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TITLE: <b>IEC 60079-44: Explosive atmospheres – Part 44 - Personal Competence</b>
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NOTE FROM TC/SC OFFICERS:
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## IEC TS 60079-44

## EXPLOSIVE ATMOSPHERES

## Part 44: Personal Competence

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XX/XX/DTS	XX/XX/RVDTS

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

139 The language used for the development of this document is **English**.

140 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in  
141 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available  
142 at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are  
143 described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

144 The committee has decided that the contents of this publication will remain unchanged until the  
145 stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to  
146 the specific publication. At this date, the publication will be

147 transformed into an International standard,

148 reconfirmed,

149 withdrawn,

150 replaced by a revised edition, or

151 amended.

152

153 The National Committees are requested to note that for this publication the stability date is ....

154 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED  
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157

## Introduction

158 The objective of this Document is to minimize the impact on safety and integrity of facilities,  
159 where hazardous areas may be present, due to human error that may result from an individual's  
160 lack of knowledge, skills, or abilities during the performance of certain activities. This document  
161 explains how the minimum requirements for the competence and management of competencies  
162 of personnel working in industries where hazardous areas may be present can be achieved.  
163 Assurance that individuals who perform such tasks and those individuals responsible for  
164 ensuring a qualified workforce are competent according to this document will also support the  
165 achievement of the stated objective.

166 Competence depends on knowledge, skill, experience, and training. Verification of competence  
167 is a difficult task and requires specific assessment methods based on clear criteria. In  
168 establishing these criteria, it is acknowledged that:

- 169 – The competencies for conducting work in facilities where explosive atmospheres may be  
170 present are in addition to any competencies which may apply for the specific type of work  
171 being undertaken, for example, electrical, mechanical, operations.
- 172 – Competencies for working in hazardous areas vary by the individual roles and tasks  
173 performed (see Section 8), and the protection techniques used.
- 174 – As protection techniques adopt quite different and individual design and installation  
175 requirements it is common for personnel to be trained and competent either in some or all  
176 these techniques.

177 Regarding the assurance of competence, it is recognised that competence evolves with years  
178 but can also deteriorate if not applied, and so continued training and assessment to verify  
179 competence is necessary. Where training or assessment of competence is required it is  
180 expected that those conducting these activities should have at least the same level of  
181 competence as those being trained or assessed. These and other specific processes and  
182 requirements might also be defined in other publications that are employed in competence  
183 certification systems.

184

## 185 **1 Scope**

186 The purpose of this document is to provide guidance to establish recommended minimum  
187 criteria to determine roles, establish expectations of the necessary skills and evidence of  
188 competence to assess and manage the competence of personnel conducting work in or  
189 associated with hazardous areas.

190 This document provides examples and recommendations of minimum levels of competence for  
191 typical roles associated with hazardous areas by addressing the knowledge, skills, or abilities  
192 that is expected of personnel, and provides examples of the evidence of competence expected  
193 for each role.

194 This document is to assist employers in developing a programme to define, assess and manage  
195 requirements for competence. Such a programme could be unique to a facility or used in  
196 conjunction with other regulatory requirements where they exist. The competencies for  
197 conducting work in a hazardous area are in addition to any competencies which may apply for  
198 the general type of work being undertaken (for example, professional credentials, electrical,  
199 non-electrical, operations, design).

200 This document applies to both electrical and non-electrical applications.

## 201 **2 References**

202 The following documents are referred to in the text in such a way that some or all of their content  
203 constitutes requirements of this document. For dated references, only the edition cited applies.  
204 For undated references, the latest edition of the referenced document (including any  
205 amendments) applies.

