



SLOVENSKI STANDARD SIST EN 17824:2023

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Železniške naprave - Talna oskrba - Oprema za ponovno polnjenje tekočine, ki se uporablja za obdelavo izpušnih plinov (AUS 32)

Railway applications - Ground based services - Exhaust treatment fluid (AUS 32) refilling equipment

Bahnanwendungen - Versorgungseinrichtungen - Nachfüllvorrichtung für Abgasreinigungsflüssigkeit (AUS 32)

Applications ferroviaires - Services au sol - Équipement de remplissage du fluide de traitement des gaz d'échappement (AUS 32)

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45.060.10	Vlečna vozila	Tractive stock
75.200	Oprema za skladiščenje nafte, naftnih proizvodov in zemeljskega plina	Petroleum products and natural gas handling equipment

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EUROPEAN STANDARD

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English Version

Railway applications - Ground based services - Exhaust treatment fluid (AUS 32) refilling equipment

Applications ferroviaires - Services au sol - Équipement
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d'échappement (AUS 32)

Bahnanwendungen - Versorgungseinrichtungen -
Nachfüllvorrichtung für Abgasreinigungsflüssigkeit
(AUS 32)

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European foreword

This document (EN 17824:2023) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2023, and conflicting national standards shall be withdrawn at the latest by September 2023.

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EN 17824:2023 (E)**Introduction**

This document contains requirements regarding equipment for railway vehicles and railway infrastructure for filling railway vehicles with a NO_x reduction agent AUS 32 (32 % aqueous urea solution) as specified in ISO 22241-1:2019, hence forward referred to as AUS 32. These minimum requirements describe the target system to be available across Europe to assist use of the railway network.

The urea solution (AUS 32) as referred to in this document is commercially available and may exist under various trade names. Trade names of products commercially available include: AdBlue®, ARLA 32®, DEF, etc.

NOTE This information is given for the convenience of users of this document and does not constitute an endorsement by CEN of the products named.

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1 Scope

This document specifies interface requirements on vehicles and on ground based refilling and storage equipment for any railway vehicle fitted with internal combustion engine(s) requiring a NO_x reduction agent AUS 32 (32 % aqueous urea solution) as specified in ISO 22241-1:2019.

It is also applicable to mobile or temporary refilling points for AUS 32.

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.

EN 13617-2:2021, *Petrol filling stations — Part 2: Safety requirements for construction and performance of safe breaks for use on metering pumps and dispensers*

EN 50122-1:2011,¹ *Railway applications — Fixed installations — Electrical safety, earthing and the return circuit — Part 1: Protective provisions against electric shock*

ISO 22241-1:2019,² *Diesel engines — NO_x reduction agent AUS 32 — Part 1: Quality requirements*

ISO 22241-3:2017, *Diesel engines — NO_x reduction agent AUS 32 — Part 3: Handling, transportation, and storage*

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:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

NATO STANAG

North Atlantic Treaty Organisation standardisation agreement

¹ Document impacted by A1:2011, A2:2016, A3:2016, A4:2017 and AC:2012.

² Document impacted by A1:2019.

EN 17824:2023 (E)**4 Requirements****4.1 System requirement**

Railway vehicles fitted with an internal combustion engine that uses AUS 32 shall either have:

- 1) pumped refilling system with mechanical and electrical couplings and storage tank on the railway vehicle compliant with 4.2. This is intended to permit routine regular refilling of the AUS 32 tanks on the vehicle without the need for constant attendance by servicing personnel;

or

- 2) manual top-up system that informs the user that AUS 32 requires refilling, and a tank provided to be refilled, as set out in 4.4, similar to systems used on road vehicles and construction machinery.

It is permitted to also fit additional alternative refilling connections to suit local servicing requirements.

Designated refilling points on railway infrastructure that store and dispense AUS 32 shall be fitted with at least one mechanical and electrical coupling compliant with 4.3.1. It is permitted to also fit additional alternative filling couplings to suit local conditions at the fuelling point where alternative AUS 32 couplings are fitted to the vehicles serviced in this location.

Mobile refilling equipment to dispense AUS 32 shall be fitted with couplings compliant with 4.3.1 or suitable for use with the open system described in 4.4.

4.2 On vehicles**4.2.1 On board AUS 32 system**

The AUS 32 system from the inlet up to and including the storage tank shall be able to withstand the maximum pressure and flow rate shown in 4.3.2.

All parts of the AUS 32 storage tank and pipework on the vehicle that come into contact with the AUS 32 shall be chemically and structurally stable under known service conditions and shall be corrosion free. Materials likely to come into contact with the AUS 32 shall be resistant to attack by the AUS 32.

4.2.2 Mechanical coupling for AUS 32 fluid supply

Vehicles shall be fitted with the male part of a self sealing coupling compliant to NATO STANAG-3756, with a nominal diameter of 25 mm, type DDC 1 inch, in a material that does not react with AUS 32, such as inox or hard alloy.

The connections shall be on each side of the vehicle between 600 mm and 1 600 mm above rail level, measured to the centre of the connection. Where the connection is recessed from the vehicle bodyside they shall not be recessed further than 100 mm deeper than the local bodyside. The connection shall have space around it to allow removal of dust cap (whilst wearing thick gloves). A typical example of the installed system is shown in Figure 1.

