
Interior air of road vehicles —

Part 8:

**Handling and packaging of materials
and components for emission testing**

Air intérieur des véhicules routiers —

*Partie 8: Manutention et emballage des matériaux et des composants
pour les essais d'émissions*

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*.

A list of all parts in the ISO 12219 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

Volatile and semi-volatile organic compounds (VOCs and SVOCs) are widely used in industry and can be emitted by many everyday products and materials. They have attracted attention in recent years because of their impact on indoor air quality. After homes and workplaces, the other place people spend a lot of time is in their vehicles. Therefore, it is important to determine the material emissions of interior parts of vehicles and to reduce them to an acceptable level. To do so, it is necessary to get comprehensive and reliable information about the types of organic compounds in the indoor air of vehicles and their concentrations. Since contamination of the materials and/or rapid volatilization of emissions can influence the results of the measurements, it is necessary to know these effects to achieve repeatable and accurate test results.

This document describes the handling and packaging of materials and components for emission testing. It is intended to be used by producers and testing laboratories in the automotive industry.

This document supports the vehicle product development cycle since vehicle interior materials change frequently. Testing methods can specifically define the handling and packaging conditions for the material to be analysed. In these cases, the method is followed as closely as possible. This document can be used as a guide for when the protocol for handling and packaging the samples between part production and testing is not exactly defined.

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Interior air of road vehicles —

Part 8:

Handling and packaging of materials and components for emission testing

1 Scope

This document specifies the selection, preparation, conditioning, packaging, labelling, transportation and storage for materials and components for, but not limited to, volatile organic compound (VOC) testing, fogging testing and odour testing.

It pays special attention to materials sensitive to contamination and/or rapid volatilization of emissions in order to achieve repeatable and accurate test results.

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

analytical sample

emissions sample that is taken during the emissions test procedure

Note 1 to entry: When determining volatile organic compound emissions, typical air samples are taken at selected times during the test procedure. Other methods, such as fogging or odour, may produce results without the need for analytical samples and post analysis. Two other terms used with “analytical sample” are “background sample” and “blank sample”. Both terms are used to ensure accurate measurements, see ISO 16000-6 and ISO 16000-3 for more details.

3.2

liquid material

material that arrives at the vehicle assembly line in a liquid form and does not fully solidify

EXAMPLE Sealers and adhesives.

3.3

producer

company and manufacturing plant that makes and supplies the product to be tested

3.4
product sample

basic material of the vehicle interior component or complete component being assembled in the vehicle interior (sometimes referred to as a field sample)

Note 1 to entry: The product sample is representative of the production component or a representative sample of material cut out from vehicle interior parts to be tested. The product samples should have been put through all of the steps of production intended for the production process and with all of the pertinent auxiliary production equipment, including the proper production rate. Deviations shall be documented in precise detail in the test report. Product samples should be selected at random.

3.5
production cycle

processing of raw products and materials from the beginning of manufacturing through the output of a finished product

Note 1 to entry: In addition to the processing time, the production cycle includes normal drying times and the period up to the point where the product is packaged and shipped, prior to leaving the control of the product manufacturer.

3.6
test laboratory
analytical facility

Note 1 to entry: This is where the material product is sent for testing. The *test specimens* (3.8) and *analytical samples* (3.1) are created here. The analytical samples are also analysed by the test laboratory even though the sampling test may not take place at the same location as the samples are analysed.

3.7
test requester

client of the *test laboratory* (3.6)

Note 1 to entry: In automotive scenarios, this is typically the original equipment manufacturer (OEM) or Tier 1 supplier but it could be anyone requesting a material or component to be tested.

3.8
test specimen

part of the product sample specifically prepared for testing

Note 1 to entry: The test specimen is prepared, stored and conditioned by experienced laboratory personnel in order to simulate the emission behaviour of the material or component that is tested.

4 Simplified process overview and timeline

4.1 The complete process is simplified and summarized for the benefit of producers and testing laboratories. In every case, great care should be used when sealing and packaging the test specimens to halt off-gassing and to preserve the VOC emissions. Also, each product or specimen sent for testing shall include a complete and accurate label. Follow all the specific instructions described by the test request.

