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Diesel engines — NOx reduction agent AUS 32 —

Part 3: Handling, transportation, and storage

Moteurs diesel — Agent AUS 32 de réduction des NOx —

Partie 3: Manipulation, transport et stockage

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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).

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 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 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain and powertrain fluids*.

This second edition cancels and replaces the first edition (ISO 22241-3:2008), which has been technically revised by adding a variety of editorial changes throughout the document and by adding flexible compliance methodology to 5.5.1.

A list of all parts in the ISO 22241 series can be found on the ISO website.

Diesel engines — NOx reduction agent AUS 32 —

Part 3:
Handling, transportation, and storage

1 Scope

This document describes best practice recommendations and requirements for the handling, transportation, and storage of AUS 32. These recommendations and requirements are necessary to preserve the specified quality of AUS 32 from any point of production to the point where it is filled into the on-board tank of a vehicle or other application, in order to ensure the proper function of selective catalytic reduction (SCR) converter systems.

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 22241-1, *Diesel engines — NOx reduction agent AUS 32 — Part 1: Quality requirements*

ISO 22241-2, *Diesel engines — NOx reduction agent AUS 32 — Part 2: Test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22241-1 and the following apply.

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

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

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

3.1
shelf life
period of time starting with the completion of the production of the batch in which a product, stored under specific conditions, remains within the specification

3.2
production batch
quantity of product produced during one operation at a site where the product has (last) been physically or chemically modified to reach compliance with applicable specifications

Note 1 to entry: Comingling of smaller batches into one larger batch does not constitute a physical or chemical modification, provided the smaller batches before comingling meet specification.

3.3
bulk operation
handling of AUS 32 in large containers

EXAMPLE Road tankers, rail cars, storage tanks, and tank vessels.

3.4
packaged shipment
handling of AUS 32 in small containers

EXAMPLE Drums, cans, bottles, intermediate bulk containers (IBCs), and totes.

4 General requirements and recommendations

4.1 Requirements for use of materials compatible with AUS 32

4.1.1 General

To avoid contamination of AUS 32 and to resist corrosion of the devices used (containers, tubes, valves, fittings, gaskets, hoses, etc.), all materials in direct contact with AUS 32 during handling, transportation and storage, including sampling, shall be compatible with AUS 32.

It is the responsibility of the user of this document to ensure that the correct materials are used. The list of the materials given in Table 1 and Table 2 are for guidance only.

Any material with uncertain compatibility with AUS 32 shall be tested. The test conditions should reflect the intended temperature range and contact time, in order to evaluate possible influences on the product quality as specified in ISO 22241-1. In addition, this test shall ensure that the integrity of the material in contact with AUS 32 is maintained. Accelerated tests using higher temperatures may be used, as appropriate.

If a contamination of AUS 32 is detected during handling, transportation and storage, an investigation shall be carried out to determine the causes of contamination and to take appropriate corrective actions.

4.1.2 Recommended materials

Examples of materials recommended for use with AUS 32 are given in Table 1.

NOTE This list has been compiled in accordance with the state of the art and with the best knowledge at the time of publication of this document.

Table 1 — Examples of recommended materials

Austenitic Cr-Ni, Cr-Ni-Mo, and Cr-Ni-Mo-Ti stainless steels, e.g. UNS S30400, S30403, S31600, S31603, S31625, and S32100.
Titanium
Ni-Mo-Cr-W superalloys, e.g. Hastelloy C-276, (UNS N10276)
Polyethylene (PE), free of additives that may damage SCR systems
Polypropylene (PP), free of additives that may damage SCR systems
Polyisobutylene (PIB), free of additives that may damage SCR systems
Perfluoroalkoxy alkane (PFA), free of additives that may damage SCR systems
Polyfluoroethylene (PFE), free of additives that may damage SCR systems
Polyvinylidene fluoride (PVDF), free of additives that may damage SCR systems
Polytetrafluoroethylene (PTFE), free of additives that may damage SCR systems
Copolymers of vinylidene fluoride and hexafluoropropylene (PVDF-HFP), free of additives that may damage SCR systems
NOTE 1 The sequence given in this list does not constitute a ranking of the recommended materials. NOTE 2 Materials made of plastics can contain various kinds of additives used either for processing or for special kinds of serviceability. These additives can possibly migrate into AUS 32. For this reason, special care is taken for testing the contamination of AUS 32 by additives from plastic materials used in direct contact with AUS 32.