- 206 – IEC 60050-426, International Electrotechnical Vocabulary – Part 426: Equipment for  
207 explosive atmospheres.
- 208 – IEC 60079-0 Explosive atmospheres - Part 0: Equipment - General requirements
- 209 – IEC 60079-17, Explosive atmospheres – Part 17: Electrical installations, inspection, and  
210 maintenance

## 211 **3 Definitions**

212 For the purposes of this document, the terms and definitions given in IEC 60079-0 and the  
213 following apply.

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

- 216 • IEC Electropedia: available at <http://www.electropedia.org/>
- 217 • ISO Online browsing platform: available at <http://www.iso.org/obp>

### 218 **3.1** 219 **first-party verification**

220 process where an individual self-declares their credentials and competency

221 Note 1 to entry: permitting first-party verification for individuals working in hazardous areas could result in liability  
222 issues for the employer

223 **3.2**  
224 **second-party verification**

225 process where the employer, a person or organization appointed by the employer assesses an  
226 individual to a defined set of competency requirements

227 **3.3**  
228 **third-party verification**

229 process where an organization independent of the employer, or its contractors, assesses  
230 individuals against a defined set of competency requirements

231 Note 1 to entry: Third-party verification organizations typically satisfy ISO/IEC17024 requirements and are assessed  
232 by a National Accreditation Body.

233 **3.4**  
234 **prerequisite qualifications**

235 knowledge, skills, and capabilities required to perform an assigned role or task in non-  
236 hazardous areas

237 Note 1 to entry: Some work roles may require registration or licencing by a local or national authority to verify,  
238 approve or endorse specific base knowledge. For example, professional engineer or tradespersons professional  
239 registration or licencing.

240 **3.5**  
241 **competence**  
242 ability to apply knowledge and skills to achieve intended results

243 [SOURCE: ISO/IEC 17024:2012, 3.6]

244 **3.6**  
245 **hazardous area**

246 area in which an explosive atmosphere is present, or can be expected to be present, in  
247 quantities such that special precautions for the construction, installation and use of equipment  
248 are required

249 Note 1 to entry: IEC 60079-10-1, Explosive atmospheres – Part 10-1: Classification of areas – Explosive gas  
250 atmospheres, gives a classification of hazardous areas containing explosive gas atmospheres (see IEC 426-03-03,  
251 IEC 426-03-04 and IEC 426-03-05).

252 Note 2 to entry: IEC 60079-10-2, Explosive atmospheres – Part 10-2: Classification of areas – Explosive dust  
253 atmospheres, gives a classification of hazardous areas containing explosive dust atmospheres (see IEC 426-03-23,  
254 IEC 426-03-24, and IEC 426-03-25).

255 [SOURCE: IEC 60050 426-03-01]

256 **3.7**  
257 **non-hazardous area**

258 area in which an explosive atmosphere is not expected to be present in quantities such as  
259 special precautions for the construction, installation and use equipment

260 [SOURCE: IEC 60050 426-03-02]

261 **3.8**  
262 **equipment**

263 apparatus, fittings, devices, components, and the like used as a part of, or in connection with,  
264 an installation

265 [SOURCE: IEC 60050 426-01-01]

266 **3.9**  
267 **Ex Equipment**

268 explosion-protected equipment

269 Note 1 to entry: Such equipment often includes Ex Components, but additional evaluation is always required as part  
270 of their incorporation into equipment.

271 [SOURCE: IEC 60050 426-01-14]

272 **3.10**  
273 **qualified assessor**

274 individual with enough knowledge, skills, and experience to undertake assessments

275 Note 1 to entry: This is likely to require on-site experience, understanding, interpreting and applying technical  
276 content, such as in IEC 60079-17, along with successful completion of nationally recognized training/assessment  
277 courses.

278 **3.11**  
279 **role**

280 tasks or responsibilities within the context of an organization that identify the responsibility and  
281 authority assigned to specific persons

282 **3.12**  
283 **verification**

284 confirmation of truthfulness, through the provision of objective evidence that specified  
285 requirements have been fulfilled

286 [SOURCE: ISO/IEC 17000]

287 Note 1 to entry: Verification can be applied to claims to confirm the information declared with the claim regarding  
288 events that have already occurred or results that have already been obtained.

