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Title: Draft BS EN IEC 62990-3 Workplace atmospheres. Part 3: Gas detectors - Electrical apparatus for the detection and measurement of oxygen - Performance requirements and test methods.

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Introduction

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For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



31/1530/CD

COMMITTEE DRAFT (CD)

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31/1479/CD, 31/1500A/CC

IEC TC 31 : EQUIPMENT FOR EXPLOSIVE ATMOSPHERES	
SECRETARIAT: United Kingdom	SECRETARY: Mr Mick Maghar
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

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TITLE:

Workplace atmospheres – Part 3: Gas detectors - Electrical apparatus for the detection and measurement of oxygen - Performance requirements and test methods

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WORKPLACE ATMOSPHERES –

**Part 3: Gas detectors - Electrical equipment for the detection and measurement of oxygen -
Performance requirements and test methods**

FOREWORD

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- International Standard IEC 62990-3 has been prepared by Joint Working Group (JWG) 45 of IEC technical committee TC31: Equipment for explosive atmospheres. The text of this standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

- 136 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.
- 137 The committee has decided that the contents of this publication will remain unchanged until the
138 stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to
139 the specific publication. At this date, the publication will be
- 140 • reconfirmed,
 - 141 • withdrawn,
 - 142 • replaced by a revised edition, or
 - 143 • amended.
- 144

145 The National Committees are requested to note that for this publication the stability date
146 is 202X.

147 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
148 AT THE PUBLICATION STAGE.

149

INTRODUCTION

WORKPLACE ATMOSPHERES –

Part 3: Gas detectors - Electrical equipment for the detection and measurement of oxygen - Performance requirements and test methods

1 Scope

This International Standard specifies general requirements for construction, testing and performance, and describes the test methods that apply to portable, transportable and fixed equipment for the measurement of the oxygen concentration in gas mixtures indicating up to 25 % (V/V). The equipment, or parts thereof, may be intended for use in potentially explosive atmospheres (see 4.1) and in mines susceptible to firedamp.

Type DE equipment:

This standard applies to equipment intended for monitoring oxygen deficiency and/or enrichment.

EXAMPLE 1 Monitoring oxygen deficiency and/or enrichment includes:

- protection of human health and safety in potentially oxygen deficient atmospheres;
- fire protection by monitoring areas with reduced oxygen concentration;
- fire protection by monitoring oxygen concentrations exceeding that of normal ambient air.

Type IN equipment:

This standard also applies to equipment with an oxygen measuring function for explosion protection in the case of monitoring inertisation. Inertisation is an explosion protection technique where a potentially explosive atmosphere is purged with inert gas.

This standard is applicable to equipment intended to measure reliably the oxygen concentration, to provide an indication, alarm or other output function, the purpose of which is to give a warning of a potential hazard and, in some cases, to initiate automatic or manual protective action(s), whenever the level exceeds or falls below an alarm set point.

This standard is applicable to equipment, including integral sampling systems of aspirated equipment, intended to be used for commercial, industrial and non-residential safety applications.

NOTE Commonly used oxygen sensors in commercial equipment for industrial application are:

- electrochemical sensors (aqueous and solid electrolytes);
- paramagnetic sensors;
- zirconium dioxide sensors;
- tunable diode laser absorption spectroscopy sensors (TDLAS).

For equipment used for sensing the presence of multiple gases, this standard applies only to the measurement of oxygen.

This document is not applicable to equipment:

- used for medical equipment;

- 194 – used only in laboratories for analysis or measurement;
- 195 – used only for process measurement purposes;
- 196 – used in the domestic environment;
- 197 – used in environmental air pollution monitoring;
- 198 – used for flue gas analysis;
- 199 – used for open-path (line of sight) area gas measurement;
- 200 – used for sampling systems external from the gas detection equipment.