4.1.3 Materials not recommended

Examples of materials not recommended are given in Table 2.

NOTE This list has been compiled in accordance with the state of the art and with the best knowledge at the time of publication of this document.

Table 2 — Examples of materials not recommended

Materials forming compounds as a result of reaction with ammonia, which may negatively interfere with the SCR converter system: carbon steels, zinc coated carbon steels, mild iron
Nonferrous metals and alloys: copper, copper alloys, zinc, lead
Solders containing lead, silver, zinc or copper
Aluminium, aluminium alloys
Magnesium, magnesium alloys
Plastics or metals coated with nickel

4.2 Physical conditions during transportation and storage

4.2.1 General recommendation

In order to avoid any impairment of the AUS 32 quality during transportation and storage, the following conditions should be taken into account.

— In order to prevent decomposition of the urea, as well as the evaporation of water in the case of vented containers, prolonged transportation or storing above 30 °C should be avoided.

NOTE 1 Insulation can be required for transportation vehicles.

NOTE 2 Transient exposure to temperatures above 30 °C does not necessarily influence the quality of AUS 32, but continuous storage at temperatures above 30 °C, for example, for periods greater than six months, may increase the alkalinity of the fluid to levels that exceed the specifications in ISO 22241-1.

— In order to prevent solidification of AUS 32, storage below −5 °C should be avoided.

NOTE 3 Insulation or means of heating the AUS 32 can be required for transportation vehicles.

NOTE 4 Solidified AUS 32 has an approximately 7 % larger volume than the liquid and, therefore, can cause a fully filled, closed container to burst. Solidified AUS 32, which has been warmed up carefully at temperatures not exceeding 30 °C will not be impaired in quality and may be used as soon as the warmed up solution is free from solids.

— In order to avoid excessive temperature rise, AUS 32 should be protected from sunlight.

— In order to protect AUS 32 from any contamination carried by the air, well-closed containers or vented containers with filters should be used.

4.2.2 Shelf life

Throughout the entire distribution chain, AUS 32 is expected to remain within the specifications given in ISO 22241-1 for at least the time periods specified in Table 3 as a function of the constant ambient temperature at which the AUS 32 is stored.

Table 3 — Shelf life as a function of storage temperature

Constant ambient storage temperature °C	Minimum shelf life months
≤10	36
≤25	18
≤30[a]	12
≤35	6
>35	Significant loss of shelf life: check every batch before use

NOTE The main factors taken into account to define the shelf life in this table are the ambient storage temperature and the initial alkalinity of AUS 32. The difference in evaporation between vented and non-vented storage containers is an additional factor.

[a] To prevent decomposition of AUS 32, prolonged transportation or storage above 30 °C should be avoided.

4.3 Cleanliness of surfaces in contact with AUS 32

All surfaces of handling, transportation, and storage equipment in direct contact with AUS 32 shall be free of foreign matter (e.g. fuel, oil, grease, detergent, dust, and any other substance).

To avoid any contamination of AUS 32 with trace elements, particles, and foreign matter, surfaces of equipment not exclusively used with AUS 32 shall be cleaned with distilled or de-ionized water and AUS 32 in the last cleaning step immediately before the use with the AUS 32 to be handled with the equipment.

The use of tap water should especially be avoided due to the high concentrations of alkali and alkali earth metal ions therein. However, if distilled water or de-ionized water is not readily available, the material may be cleaned with tap water, provided the last rinse is done using the AUS 32 to be handled with the equipment.