4.2 Time is a very critical parameter. VOC emissions rates are very sensitive to time and exposure conditions. The times listed are suggestions. Timing should be agreed by the producer, testing laboratory and the test requester as per the test method and the material or part specification. The testing laboratory typically requires two weeks to test the specimen(s). Specific aging time shall be specified by the test requester and documented by the producer and testing laboratory. The testing laboratory could then require an additional two weeks to analyse the collected test sample(s) and to send the final test report

to the requester. The summary table phases, A through H, as shown in [Table 1](#), match the timeline phases in [Figures 1](#) and [2](#). For more specific details, see the appropriate clause referenced in [Table 1](#).

Table 1 — Handling and packaging process by phase

Phases	Procedure	Clause
A	The product is manufactured by the producer.	5, 6, 7
B	Ample products for the required test(s) are selected and labelled.	5, 9
C	The producer handles and stores the product in the normal manner.	5, 11
D	Careful preparation and/or packaging the test specimen(s).	6, 7, 8, 9, 10
E	Shipping to the test laboratory. The test laboratory receives the package, verifies the test method, verifies the quantities and the documents describing when the product was manufactured. National shipping logistics should not exceed the two-week limit from manufacture to receipt from the test laboratory.	10
F	The product remains in its original packaging until the specimen is aged and/or tested. The test laboratory should photograph the product and/or test specimens.	7, 11
G	The test is started per the specific VOC, odour or fogging method. Analytical samples created by the test can be stored and analysed at a later date.	6, 7, 11
H	Analytical samples shall be analysed and the final test report shall be sent to the requester after the completion of the specific test method.	

Timelines for the different phases for the different aging scenarios, explained in [Table 1](#), are shown in [Figure 1](#) and [2](#).

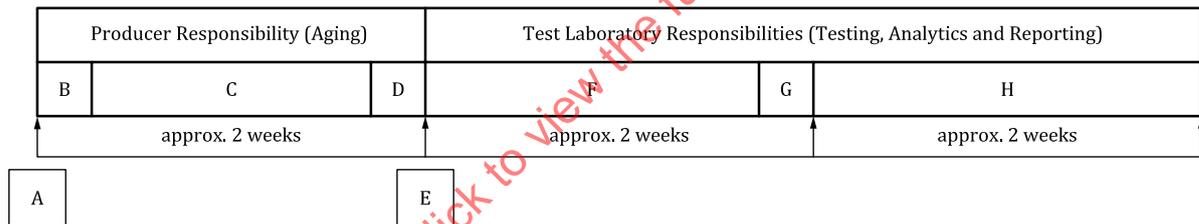


Figure 1 — Handling and packaging process timeline (aged by producer under normal process conditions)

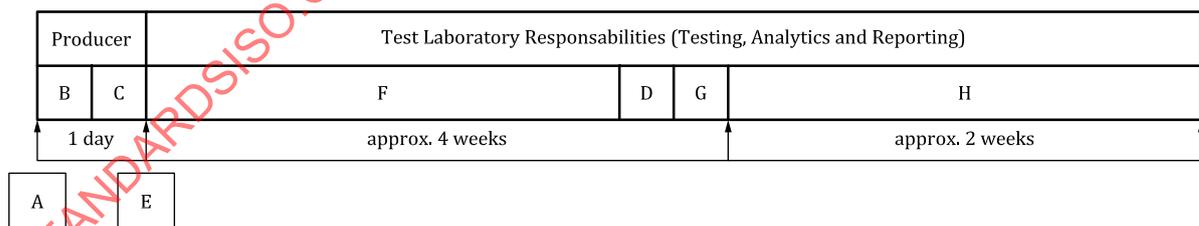


Figure 2 — Handling and packaging process timeline (aged by test laboratory under controlled conditions)

NOTE The emission status of a material or compound can be preserved by proper packaging and storage.

4.3 This method describes two guidelines for aging products.

- a) Age the product at the place of the producer following the normal production process, see [Figure 1](#). This method also suggests that the producer prepare the test specimens. The test requester or test method instructs the producer to prepare their product following the normal process for aging and to create the test specimen(s) before packaging and sending to the testing laboratory. The producer cuts, moulds, applies, etc. the product into the final agreed shape and size to be tested. When the testing laboratory receives the sealed test specimen, they can remove the test specimen

from the packaging and can perform the test immediately with no additional preparation, aging or conditioning of the test specimen.

