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ISO 22241-5:2019(E)

Diesel engines — NOx reduction agent AUS 32 —Part 5: Refilling interface for passenger cars

Moteurs diesel — Agent AUS 32 de réduction des NOx —

Partie 5: Interface de remplissage pour voitures particulières

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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 34, *Propulsion, powertrain and powertrain fluids*.

This second edition cancels and replaces the first edition (ISO 22241-5:2012) which has been technically revised.

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The main changes compared to the previous edition are as follows:

— the definition of AUS 32 has been deleted as it is included in ISO 22241-1 and the document is cited normatively;

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— new definitions have been added;

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— new normative references have been added;

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— Table 1 has been editorially and technically revised.

A list of all parts in the ISO 22241 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.

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Introduction

The refilling system specified in this document has been developed in accordance with passenger vehicle manufacturer's specifications. The functional requirements include a filling system that has minimal obtrusive odours, has minimal spill risk, limits pressure build-up and includes mismatch prevention. The system should be designed to prevent the deleterious effects of AUS 32, including, but not limited to, uncontrolled flow into gaps in body work with the potential to cause corrosion, smell nuisance and crystal formation.

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Diesel engines — NOx reduction agent AUS 32 —Part 5:Refilling interface for passenger cars

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1 Scope

This document applies to diesel engine powered road vehicles using selective catalytic reduction (SCR) technology. It is primarily intended for use by passenger cars and light commercial vehicles including buses with a gross vehicle mass of not more than 3,5 t, but can also be used by vehicles with a gross vehicle mass of over 3,5 t.

This document specifies the refilling interface for the NOx reduction agent AUS 32 in conformance with ISO 22241-1, which is needed to operate converters with selective catalytic reduction (SCR) exhaust treatment system. This document specifies the essential functional and geometric requirements of the refilling system in order to ensure compatibility between the on-board refilling system and the off-board refilling system.

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For light commercial vehicles and buses having a gross vehicle mass of not more than 3,5 t, the open refilling system specified in ISO 22241-4 can be used.

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NOTE Throughout this document, the term "NOx reduction agent AUS 32" is abbreviated to "AUS 32".

2 Normative references

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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 2575, *Road vehicles — Symbols for controls, indicators and tell-tales*

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

ISO 22241-3, *Diesel engines — NOx reduction agent AUS 32 — Part 3: Handling, transportation, and storage*

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/

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

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3.1
refilling system

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off-board system and on-board system including their refilling interface for dispensing AUS 32 into the on-board tank of the vehicles

3.2
canister
bottle
container of size one to ten litres capacity, with spout, used to refill the on-board tank of the vehicle

3.3
off-board refilling system
stationary equipment for dispensing AUS 32 into the on-board tank of the vehicles, consisting typically of storage tank, pump, hose and *filler nozzle* (3.5)

3.4
on-board refilling system
equipment of the vehicles necessary for refilling AUS 32 and consisting typically of *filler neck* (3.6), *filler cap* (3.7) and on-board tank

3.5
filler nozzle
interfacing part of an *off-board refilling system* (3.3) which allows the operator to control the flow of AUS 32 during the filling, consisting of a nozzle spout with a defined interface geometry and an automatic shut-off system

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3.6
filler neck
interfacing part of the *on-board refilling system* (3.4)

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3.7
filler cap
part fitted to the *filler neck* (3.6) to prevent spillage as well as to minimize contamination of AUS 32 and which is temporarily opened or removed for refilling

3.8
spillage
quantity of fluid that escapes from the *filler nozzle* (3.5) to the atmosphere after the nozzle has shut off

4 Requirements

4.1 Functional requirements

The on-board refilling system and the off-board refilling system shall comply with the following basic functional requirements:

— minimal spillage;

— minimal smell nuisance;

— minimal pressure; and

— mismatching prevention.

The detailed requirements specified in Table 1 apply.

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Details not specified are left to the manufacturer's choice.