If it is necessary to clean a system regardless of whether detergents are used or not, it should be verified that the trace elements specified in ISO 22241-1 in the AUS 32 that is used for a last rinsing are within the specification using the methods specified in ISO 22241-2.

For storage and transportation facilities, the result of the cleaning can be verified by analysing the AUS 32 used for a last rinsing using the methods specified in ISO 22241-2.

4.4 Recommendation on further properties

Information on further properties of AUS 32 should be given in the safety data sheet (SDS), which contains indications on the hazard ranking and regulations to be respected, as well as measures required to be taken for the protection of persons and of the environment when handling the product.

5 Quality assurance

5.1 General

Each container of AUS 32 brought to the market shall be traceable back to production batches of AUS 32 by way of a unique batch number. It is recommended to include the date of original manufacturing or the date of last certification. The quality of AUS 32 taken at any point in the distribution chain shall meet the specifications defined in ISO 22241-1.

5.2 Sampling

In addition to the sampling instructions given in ISO 22241-2, the instructions below apply to any sampling.

— Written operating procedures should be available.

— The details of the sampling procedures should be adapted to the purpose of the sampling.

EXAMPLE 1 If it is intended to determine the quality of AUS 32 in a bulk container, discarding the first 2 l to 3 l taken from the outlet is appropriate.

EXAMPLE 2 If sampling is conducted to determine the compatibility of materials in direct contact with AUS 32, discarding the first 2 l to 3 l taken from the container outlet is not appropriate.

EXAMPLE 3 If it is intended to determine the quality of AUS 32 out of the dispenser's filling nozzle to assess effects of long time intervals between filling operations, taking a sample from the first 3 l of delivery volume is appropriate.

— After loading of any means of bulk transportation at the production site, a sample should be taken that is representative of the filled container. This should be done according to a written standard operating procedure that ensures the sample taken is representative. The manufacturer is responsible for ensuring, by analysis in accordance with ISO 22241-2, that the AUS 32 meets the requirements of ISO 22241-1. In case of a dedicated means of bulk transportation, an analysis of this sample is not needed.

— Retained samples, which may have been taken in the distribution chain when handling bulk AUS 32, should be analysed only if a problem is identified in the distribution chain. Samples should be kept safe for at least the shelf life of the volume of AUS 32. Storage should be under the physical conditions given in 4.2.

— Any AUS 32 package or conveyance which has been stored for a period of time in conditions that exceeds those described in Table 3 should be tested by analysis to determine if the quality of the material meets the requirements of ISO 22241-1.

— Production retained samples shall be maintained for a minimum of one year from the date of collection in a storage environment between 12 °C and 30 °C.

5.3 Testing

The quality of each production batch of AUS 32 shall be verified prior to shipment in accordance with the specifications defined in ISO 22241-1. The results shall be noted in writing and shall be kept on file at the production sites (see 5.5.3).

NOTE In case of dispute, qualified laboratories for verification are laboratories certified to ISO/IEC 17025 or an equivalent national standard.

5.4 Procedures for product release and handling of non-conforming product

Production batches of AUS 32 may be released for the intended use if the results of testing fully conform to the specifications defined in ISO 22241-1, or if the manufacturing process verification data demonstrate that the product is in conformance with the specifications of ISO 22241-1.

Should there be any quality characteristic deviating from specification or any doubt about the quality of the product, e.g. due to containers without labels, coloured or cloudy product, uncharacteristic smell or a shelf life being exceeded, the AUS 32 in the container shall be withheld and stored separately, and labelled accordingly. Further investigations should then be carried out.

To re-enter the distribution chain, the product quality shall be determined by analysis in accordance with ISO 22241-2, such that the quality defined in ISO 22241-1 are fulfilled.

If the results of an analysis reveal that the AUS 32 from the same production batch has the same fault, the shipments concerned shall be recalled.