- b) Age the product at the test laboratory under controlled conditions, see [Figure 2](#). In this practice, pull the product after final production and package the product sample using the same care to halt the emission of VOCs during storage and transportation to the testing laboratory. When received and unpackaged by the testing laboratory, immediately age the material under the desired conditions as described by the test requester and/or test method. After aging is complete, immediately test as instructed.

5 Sampling the product

5.1 Vehicle interior components selected for emissions testing shall be manufactured and handled in the usual way prior to packaging and shipping to the test laboratory. In general, samples should be prepared to allow for emissions from those products that would typically be exposed in the same application in a vehicle to mimic actual use conditions.

5.2 A representative product sample of material and/or trim component is obtained from the point of manufacture as soon as possible following the normal production cycle and is equilibrated to ambient temperature. The product samples shall not be directly marked with any type of labelling.

5.3 For larger parts, smaller samples may be cut for packaging, shipment or storage purposes. Liquid materials, chemicals or mixtures shall be drawn fresh from their normal shipping containers. This also applies for paints, sealers, liquid sound deadeners and adhesives.

5.4 The sample should not be touched with bare skin, hair or nails. Clean gloves should be worn at all times during the handling and packaging of the product samples. The cutting shall be done with clean oil-free tools. The product sample shall be larger than the required size of the test specimen(s) so that additional trimming at the analytical facility can take place. Document the location from which the product sample was extracted from the total component piece. The number of tests required for the material or product can also increase the size or number of product samples.

5.5 Place and store product samples in a clean area free from VOCs to prevent possible production contamination, e.g. paint spray booths, exhaust gases, fumes. Do not place product samples in contact with one another or different materials to eliminate cross-contamination.

6 Preparation of the test specimen

6.1 Detailed specifications depend on the type of materials used to create or assemble the components. The entire component should be tested, where appropriate. Regardless of the test method used, the test specimen shall be properly handled prior to and during the testing period. It is best practice to take a picture of the product sample as received and a picture of the test specimen before testing occurs using a ruler as a point of reference.

6.2 The simplest components are solid homogeneous materials. Component or material suppliers should send the entire component to be tested, unless the customer requests otherwise due to cost or logistics. When testing requires small samples of the complete component or materials to be tested, e.g. when using a screening method or for routine quality control, specific material instructions should be followed. If specific material instructions are defined by the customer or test method, follow the method as closely as possible. The preparation of different products for testing by various methods, i.e. bag, small chamber, microscale chamber, static headspace, direct thermal desorption, are prescribed in more detail in the test request.

6.3 Every sample shall be treated the same way in terms of the type of storage container or packaging, the method of test specimen preparation, and the period between sample collection and analysis. The time between unpacking and preparation of the specimen shall be as short as possible and shall be recorded. There may be occasions where it is appropriate to analyse emissions from the bulk material, in which case the sample is placed directly on the test device with no modifications. It may be necessary to make measurements on multiple test specimens from the same sample to determine the mean specific emission rate.

6.4 Test specimens often need to be cut to fit in test measurement equipment, such as bags or chambers. It is best practice to use a punch to minimize heat generation and to maintain accuracy. This also standardizes the shape and surface area of the test specimen and minimizes or eliminates edge effects. This allows for a reproducible, scalable and economical way to prepare test specimens. Each test specimen is identified and weighed. Use caution when sawing, as heating the sample can change emission rates.

7 Conditioning of the test specimen

Some test methods do not condition the test specimen at the test laboratory. The test specimen is prepared by the producer and conditioned at the production site, and then packaged to create the test specimen to be tested. Aging time varies with the test methods. Some methods condition the test specimen for 2 h, 8 h or 24 h in a controlled environment.

Ensure the test laboratory and the test requester have agreed to the aging conditions of the product and/or test specimen.

