# INTERNATIONAL STANDARD ISO 3929

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# Road vehicles — Determination of exhaust carbon monoxide concentration at idle speed

*Véhicules routiers — Détermination du monoxyde de carbone émis par un moteur tournant au régime de ralenti*



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## FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3929 was drawn up by Technical Committee ISO/TC 22, *Road vehicles*, and was circulated to the Member Bodies in May 1975.



It has been approved by the Member Bodies of the following countries :



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No Member Body expressed disapproval of the document.



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# Road vehicles — Determination of exhaust carbon monoxide concentration at idle speed

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the in-service test procedure for the determination of the concentration of exhaust carbon monoxide (CO) emissions from road vehicles equipped with spark-ignition engines running at idle speed.

## 2 REFERENCE

ISO 3930, *Road vehicles — Carbon monoxide analyser equipment — Technical specifications.*



## 3 DEFINITIONS

**3.1 spark-ignition engine :** An internal combustion engine in which the combustion of the air/fuel mixture is initiated at given instants by a hot spot, usually an electric spark.



**3.2 idle speed :** The engine rate, in revolutions per minute, with fuel system controls (accelerator and choke) in the rest position, transmission in neutral and clutch engaged in the case of vehicles with manual or semi-automatic transmission, or with selector in park or neutral position when an automatic transmission is installed.

**3.3 normal thermal conditions :** The thermal conditions attained by an engine and its drive line after a run of at least 15 min on a variable course, under normal traffic conditions.

**3.4 carbon monoxide percent by volume :** The carbon monoxide percentage by volume, at the moisture level of the sample as analysed.

## 4 TEST INSTRUMENT

**CO analyser** such as defined in ISO 3930. (The accuracy limit of this test procedure is not better than that of the instrument selected.)

## 5 INSTRUMENT PREPARATION

**5.1** Prepare, use and maintain the analyser following the directions given in the instrument manufacturer's operation manual, and service the instrument at such intervals as to ensure accuracy.

**5.2** Carry out a "span and zero" calibration within a period of 4 h before the instrument is first used and each time the instrument is moved or transferred to a new environment. The calibration shall be performed well away from the exhaust of motor vehicles whose engines are running.

If the instrument is not self-compensated for non-standard conditions of altitude and ambient temperature or not equipped with a manually controlled system of compensation, the scale calibration shall be performed using calibration gas.

**5.3** If the sample handling system is not integral with the analyser, check the effectiveness of the condensate traps and check that all connections of the gas sampling system are leakproof. Check that filters are clean, that filter holders are fitted with their gaskets and that these are in good condition.

**5.4** Ensure that the sample handling line and probe are free from contaminants and condensates.

## 6 VEHICLE INSPECTION

**6.1** Check that the road vehicle exhaust system is reasonably leakproof and that the manual choke control has been returned to the rest position.

**6.2** Check that the gas sampling probe can be inserted into the exhaust pipe to a depth of at least 300 mm. If this proves impossible owing to the exhaust pipe configuration, apply a suitable extension to the exhaust pipe(s), making sure that the connection is reasonably leakproof.

**6.3** The vehicle shall have attained normal thermal conditions as defined in 3.3. When corrections to the observed values are made in order to take into account atmospheric temperature and pressure during the test, they should be, for the moment, based on the values indicated in the ECE/UNO document "Draft consolidated Resolution on the Construction of Vehicles" — document TRANS/SC1/R.28 (*see note*).

NOTE — Studies are continuing in order to determine improved correction factors for temperature and pressure.

## 7 MEASUREMENT

**7.1** Immediately preceding the measurement, accelerate the engine to a moderate speed with no load, maintain for at least 15 s, then return the engine to idle speed as defined in 3.2.

**7.2** While the engine idles, insert the sampling probe into the exhaust pipe as deeply as possible but in any case for not less than 300 mm.

**7.3** Wait about 20 s and take the reading.

**7.4** Record the value of CO concentration read. In case of dilution of the exhaust gases, it is necessary to use the correction given by the formula :

$$T_{corrected} = T_{read} \times \frac{15}{T_{CO} + T_{CO_2}}$$

**7.5** Multiple exhaust outlets should be connected to a manifold arrangement terminating in a single outlet. If a suitable adaptor is not available, the arithmetic average of the concentration from the multiple pipes may be used.

**7.6** If the measurement is to be repeated, the entire procedure of clause 7 shall be repeated.