201

202 **2 Normative references**

203 The following documents, in whole or in part, are normatively referenced in this document and
204 are indispensable for its application. For dated references, only the edition cited applies. For
205 undated references, the latest edition of the referenced document (including any amendments)
206 applies.

207 IEC 60079-0, *Explosive atmospheres - Part 0: Equipment - General requirements*

208 IEC 60068-2-6, *Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)*

209 IEC 60079-29-2, *Explosive atmospheres - Part 29-2: Gas detectors - Selection, installation, use
210 and maintenance of detectors for flammable gases and oxygen*

211 IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

212 IEC 61326-1:2012, *Electrical equipment for measurement, control and laboratory use – EMC
213 requirements – Part 1: General requirements*

214

215 IEC 61000-4-29, *Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement
216 techniques - Voltage dips, short interruptions and voltage variations on d. c. input power port
217 immunity tests*

218

219 IEC 61000-6-3, *Electromagnetic compatibility (EMC) - Part 6-3: Generic standards -
220 Emission standard for residential, commercial and light-industrial environments*

221

222 IEC 61000-6-4, *Electromagnetic compatibility (EMC) - Part 6-4: Generic standards -
223 Emission standard for industrial environments*

224

225 **3 Terms and definitions**

226 For the purposes of this document, the terms and definitions given in IEC 60079-0 and the
227 following apply. Additional definitions applicable to explosive atmospheres can be found in
228 IEC 60050-426.

229 **3.1 Gas properties**

230 **3.1.1**

231 **ambient air**

232 normal atmosphere surrounding the equipment

233 **3.1.2**

234 **poisons**

235 <for sensing elements> substances that lead to temporary or permanent change of
236 performance, particularly loss of sensitivity of the sensing element

237 **3.1.3**

238 **reference air**

239 air with an oxygen concentration of $(21 \pm 0,4) \% (V/V)$

240 **3.1.4**
241 **standard test gas**
242 test gas with a composition specified for each equipment to be used for all tests unless
243 otherwise stated (see 5.3.2)

244 **3.1.5**
245 **volume fraction (V/V)**
246 quotient of the volume of a specified component and the sum of the volumes of all components
247 of a gas mixture before mixing, all volumes referring to the pressure and the temperature of the
248 gas mixture

249 NOTE The volume fraction and volume concentration take the same value if, at the same state conditions, the sum of the
250 component volumes before mixing and the volume of the mixture are equal. However, because the mixing of two or more gases
251 at the same state conditions is usually accompanied by a slight contraction or, less frequently, a slight expansion, this is not
252 generally the case.

253 **3.1.6**
254 **zero test gas**
255 gas which is free of oxygen, interfering substances, and contaminating substances

256 EXAMPLE Nitrogen.

257 **3.2 Types of equipment**

258 **3.2.1**
259 **alarm-only equipment**
260 equipment with an alarm but not having an indication of measured value

261 **3.2.2**
262 **aspirated equipment**
263 equipment that samples the gas by drawing it to the gas sensor

264 Note 1 to entry: A hand operated or electric pump is often used to draw gas to the sensor.

265 **3.2.3**
266 **automatically aspirated equipment**
267 aspirated equipment with an integral pump or separate pump, which is connected directly to the
268 equipment

269 **3.2.4**
270 **continuous duty equipment**
271 equipment that is powered for long periods of time, but may have either continuous or
272 intermittent sensing

273 Note 1 to entry: Within this document, all equipment is regarded as continuous duty.

274 **3.2.5**
275 **diffusion equipment**
276 equipment in which the transfer of gas from the atmosphere to the sensor takes place without
277 aspirated flow

278 **3.2.6**
279 **fixed equipment**
280 equipment fastened to a support, or otherwise secured in a specific location when energized

281 **3.2.7**
282 **portable equipment**
283 equipment intended to be carried by a person during its operation

284 Note 1 to entry: Portable equipment is battery powered and includes, but is not limited to

- 285 a) hand-held equipment, typically less than 1 kg, which requires use of only one hand to operate,
286 b) personal monitors, similar in size and mass to the hand-held equipment, that are continuously operating while
287 they are attached to the user, and
288 c) larger equipment that can be operated by the user while it is carried either by hand, by a shoulder strap or
289 carrying harness and which may or may not have a hand directed probe.