NOTE 1 OEMs and test operators have expressed concerns over this practice, saying water and contamination affects the results no matter how much care is used. Some test laboratories have developed well-controlled environments so that contamination is not a factor in the final result.

NOTE 2 In the case of some polyurethane foams and other cellular materials, contamination becomes easy due to their structure and high-surface area coupled with their propensity to absorb chemicals to which they are exposed.

8 Packaging

8.1 Care should be taken to prevent material out-gassing after aging and before analysis by using clean, airtight packaging during transportation and storage. Clean gloves, compatible with the requirements of the processing chemicals' safety data sheets (SDS) shall be worn at all times during the production, handling and packaging of the test specimens.

8.2 Product samples shall be thoroughly protected from chemical contamination and any extreme physical exposure until the start of the test. General limits to physical exposure are as follows.

- The air temperature should not be above 25 °C, unless this condition is part of the normal production process.
- The air relative humidity storage conditions should be 50 % RH at 21 °C or a dew point of 10 °C, unless this condition is part of the normal production process.
- The air concentration of total volatile organic compounds (TVOCs) shall be less than 500 µg/m³.
- Solar load should be less than 50 W/m². Interior lights typically do not generate a high solar load. Heat lamps are the exemption and should not be used near products or test specimens. Keep the sample product out of direct sunlight to avoid exposing the material to a solar load over 50 W/m².

8.3 The test specimens should be bagged in an aluminized packaging lined with polyethylene or clear polyvinyl fluoride film. Remove excess air from inside the bag, for example, remove air to the extent that the parts do not move. The test specimens can also be triple-packed separately in silicone-free aluminium

foil, with a glossy surface outside. The edges shall be folded multiple times to prevent contamination and to ensure a gastight packing. Specifications and additional information on aluminium foil or any other materials to be used are given in DIN 55531. Liquid samples shall be shipped unopened.

8.4 The aluminium foil-packed test specimens and liquid material should then be placed within a polyethylene bag. The outside of the bag should be labelled with the corresponding product sample documentation. Samples without proper identification labels will not be analysed by credited laboratories until written clarification is received. The packaged product samples should be shipped in a lightproof outer package, e.g. cardboard box.

8.5 An unused, sealable bag or specified container and unused foil samples shall be included in the shipment for background analysis as a transport quality assurance (QA) blank.

9 Labelling

9.1 The sample label shall serve as the past history of the product to be tested. It shall be documented as completely as possible.

9.2 To ensure proper identification of samples and specimens, the labelling procedure of this document is divided into two parts:

- a) labelling of product samples taken from the product manufacturer;
- b) labelling of test specimens prepared at the laboratory. The test laboratory is then responsible for labelling any respective analytical samples generated during emission testing. The analytical samples and test report results should use the same label fields, where appropriate, to properly document samples throughout the complete chain of custody and in the test report.

9.3 Product samples shall be collected in accordance with [Clause 5](#) or with the applicable test procedure. Samples without proper identification labels should not be analysed until written clarification is received by the contact person(s) who collected the sample(s) and who prepared the sample(s) for transport to a testing facility.

9.4 Each product sample shall have a label. Product samples shall not be directly labelled to avoid contamination. The adhesive labels or marker pens used shall not impact emission data. Labelling of samples shall be provided on the outside of the bagging or packaging only. Bagging and packing of samples shall follow [Clause 8](#).

9.5 If multiple samples are shipped at once, one complete product sample label can cover multiple product samples, but only if each product sample is labelled with a sequenced number.

10 Transport

10.1 Transportation of collected samples or test specimens can affect the emission characteristics. Each packaged product sample or test specimen shall be properly wrapped, bagged and labelled to provide an airtight and solar barrier with proper identification. Without the proper packaging and labelling, the parts will be rejected. The packaged product samples should then be shipped in a lightproof outer package, e.g. cardboard box. Shipping to the analytical facility or requester should occur as soon as possible, preferably overnight. National shipping logistics should not exceed the two-week limit from manufacture to receipt from the test laboratory. Provisions can be made and noted if shipping times are longer, e.g. shipping international.

10.2 The possible effects of temperature, humidity, VOC levels and solar loads are of particular concern. The environment of the sample storage should protect the samples from exposure to heat, light, humidity