289 **4 General**

290 Competence depends on specific knowledge, skill, and experience. Measurement of  
291 competence is a difficult task and requires assessment methods specific to the role being  
292 performed. Competence can develop with experience but can also deteriorate over time,  
293 therefore continued training or reassessment of competency can be required.

294 Competence assessors should have suitable qualifications for both:

- 295 • the activity being assessed; and  
296 • the assessment methodologies to be used.

297 **5 Typical evidence of competence**

298 **5.1 General**

299 Individuals should demonstrate they have the knowledge and skills relevant to the Type(s) of  
300 Protection, Types of ex Equipment, or safety related requirements necessary to perform their  
301 assigned tasks.

302 Evidence that can be used to verify an individual's competence and ability to perform their  
303 assigned task includes, but is not limited to:

- 304 – review and confirmation of validity of applicable documentation such as educational records  
305 and professional credentials;
- 306 – documentation of experience;
- 307 – practical skills evaluation;
- 308 – theoretical assessment such as exams; and
- 309 – second-party verification or third-party verification of knowledge and skills in accordance  
310 with Clause 8.

311 NOTE In many jurisdictions it is the legal responsibility of the owner or operator of a facility to ensure that individuals  
312 conducting work have received appropriate training and are competent to complete the tasks assigned to them.

## 313 5.2 Prerequisite qualifications

314 The competence assessment in this document is to assist employers define requirements in  
315 addition to any prerequisite qualifications expected of an individual to perform a specific role  
316 as required where National requirements are not in place.

317 Some of the roles identified in this document recommend prerequisite qualifications are likely  
318 to be necessary to meet the objectives.

319 NOTE 1: Prerequisite qualifications include items such as educational or professional credentials and licences to  
320 work required by applicable regulations.

321 NOTE 2 For example, a prerequisite qualification for an installer could be electrician qualifications in addition to  
322 being competent to perform other roles identified in this document such as maintenance.

## 323 5.3 Recommendations for the verification of Ex competence

324 Ex competence may be verified through written or verbal tests, by witnessing of work in-  
325 process, or assessment of competency verification systems. The results of the verification  
326 should be documented, including the verification methodology used and the level of results  
327 attained. The verification should be traceable and auditable.

328 Employers should consider including a second-party verification or third-party verification  
329 systems in their employment, contract, or procurement processes.

330 First-party verification for individuals working in, or associated with, hazardous areas should  
331 not be permitted.

332 NOTE Documents such as ISO/IEC 17024 provide guidance for assessment and certification of competence.

## 333 6 Task competency expectations

334 The level of competence required for specific operations should be determined. This could  
335 include assigning a competence level required for certain tasks rather than defining a specific  
336 role.

337 Competence expectations should be identified according to the complexity and risk associated  
338 with the task and can vary by employer, role, operator, or facility.

339 NOTE For example, the minimum competency expectation for personnel that only install Cable Glands can require  
340 different competencies to that of personnel who are expected to install more complex equipment.

341 The skill level of a manufacturer's technician working on their equipment is not expected to be  
342 the same as the person carrying out the installation of that equipment.

343 A programme to assess the competence of individuals for specific roles should be established,  
344 including pass-fail criteria. (see Clause 9).

## 345 **7 Party legally responsible for a facility**

### 346 **7.1 General**

347 The party legally responsible for a facility should ensure the organizational structure and  
348 competency of the staff maintains the safety of the facility. The responsibilities and authorities  
349 should be clearly defined and communicated within the organization. These should:

- 350 – be appropriate to the purpose of the organization;
- 351 – be appropriate to the management structure of the organization;
- 352 – include a commitment to comply with regulatory requirements.
- 353 – be communicated and understood within the organization;
- 354 – be periodically reviewed for continuing suitability; and
- 355 – identify or delegate the responsibility to ensure compliance and maintain the integrity of the  
356 equipment and facility (see 8.11).