290 **3.2.8**
291 **transportable equipment**
292 equipment not intended to be carried by a person during operation, nor intended for fixed
293 installation

294 **3.2.9**
295 **gas detection transmitter**
296 fixed gas detection equipment that provide a conditioned electronic signal or output indication
297 to a generally accepted industry standard (such as 4-20 mA), intended to be utilized with
298 separate gas detection control units or signal processing data acquisition, central monitoring
299 and similar systems, which typically process information from various locations and sources
300 including, but not limited to gas detection equipment

301 **3.2.10**
302 **gas detection control unit**
303 equipment intended to provide display indication, alarm functions, output contacts or alarm
304 signal outputs or any combination when operated with remote sensor(s)

305 **3.2.11**
306 **separate gas detection control unit**
307 equipment intended to provide display indication, alarm functions, output contacts or alarm
308 signal outputs or any combination when operated with gas detection transmitter(s)

309 **3.2.12**
310 **equipment with integral sensor(s)**
311 equipment that provides display indication, alarm functions, output contacts and/or alarm signal
312 outputs using a sensor which is within or directly assembled to the equipment housing

313 **3.2.13**
314 **accessory**
315 component which can be fitted to the equipment for special purpose

316 EXAMPLE: External gas pump, sampling probe, hoses, collecting cone, weather protection device.

317 **3.3 Sensors**

318 **3.3.1**
319 **sensing element**
320 part of the sensor which is sensitive to the gas/vapour to be measured

321 **3.3.2**
322 **measuring principle**
323 type of physical or physico-chemical detection principle and the measurement procedure to
324 determine the measured value

325 **3.3.3**
326 **sensor**
327 assembly in which the sensing element is housed and that may also contain associated circuit
328 components

329 **3.3.4**
330 **integral sensor**
331 sensor which is within or directly assembled to the equipment housing

332 **3.3.5**
333 **remote sensor**
334 sensor which is installed separately, but is connected to a gas detection control unit, gas
335 detection transmitter, or to transportable or portable equipment

336 **3.4 Supply of gas to equipment**

337 **3.4.1**
338 **sample line**
339 means by which the gas being sampled is conveyed to the sensor

340 Note 1 to entry: Accessories such as filter or water trap are often included in the sample line.

341 **3.4.2**

342 **sampling probe**

343 separate accessory sample line which is optionally attached to the equipment

344 Note 1 to entry: It is usually short (e.g. of the order of 1 m) and rigid, although it can be telescopic. In some cases,
345 it is connected by a flexible tube to the equipment.

346 **3.4.3**

347 **adjustment**

348 procedure carried out to minimize the deviation of the measured value from the test gas
349 concentration

350 Note 1 to entry: When the equipment is adjusted to give an indication of zero in zero test gas, the procedure is
351 called 'zero adjustment'.

352 **3.4.4**

353 **calibration**

354 procedure which establishes the relationship between a measured value and the concentration
355 of a test gas

356 **3.4.5**

357 **field calibration kit**

358 means of presenting test gas to the equipment for the purpose of calibrating, adjusting or
359 verifying the operation of the equipment

360 Note 1 to entry: The field calibration kit can be used for verifying the operation of the alarms if the concentration of
361 the test gas is above the alarm set-point.