Table 1 — Basic functional requirements

No.	Characteristic	Requirement	Remark
1	Maximum flow rate range	5 l/min ≤ x ≤ 10 l/min.	Flow rates do not apply to: — canister filling; — production line filling.
2	Automatic shut-off of filler nozzle	Automatic shut-off feature required. The maximum amount of flow after automatic stop shall be not more than 50 ml.	For example, a nozzle in conformance with EN 13012
3	Maximum filling level in AUS 32 on-board tank	The automatic shut-off system of the nozzle shall be used to protect against filling above maximum level.	High volume expansion of AUS 32 during freezing (approx. 7 %).
4	Spillage	Less than 0,4 ml per refilling with filler neck angle from the horizontal ≥ 30°.	For test procedure see 5.2
5	Pressure in the filler neck	At five seconds after starting the refilling process, the pressure in the filler neck shall be not more than ±3 mbar. At the end of refilling process, there shall be ambient pressure in the filler neck.	—
6	Ventilation during refilling	The filler neck shall be used for ventilation of the AUS 32 on-board tank. During refilling, no more than 15 mg/l ammonia concentration should be measured.	For test procedure see 5.3
7	Operational temperature range	−30 °C to + 80 °C for on-board components −20 °C to + 40 °C for off-board components	For specific regions, the temperature range specified may not be sufficient or excessive. In such cases, a wider or more narrow temperature range, representative of that specific region, may be considered.
8	Freezing of AUS 32	Provide protection at the service station in accordance with operational temperature range. Vehicle parts shall be designed to cope with freezing and thawing in accordance with operational temperature range.	AUS 32 freezes at −11,5 °C and has a volume increase of approximately 7 %.
9	Misfilling of fuel into the AUS 32 on-board tank	Feature required to prevent dispensing of fuel into the AUS 32 on-board tank.	The geometry of the filler neck specified in Figure 1 is significantly smaller than the filler nozzles for fuel in service; thus misuse is precluded.

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10	Misfilling of AUS 32 into the diesel fuel tank	Feature required to prevent dispensing of AUS 32 in the fuel on-board tank. The design and geometry of the filler nozzle shall be such that the insertion of this device in the filler neck of on-board fuel tank is not feasible; thus misuse is precluded. For canister filling such design and geometry is recommended.	—
11	Materials	Materials in contact with AUS 32 shall be compatible with AUS 32 to avoid contamination of AUS 32 as well as corrosion of the devices used. Suitable materials in accordance with ISO 22241-3 shall be selected.	—
12	Cleanliness	A high level of cleanliness of all components of the on-board and off-board refilling systems shall be secured during the manufacturing, assembly and installation processes in order to minimize contamination of AUS 32. Regarding cleanliness level for the components of the off-board refilling system, see ISO 22241-3. Cleanliness level for the components of the on-board refilling system shall be agreed between vehicle and component manufacturers, in conformance with state of the art.	—
13	Reliability	The filler neck and the filler cap shall be designed and manufactured to be fully functional for the life of the vehicle as defined by vehicle manufacturers.	—
14	Crystallization[a]	Protection recommended	Contact with air should be minimized.
15	Marking[a]	Symbol as specified in ISO 2575 or equivalent national standard.	Blue is the recommended colour for filler caps.

[a] Recommendations only.

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4.2 Filler neck

The dimensional characteristics of the filler neck on the vehicle shall be in accordance with the specifications of Figure 1. The interface of the filler neck shall be furnished with a buttress thread S 36 × 4 as specified in Figure 1, Figure 2 and Table 2. The front face of the filler neck shall be designed as sealing surface having a surface finish as specified in Figure 1.

The thread on the filler neck shall withstand a torque of at least 5 Nm.

The filler neck designer should be aware of the potential for insufficient venting with nozzle filling. One possibility for a design with improved venting capability is a filler neck with ribs as shown in Annex A.

NOTE Buttress thread: a thread with an asymmetrical ridge that has one straight and one angled flank.

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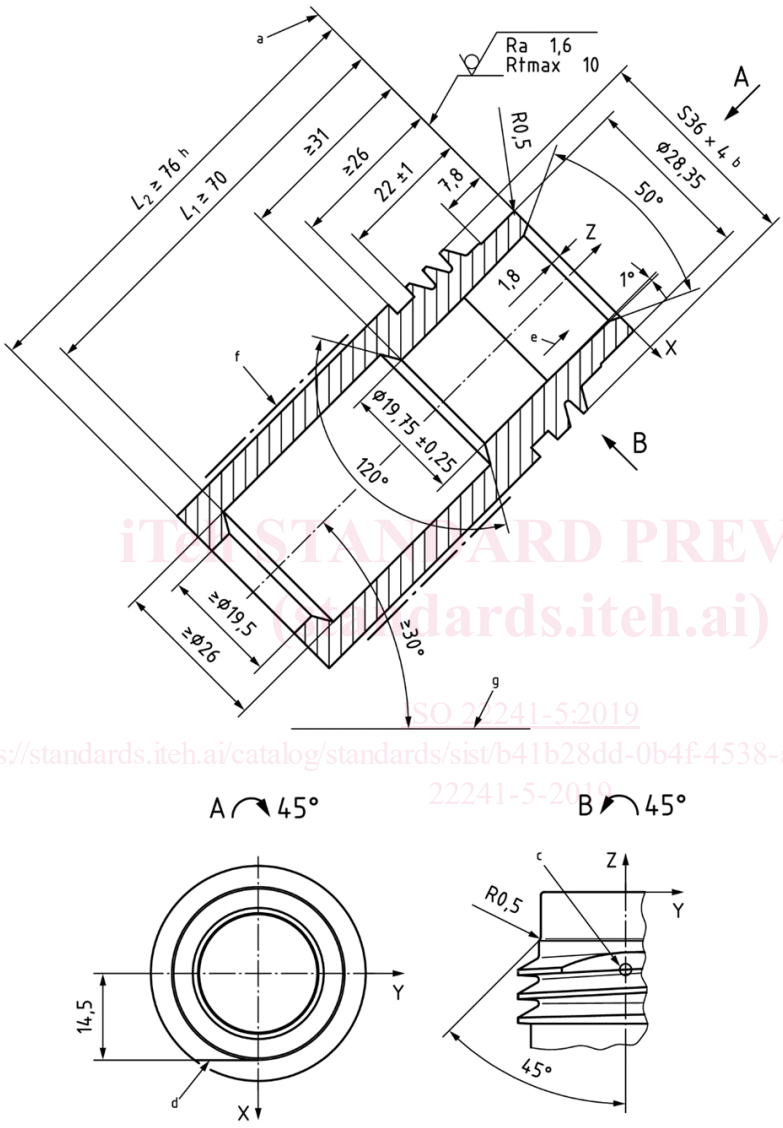
Dimensions in millimetres