### 357 **7.2 Internal quality audit of competency management system**

#### 358 **7.2.1 General**

359 Internal auditing of a competency management system to be implanted to assess the  
360 effectiveness of the system. The auditing technique can include the interview of selected  
361 individuals using an “explain” and “show me” sampling technique.

362 Auditing should be a structured activity based upon a formal programme. Documents such as  
363 ISO 19011 provide guidance on the management of an audit programme, its planning and  
364 conduct.

#### 365 **7.2.2 Examples of typical auditing tasks**

366 Audits may have a specific focus based on the auditor's prior experience or knowledge of  
367 typically weak areas, event history at the facility, management priorities and regulatory  
368 requirements.

369 Examples of typical auditing tasks include, but are not limited to, to confirm that:

- 370 – Ex and relevant management processes are appropriate, up to date and available to those  
371 who need them;
- 372 – roles and responsibilities are clearly defined and assigned to the appropriate personnel to  
373 allow the management processes to be implemented;
- 374 – people clearly understand their duties and are competent to carry them out;
- 375 – Ex Equipment integrity is well managed and documented, and appropriate records are kept  
376 of equipment installed, work carried out, inspections performed and findings;
- 377 – records and documentation are kept accurate and current; and
- 378 – management of change procedures relating to hazardous areas and Ex Equipment is in  
379 place, and correctly implemented.

#### 380 **7.2.3 Examples of evidence of competence**

381 The auditor should have competence in the audit process, knowledge of the activities to be  
382 audited and should be independent of the part of the organization that is being audited.  
383 Examples of evidence of competence can include, but are not limited to:

- 384 – having prior experience in the audit process including; plan, conduct, prepare an opening  
385 meeting and conduct close out presentations and reports. (ref. ISO 19011); and
- 386 – being experienced in the range of measures required to manage Ex Equipment in hazardous  
387 areas including:
- 388 a) understanding the requirements of the applicable national or international legislation;
- 389 b) being familiar with the legislation governing the management of Ex Equipment;
- 390 c) being able to demonstrate a practical understanding of the requirements for Ex areas,  
391 explosion protection principles and installation, maintenance, and repair requirements;  
392 and
- 393 d) having prior working experience in various aspects of Ex tasks related to hazardous  
394 areas.

## 395 **8 Roles associated with hazardous areas where competence should be verified**

### 396 **8.1 General**

397 This section provides examples of roles of individuals working in, or associated with, hazardous  
398 areas. Each role is based on the typical tasks performed with examples for the evidence of  
399 competence for those tasks.

400 Continuing education or training to maintain the level appropriate of competence for each task  
401 associated with a role is advisable.

402 NOTE 1 Assessment of competence is addressed in Clause 9

403 NOTE 2 Reassessment of competence is addressed in Clause 10.

404 NOTE 3 Certain tasks can additionally include the use of a Permit to Work (PTW) management system to ensure  
405 that work conducted in a facility is performed safely and efficiently.

### 406 **8.2 Area Classification**

#### 407 **8.2.1 General**

408 The area classification should be carried out by personnel who understand the relevance and  
409 significance of the properties of the flammable substances, sources of release, principles of  
410 dispersion, and the potential for an explosive atmosphere to develop. Personnel should be  
411 familiar with the activities, process, and the equipment.

412 Area classification typically requires inputs from other disciplines such as electrical, non-  
413 electrical, process engineers, plant operations personnel and others as applicable. Personnel  
414 involved in area classification should have a broad range of experience and appropriate  
415 analytical skills.

416 Competence should be relevant to the nature of the facility and methodology used for carrying  
417 out the area classification.

