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Petroleum and related products — Determination of spray ignition characteristics of fire-resistant fluids —

Part 2: Spray test — Stabilised flame heat release method

Produits pétroliers et produits connexes — Détermination des caractéristiques d'inflammation des fluides difficilement inflammables en jet pulvérisé —

Partie 2: Essai de pulvérisation — Méthode par dégagement de chaleur d'une flamme stabilisée

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources.*

This first edition of ISO 15029-2 cancels and replaces ISO/TS 15029-2:2012 which has been technically revised. Definitions and some procedural steps have been further clarified based on comments received from the market. This method has now largely superseded the older procedure in ISO 15029-1 in specifications and fluid development. Unlike ISO 15029-1, this document is a method that can rank fluids in terms of their spray flammability and as several test rigs are available, is capable of the generation of some precision data.

A list of all parts in the ISO 15029 series can be found on the ISO website.

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Petroleum and related products — Determination of spray ignition characteristics of fire-resistant fluids —

Part 2:
Spray test — Stabilised flame heat release method

WARNING — Use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of users of this standard to ensure appropriate measures to safeguard the health and safety of personnel prior to application of the standard, and to determine the applicability of any other restrictions.

1 Scope

This document specifies a method by which the fire hazards of pressurised sprays of fire-resistant fluids can be compared. Two sizes of propane flame are used to ignite and stabilise combustion of an air-atomised release of fluid. Measurements related to the rate of heat release, length of flame and density of smoke give quantitative information on the fire behaviour of the fluid.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3170, *Petroleum liquids — Manual sampling*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 9162, *Petroleum products — Fuels (class F) — Liquefied petroleum gases — Specifications*

IEC 60584-1, *Thermocouples — Part 1: EMF specifications and tolerances*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
stabilised spray flame
point at which the rate of energy release, flame length and other combustion properties, are steady as a function of time, so that sensible time-averaged values can be calculated

3.2
flame length
distance in millimetres from the vertical centre line of the gas burner to the furthest downstream point reached by the visible flame

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3.3
flame length index
function of the flame length and propane flow rate corrected to the nearest integer

3.4
ignitability factor
function of heat release at a specific propane flow rate corrected to the nearest integer

3.5
smoke density
function of smoke opacity in the flue pipe measured before and after introduction of the test fluid

Note 1 to entry: See ISO 5659-2:2017, 3.8.

4 Principle

A pre-conditioned flow of the test fluid is delivered to a test chamber through a twin-fluid atomiser. Compressed air, supplied to the nozzle at a controlled rate, is used to produce an atomised spray, which is exposed to a defined flame of a gas burner present throughout the test. As a result of heat input at a steady rate from the gas flame, a stabilised spray flame (3.1) is produced so that combustion properties, such as the rate of energy release, flame length, (3.2) and smoke production (3.5) are sufficiently steady over time to allow time-averaged values to be measured.

Temperatures are measured both at the entry to the combustion chamber and in the exhaust, with the burner operating first without, and then with, release of the test fluid. The flame length (3.2) and smoke opacity of the exhaust can be measured. Calculations of functions, such as flame length index (3.3) ignitability factor (3.4) and smoke density (3.5) are made from these measurements. A system for ranking the performance of fire-resistant fluids based upon these measurements and computed performance indices is proposed.

5 Reagents and materials

5.1 **Propane**, high purity (minimum 98 %) grade, conforming to the requirements of ISO 9162.

5.2 **Nitrogen**, oxygen-free, commercial grade.

5.3 **Compressed air**.

5.4 **Water**, conforming to the requirements of grade 3 of ISO 3696:1987.

5.5 **Mono ethylene glycol**, laboratory grade (98 % purity).

5.6 A solvent compatible with the tested fluid, laboratory grade.

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