The connection on the vehicle shall have a dust cap that is capable of being removed without tools. It shall be retained to the vehicle by flexible connection to prevent loss. It is recommended that the colour of the dust cap should be blue.

In the immediate vicinity of the filling connection there shall be a label denoting "AUS 32" and/or recognized trade name such as "AdBlue", to clearly identify the use of the coupling.



Figure 1 — Typical installation of AUS 32 coupling and electrical connector

4.2.3 Electrical connector for AUS 32 supply control circuit

An electrical connector shown in Annex A shall be fitted on each side of the vehicle (for the electrical circuit shown in Figure 4). The electrical connection shall be in close proximity to, and should be no greater than 1 000 mm from, the mechanical coupling described in 4.2.2.

To ease the identification it is recommended that the connector on the vehicle is coloured blue and labelled as described in 4.2.2.

The connections on the vehicle shall be between 600 mm and 1 600 mm above rail level, measured to the centre of the connection. They shall not be recessed further than 100 mm deeper than the local bodyside. The male connector (train side) shall have space around it to allow connection.

It is recommended that the male connector is angled downwards to reduce the risk of water ingress and to assist the manual coupling, uncoupling action.

4.2.4 On board AUS 32 storage tank

To enable the exhaust after-treatment system to operate, the vehicle storage tank shall keep the AUS 32 at a temperature of -10 °C to $+50\text{ °C}$. Heating shall be provided and a control system to ensure the temperature is automatically kept within this range whilst the engine is running.

NOTE 1 The optimum temperature range of -5 °C to $+35\text{ °C}$ will maintain the quality of the AUS 32 for a 6 month storage period.

A common design of on board AUS 32 system is for the AUS 32 to be circulated between the storage tank and the after-treatment system doser, which will cool the doser and heat the AUS 32, whilst the engine is running. However, consideration should be given for the supply and return pipes on the vehicle to have trace heating if prolonged periods of static AUS 32 containment is possible.

NOTE 2 There are also other designs featuring air assisted systems, which cool the doser and removes the AUS 32 from the doser.

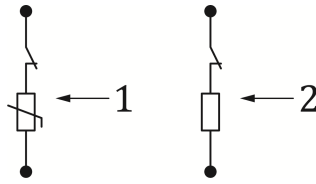
With the tank filled to maximum permitted level and pressure, there shall be no leakage from the tank or system when the vehicle is operated in the most adverse track geometry, e.g. superelevation, for leaks.

The vehicle shall be fitted on each side with an indicator showing the level of AUS 32. This indicator shall be easily seen (and read) from the filling point. It is advantageous to additionally have the level available for display on the train management system (TMS) screen where such a system is fitted.

The tank shall be fitted with level detection, connected to the electrical connection shown in Annex A. The full electrical circuit is shown in Figure 4. The level detector contacts shall be compatible with the electrical power shown in 4.3.6. There shall be a resistance of $560\ \Omega$ in series with the float switch (E in

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Figure 4) fitted on the vehicle. It is permitted to fit a thermistor with an operating range of 140 Ω up to a maximum of 560 Ω in place of the fixed resistance as shown in Figure 2.

**Key**

- 1 Overfill circuit with thermistor
- 2 Overfill circuit with resistor

Figure 2 — Overfill switch with thermistor or resistor

The tank shall be fitted with a vent valve or overflow such that if the tank is overfilled the AUS 32 will spill from the vehicle noticeable from the refilling position such that the spilt AUS 32 does not collect on the vehicle.

4.3 On railway infrastructure

4.3.1 General

The installation at the refilling point shall either be fixed, meeting the requirements of 4.3.2 to 4.3.8 or mobile equipment meeting the requirements in 4.3.2 to 4.3.7. The design of fixed installation shall consider the prevention of contamination from spillage of AUS 32.

AUS 32 purity is essential, even the smallest quantities of oil/dirt/fuel/water/dust/lubricants can seriously damage the exhaust after-treatment system on the vehicle. To avoid contamination filters shall be fitted at each dispensing point. It is recommended that these should be in the range of 40 to 70 microns particle filter.

4.3.2 System design

The ground-based storage tank and pipework shall keep the AUS 32 at a temperature of between -5°C to $+25^{\circ}\text{C}$. Heating and cooling shall be provided and a control system to ensure the temperature is automatically kept within this range to avoid crystallization and/or degradation of the AUS 32.

NOTE 1 It is possible to have a design that clears the AUS 32 from the pipework which removes the need to control temperature of the pipework.

The design of the storage facility should consider that AUS 32 is not stored longer than 18 months.

The tank and fixed pipework shall be compatible with AUS 32, i.e. it shall be urea resistant material capable of withstanding the supply pressure. It is recommended that the pipework is metallic for equipotential bonding purposes.

There shall be filters installed between storage tank and dispense point to remove contaminants from the liquid AUS 32.

The supply pressure at the train delivery point shall not exceed 0,3 MPa (3 bar). The flow rate shall be between 20 l and 35 l per minute.

NOTE 2 This maximum pressure is based on typical water storage systems on rolling stock.