362 Note 2 to entry: A mask for calibration and test is an example of a field calibration kit.

363 **3.4.6**

364 **mask for calibration and test**

365 device that can be attached to the equipment to present a test gas to the sensor in a
366 reproducible manner

367 **3.5 Signals and alarms**

368 **3.5.1**

369 **alarm set point**

370 setting of the equipment at which the measured concentration will cause the equipment to
371 initiate an indication, alarm or other output function

372 **3.5.2**

373 **fault signal**

374 audible, visible or other type of output, different from the alarm signal, permitting, directly or
375 indirectly, a warning or indication that the equipment is not working satisfactorily

376 **3.5.3**

377 **indication**

378 representation of the measured value on an output or display

379 Note 1 to entry: The indication may be affected by suppression of indication, filtering or averaging.

380 **3.5.4**

381 **latching alarm**

382 alarm that, once activated, requires deliberate action to be deactivated

383 **3.5.5**

384 **measured value**

385 calculated concentration of gas and/or vapour that results from processing sensor signal

386 **3.5.6**

387 **repeatability**

388 closeness of agreement between the results of successive measurements of the same value of
389 the same quantity carried out by the same method, with the same measuring instruments, by
390 the same observer, in the same laboratory at quite short intervals of time in unchanged
391 conditions

3.5.7**special state**

any state of the equipment other than those in which monitoring of gas concentration and/or alarming is the intent

Note 1 to entry: Special state includes warm-up, calibration mode or fault condition.

3.6 Times**3.6.1****drift**

variation in the equipment indication over time at any fixed gas volume fraction (including clean air) under constant ambient conditions

3.6.2**final indication**

indication given by the equipment after stabilisation

3.6.3**stabilization**

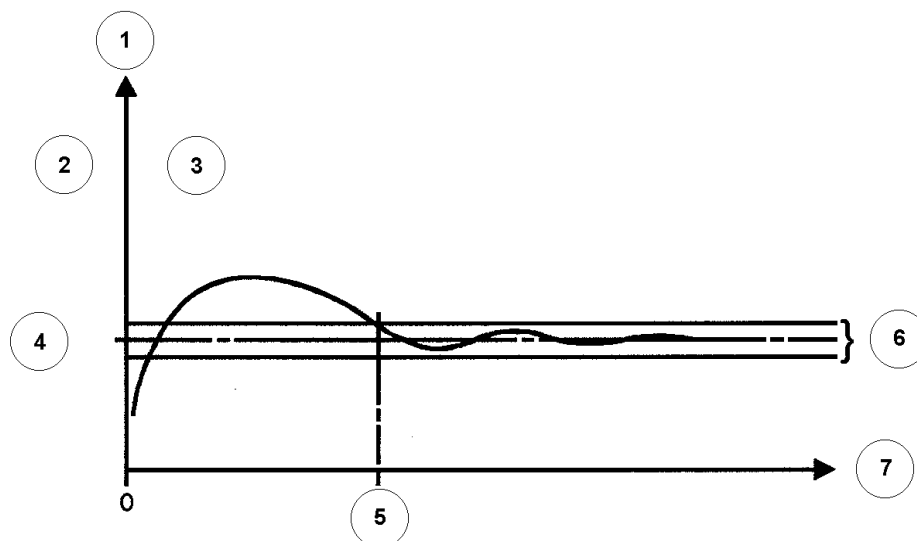
state when three successive readings of an equipment at a constant gas volume fraction, taken at twice the respective $t(90)$ indicates no changes greater than $\pm 1\%$ of the upper limit of the measuring range

3.6.4**time of response** **$t(x)$**

time interval, with the equipment in a warmed-up condition, between the time when an instantaneous variation in volume fraction is produced at the equipment inlet and the time when the indication reaches the sum of the initial indication and a stated percentage (x) of the difference between the final indication and the initial indication

3.6.5**warm-up time**

time interval, with the equipment in a stated atmosphere, between the time when the equipment is switched on and the time when the indication reaches and remains within the stated tolerances (see Figure 1)

**Key**

- 1 Indication
- 2 Power off in reference air or in zero test gas
- 3 Power on in reference air or in zero test gas