

Recommended Practice for the Measurement of Viscous Properties of Completion Fluids

ANSI/API RECOMMENDED PRACTICE 13M
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gas industries—Completion of fluids and
materials—Part 1: Measurement of viscous
properties of completion fluids**



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API Foreword

This standard replaces API Recommended Practice RP 39 Recommended Practices on Measuring the Viscous Properties of Cross-linked Water-based Fracturing Fluids, 3rd Edition, May 1998.

This standard shall become effective on the date printed on the cover but may be used voluntarily from the date of distribution.

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Standards referenced herein may be replaced by other international or national standards that can be shown to meet or exceed the requirements of the referenced standard.

In this American National standard, editorial changes have been made and are listed in Annex A.

The modifications have not been changed in the body of this standard, but are noted by an arrow (→) in the margin for reference to Annex A.

Suggested revisions are invited and should be submitted to the API, Standards Department, 1220 L Street, NW, Washington, DC 20005, or by email to standards@api.org.

This American National Standard is under the jurisdiction of the API Subcommittee 13, Drilling and Completion Fluids. This standard is considered identical to the English version of ISO 13503-1. ISO 13503-1 was prepared by Technical Committee ISO/TC 67, Materials, equipment and offshore structures for petroleum and natural gas industries, Subcommittee SC3, Drilling and completion fluids, and well cement.

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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 13503-1 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 3, *Drilling and completion fluids, and well cements*.

ISO 13503 consists of the following parts, under the general title *Petroleum and natural gas industries — Completion fluids and materials*:

— *Part 1: Measurement of viscous properties of completion fluids*

The following part is under preparation:

— *Part 2: Measurement of properties of proppants used in hydraulic fracturing and gravel-packing operations*

Introduction

For the purpose of this part of ISO 13503, completion fluids are defined as viscosified treating fluids used during the completion or workover of a petroleum- or natural gas-producing well. The objective of this part of ISO 13503 is to provide a standard procedure for measuring the viscous properties of single-phase, non-particulate-laden completion fluids. These fluids are viscosified brines, gravel-pack carrier fluids, and fracturing fluids. These fluids can be either crosslinked or non-crosslinked (aqueous, hydrocarbon- or acid-based).

An optional shear-history simulation procedure is provided for fluids that are potentially shear sensitive. This procedure is designed to simulate the shearing effects experienced by a fluid in surface apparatus and during the time it is being conveyed down the wellbore. Shear-history simulation is most often used during the development of new fracturing fluids to characterize their sensitivity to shear.

These standard procedures were compiled on the basis of several years of comparative testing, debate, discussion, and continued research by the industry.

This standard procedure is largely based on API RP 39, third edition, May 1991 [1].

In this part of ISO 13503, where practical, U.S. Customary units are included in parentheses for convenience.

Petroleum and natural gas industries — Completion fluids and materials —

Part 1: Measurement of viscous properties of completion fluids

1 Scope

This part of ISO 13503 provides consistent methodology for determining the viscosity of completion fluids used in the petroleum and natural gas industries. For certain cases, methods are also provided to determine the rheological properties of a fluid.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

bob

fixed inner cylinder of a concentric-cylinder viscometer

2.2

completion fluid

any fluid used during the completion phase of a well

2.3

concentric-cylinder viscometer

rotational viscometer that consists of a concentric-cylindrical bob and a cylindrical rotor

2.4

elasticity

capability of a material to regain its original shape and condition upon removal of an acting stress

2.5

laminar flow

→ flow property of fluids in which all layers of the fluid move parallel to each other and no material is transferred between layers

2.6

non-crosslinked fluid

shear, polymer-viscosified solution or any fluid that does not exhibit significant elasticity leading to the Weissenberg effect ("bob climbing")

2.7

rheology

science of the deformation and flow of matter