Additionally, this part of ISO 17078 is not applicable to flow-control devices used in centre-set mandrels or with tubing-retrievable applications.

This part of ISO 17078 does not include requirements for side-pocket mandrels, running, pulling, and kick-over tools, and latches that might or might not be covered in other ISO specifications. Reconditioning of used flow-control devices is outside of the scope of this part of ISO 17078.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9000, *Quality management systems — Fundamentals and vocabulary*

ISO 15156 (all parts), *Petroleum and natural gas industries — Materials for use in H_2S-containing environments in oil and gas production*

ISO 17078-1:2004, *Petroleum and natural gas industries — Drilling and production equipment — Part 1: Side-pocket mandrels*

ANSI/NCSL Z540-1, *Calibration Laboratories and Measuring and Test Equipment General Requirements*[1)]

ASME Boiler and Pressure Vessel Code, Section IX, *Welding and Brazing Qualifications*[2)]

ASTM A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*[3)]

ASTM D1415, *Standard Test Method for Rubber Property — International Hardness*

1) NCSL International, 2995 Wilderness Place, Suite 104, Boulder, Colorado 80301-5404, USA.
2) American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990, USA.
3) ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959.