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Key

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a Top surface of filler neck.
b Nominal dimension for thread details see Figure 2 and Table 2.
c Thread reference point at Y-Axis 0,0 mm at Ø29,0 mm for measuring point for start of thread on Z-Axis.
d Position of surface thread start surface to adjust at six o'clock position.
e Venting of internal vapour through the filler neck.
f Area for venting pipe.
g Horizontal line.
h Minimum straight portion of filler neck.

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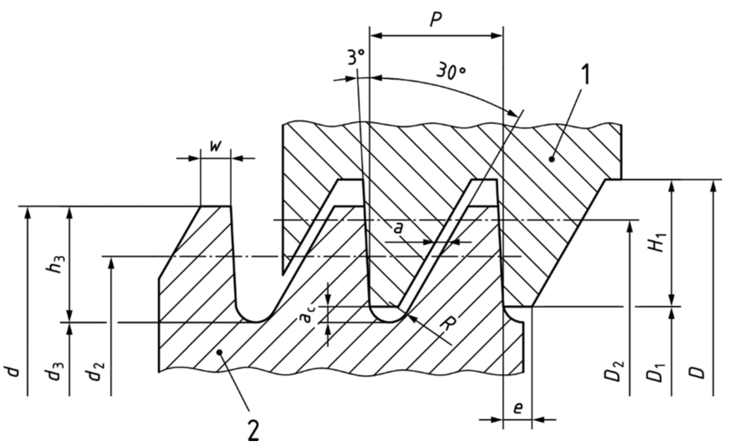
Figure 1 — Filler neck



Key

1 nut

2 screw

Figure 2 — Buttress thread

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4.3 Filler nozzle

If the filler nozzle is of screw-coupling design, the dimensional characteristics shall be as specified in Figure 2 and Table 2. The screw-on filler nozzle shall be furnished with a gasket. The gasket shall be made of suitable material and the shape of the gasket shall be such that the leakage of ammonia meets 5.2 and 5.3.

For screw-coupling designs, the filler nozzle shall be designed to limit the maximum screwing torque to 5 Nm in order to protect the filler neck thread.

A screw-coupled nozzle shall include internal vapour recovery to avoid pressurizing the tank system during refill. The back pressure in the filler neck generated by the vapour recovery during the refilling shall be not more than ±3 mbar five seconds after starting the refilling process. There shall be ambient pressure in the filler neck at the end of the filling process.

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Table 2 is a calculation and is based on DIN 513 (see Bibliography). Tolerances are recommended to calculate in accordance to the material, etc.

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Table 2 — Buttress thread

Dimensions in millimetres

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Symbol	Screw thread S36x4	Nut thread S37,6x4
D, d	36	37,6
P	4	
d_3	29,058	
D_1		30
d_2	33	
D_2		35,235
a	0,2	
h_3	3,471	
H_1		3,8
R	0,496	
w	1,056	
a_c	0,472	
e		0,856

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4.4 Clearance space

4.4.1 General

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The vehicle manufacturer shall inform his customer, which kind of filling process the customer must use and choose the freespace accordingly. The following three options are possible. The Class A-freespace (see 4.4.2), which is primarily for canister filling, the Class B-freespace (see 4.4.3), which is primarily for nozzle filling, or a combination of both freespaces.

4.4.2 Minimum clearance "Class A"

Capability of refilling only by use of canisters is required. Therefore, vehicle manufacturers shall ensure that the minimum space defined in Figure 3 is available and is not obstructed by any components in order to permit unrestricted access to the filler neck for insertion of the nozzle spout of appropriate canisters.

Dimensions in millimetres

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