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Motorcycles — Measurement method for evaporative emissions —

Part 2: Permeation test procedure

Motocycles — Méthode de mesure pour les émissions par évaporation —
Partie 2: Méthode d'essai de perméation

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Foreword

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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).

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This document was prepared by Technical Committee ISO/TC 22, *Road Vehicles*, Subcommittee SC 38, *Motorcycles and mopeds*.

A list of all parts in the ISO 21755 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document specifies the measurement method for evaporative emissions from motorcycles by using a permeation test procedure. However, the amount of permeation from a non-metallic fuel tank is generally larger than that from a metallic fuel tank. Therefore, this document also specifies a permeability test procedure in an informative annex solely for non-metallic fuel tanks as optional. This permeability test procedure is expected to be used also by fuel tank manufacturers.

Motorcycles — Measurement method for evaporative emissions —

Part 2: Permeation test procedure

1 Scope

This document specifies a basic measurement method by using a permeation test procedure for evaporative emissions from motorcycles. It is applicable to motorcycles equipped with a fuel tank to store liquid high volatile fuel and with a spark ignition engine (four-stroke engine, two-stroke engine or rotary piston engine).

2 Normative references

There are no normative references in this document.

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
permeability
losses through the walls of the non-metallic fuel tank

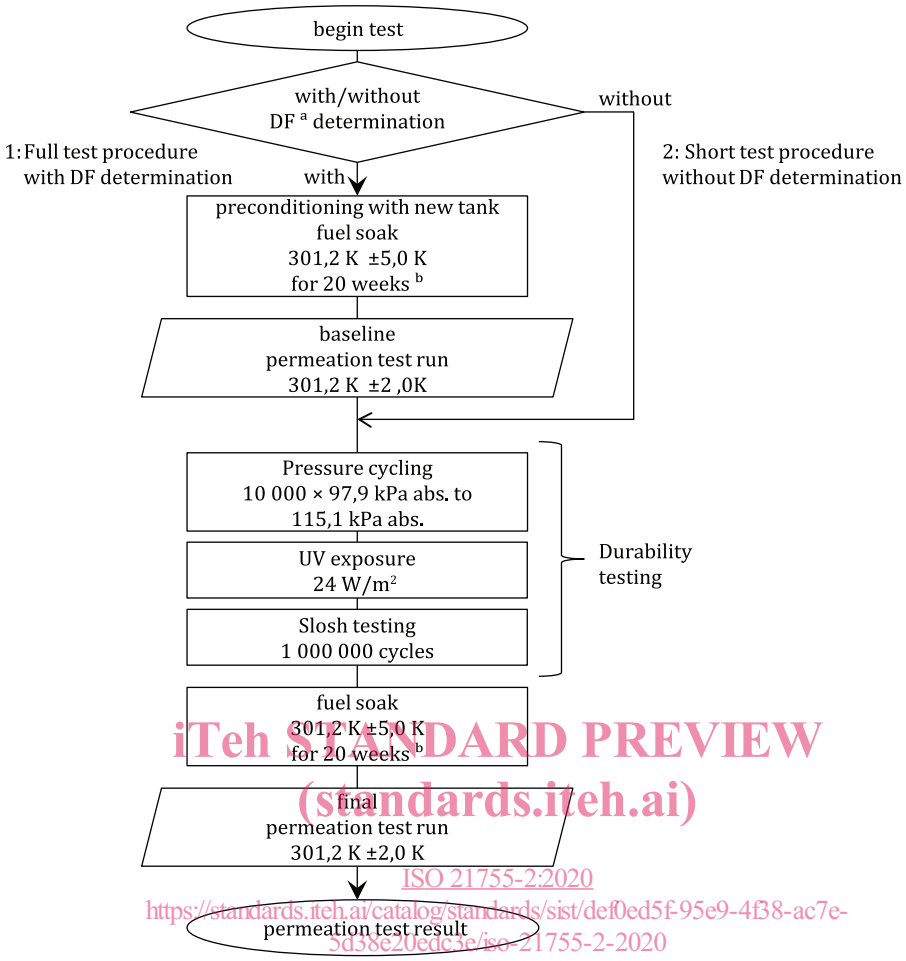
3.2
permeation
losses through the walls of the fuel tank and fuel line assembly

4 Fuel tank and fuel line assembly permeation test procedure

4.1 Description of the fuel tank permeation test

4.1.1 Measure permeation emissions by weighing a sealed fuel tank before and after a temperature-controlled soak according to the following flow charts (see Figure 1).

