
**Petroleum products — Aviation and
distillate fuels — Determination of electrical
conductivity**

*Produits pétroliers — Carburants aviation et distillats — Détermination
de la conductivité électrique*



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Foreword

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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.

International Standard ISO 6297 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

This second edition cancels and replaces the first edition (ISO 6297:1983), which has been technically revised.

Annex A of this International Standard is for information only.

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Petroleum products — Aviation and distillate fuels — Determination of electrical conductivity

WARNING — The use of this International Standard may involve hazardous materials, operations and equipment. This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard specifies a method for the determination of the electrical rest conductivity of aviation and distillate fuels with or without a static dissipator additive. The method measures conductivity when the fuel is uncharged, i.e. electrically at rest (known as rest conductivity).

Two methods are available for fuel conductivity measurement, either using a portable meter for the direct measurement in tanks or laboratory and field measurement of samples, or using an in-line meter for continuous measurement of fuel conductivities (equivalent to rest conductivity) in a flowing stream. When using either type of instrument care should be taken in allowing the relaxation of residual electrical charges before measurement and in preventing contamination.

The procedure can be used to measure conductivities from 1 pS/m to 2 000 pS/m using the equipment used to establish the reported precision. The range can be extended to greater than 2 000 pS/m with the correct selection of electrode size and current measuring apparatus.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3171:1988, *Petroleum liquids - Automatic pipeline sampling*.

ASTM D4057 : 1988, *Standard Practice for Manual Sampling of Petroleum and Petroleum Products*

3 Definitions

For the purposes of this International Standard the following definition applies.

3.1 rest conductivity: The reciprocal of the resistivity of uncharged fuel in the absence

of ionic depletion or polarization.

This is the electrical conductivity, expressed in picosiemens per metre (pS/m), at the initial instant of current measurement after a d.c. voltage is impressed between the electrodes.

NOTE 1 — The term conductivity unit (CU) is equal to 1 pS/m. A siemens is the SI definition of reciprocal ohm sometimes called mho (Ω^{-1}).

4 Principle

A voltage is applied across two electrodes immersed in the fuel and the resulting current expressed as a conductivity value. With portable meters, the current measurement is made almost instantaneously upon application of the voltage to avoid errors arising from ion depletion. Ion depletion or polarization is eliminated in dynamic monitoring systems by continuous replacement of the sample in the measuring cell.

5 Reagents

5.1 Propan-2-ol, reagent grade.

5.2 Toluene, reagent grade.

6 Apparatus

6.1 **Portable conductivity cell and current-measuring apparatus**, capable of giving a conductivity reading almost instantaneously with the application of a voltage.

6.2 **In-line conductivity measuring cell**, incorporating a facility to remove electrostatic charges before the representative fuel stream is passed through an in-line measuring cell.

NOTE 2 — A controlled continuous flow through the fuel cell prevents ion depletion thereby providing the equivalent of rest conductivity as a continuous measurement. This in-line instrument is designed for permanent installation in the fuel distribution system. It includes a pump to ensure constant flow through the fuel cell and also a sensor to monitor temperature.

Any sample tapping point shall be installed at least 30m downstream of any additive injection system, unless a mixing device is used which has been shown to give adequate mixing of the additive concerned prior to sampling.

6.3 **Temperature sensor**, having a range suitable for measuring the temperature of fuel samples in the field to $\pm 1^\circ\text{C}$. This is only required when using the portable conductivity cell.

6.4 **Measuring vessel**, capable of holding sufficient fuel sample to cover the electrodes of the conductivity measuring cell to the depth required for that particular piece of apparatus.