4.1.2 Fuel tank description shall be described in accordance with B.1.



Key

a DF is the deterioration factor.

b The length of "soak" during durability testing may be included in the fuel soak period provided that fuel remains in the tank. Soak periods can be shortened to 10 weeks if performed a 316,2 K ± 5,0 K.

Figure 1 — Flow chart of fuel tank permeation full and short tests

4.2 Test fuel

The test fuel shall be selected in accordance with agreement among the parties involved or the manufacturer's requirements and the specifications of test fuel shall be reported. An example of the record form is given in B.2.

4.3 Preconditioning fuel soak for the fuel tank permeation test

To precondition the fuel tank in the fuel tank permeation test, the following five steps shall be followed:

4.3.1 The tank shall be filled with reference fuel specified in 4.2 and sealed. The filled tank shall be soaked at an ambient temperature of 301,2 K ± 5,0 K for 20 weeks or at 316,2 K ± 5,0 K for 10 weeks.

4.3.2 The fuel tank's internal surface area shall be determined in square metres accurate to at least three significant figures. The manufacturer may use less accurate estimates of the surface area if it is ensured that the surface area will not be overestimated.

4.3.3 The fuel tank shall be filled with the reference fuel to its nominal capacity.

4.3.4 The tank and fuel shall equilibrate to 301,2 K ± 5,0 K or 316,2 K ± 5,0 K in the case of the alternative short test.

4.3.5 The fuel tank shall be sealed using fuel caps and other fittings (excluding petcocks) that can be used to seal openings in a production fuel tank. In cases where openings are not normally sealed on the fuel tank (such as hose-connection fittings and vents in fuel caps), these openings may be sealed using non-permeable fittings such as metal or fluoropolymer plugs.

4.4 Fuel tank permeation test procedure

To run the test, the following steps shall be taken for a tank preconditioned as specified in 4.3.

4.4.1 Weigh the sealed fuel tank and record the weight in milligrams. This measurement shall be taken within 8 h of filling of the tank with test fuel.

4.4.2 The tank shall be placed in a ventilated, temperature-controlled room or enclosure.

4.4.3 The test room or enclosure shall be closed and sealed and the test time shall be recorded.

4.4.4 The test room or enclosure temperature shall be continuously maintained at 301,2 K ± 5,0 K for 14 days. This temperature shall be continuously monitored and recorded.

4.5 Fuel tank permeation test result calculation

4.5.1 At the end of the soak period, the weight in milligrams of the sealed fuel tank shall be recorded. Unless the same fuel is used in the preconditioning fuel soak and the permeation test run, weight measurements shall be recorded on five separate days per week of testing. The test is void if a linear plot of tank weight vs. test days for the full soak period for permeation testing yields a linear regression correlation coefficient $r^2 < 0,8$.

4.5.2 The weight of the filled fuel tank at the end of the test shall be subtracted from the weight of the filled fuel tank at the beginning of the test.

4.5.3 The difference in mass shall be divided by the internal surface area of the fuel tank.

4.5.4 The result obtained in 4.5.3, expressed in mg/m^2, shall be divided by the number of test days to calculate the (mg/m^2)/day emission rate and rounded to integer value.

4.5.5 In cases where permeation rates during a soak period of 14 days are not long enough to be able to measure significant weight changes, the period may be extended by a maximum of 14 additional days. In this case, the test steps in 4.5.2 to 4.5.4 shall be repeated to determine the weight change for the full 28 days.

4.5.6 Determination of the deterioration factor when applying the full permeation test procedure

The deterioration factor (DF) shall be determined from any of the following choices:

— the ratio between the final permeation and baseline test runs;

— fixed DF for total hydrocarbons regulated in each country.