#### 418 **8.2.2 Examples of area classification tasks**

419 Typical area classification tasks include, but are not limited to:

- 420 – area classification involving gathering and analysing of data relative to explosion hazards;
- 421 – identification of the relevant characteristics of the flammable materials;
- 422 – identification of the type and extent of the hazardous area in accordance with the  
423 appropriate codes or regulations for the jurisdiction of the facility and material(s) involved;

- 424 – determination of the types and availability of ventilation for gases / vapours and the impact  
425 it has on the hazardous area (such as in IEC 60079-10-1);
- 426 – determination of the type dusts involved and the potential for explosive dust atmospheres  
427 or dust layering forming (such as in IEC 60079-10-2);
- 428 – Consideration of any influence due to environmental conditions; and
- 429 – preparation of drawings and documentation to identify the hazardous areas within a facility,  
430 and the associated risks that occur in those areas;

### 431 **8.2.3 Examples of evidence of area classification competence**

432 Typical evidence of area classification competence includes, but is not limited to:

- 433 – understanding of the relevant standards and guidance documents applicable to the  
434 jurisdiction of work and the legal expectations of the local jurisdiction;
- 435 – ability to interpret the input from others as appropriate to understand the processes within  
436 a facility and the necessary documents required to enable area classification;
- 437 – ability to identify and grade all potential release sources and the impact of ventilation;
- 438 – ability to determine the extent of the zone using appropriate look-up tables, reference  
439 materials or calculations taking into account their limits of use; and
- 440 – ability to understand the relationship between equipment, processes, and area classification  
441 where changes or modifications in one area can affect other area(s).

442 NOTE Multiple standards and guidance documents are available and specific to the application and jurisdiction. This  
443 document does not attempt to list them. (such as IEC 60079-10-1 and IEC 60079-10-2)

## 444 **8.3 Design of systems or installations for hazardous areas**

### 445 **8.3.1 General**

446 The design of installations in hazardous areas should be carried out by those who understand  
447 the various Types of Protection, installation practices, relevant rules and regulations and the  
448 general principles of area classification.

449 A designer needs the ability to design systems for electrical, non-electrical, software, that relate  
450 to the operation of a facility in a hazardous area. There are multiple requirements based on the  
451 complexity of a facility. This requires that the design start with the objectives and consider the  
452 appropriate Ex Equipment that will be able to achieve the process and safety goals.

453 NOTE A designer can be part of a team in which individuals have different competencies necessary to complete the  
454 design of a system or installation.

### 455 **8.3.2 Examples of typical design tasks**

456 Examples of typical design tasks include, but are not limited to:

- 457 – evaluation of local regulatory, legal and facility requirements for an installation in hazardous  
458 areas;
- 459 – selection of Ex Equipment and interconnecting systems based on the area classification  
460 using documents such as IEC 60079-14;
- 461 – selection and application of standards, owner specifications and legal requirements relevant  
462 to the systems being designed and the location;

- 463 – ensure ventilation issues considered during area classification are included in the design  
464 and installation documents;
- 465 – preparation of construction or installation drawings with supporting detail where required;
- 466 – preparation of specifications for procurement; and
- 467 – preparation of, or participation in, the verification dossier to support future maintenance,  
468 inspection, and repair.

### 469 **8.3.3 Examples of evidence of design competence**

470 Examples of design competence include, but are not limited to:

- 471 – interpretation and application of requirements from source documents such as functional  
472 specifications, area classification drawings;
- 473 – understanding of the area classification and environmental conditions on which to base the  
474 design of systems and selection equipment that are appropriate;
- 475 – demonstrating the practical skills necessary for the preparation and compilation of relevant  
476 design, procurement, installation, inspection, testing, and maintenance information and  
477 documentation for the applicable concepts of protection and systems involved;
- 478 – identification of any ignition sources which shall be properly protected or controlled;
- 479 – understanding the general principles of explosion protection, relevant standards and Ex  
480 Equipment marking;
- 481 – understanding the content of instruction manual and Ex Equipment certificates;
- 482 – understanding the specific techniques employed in the selection and erection of Ex  
483 Equipment.

484 NOTE The design of systems or installations for hazardous areas typically requires prerequisite competence in other  
485 areas such as earthing, electrical systems and lightning protection.

## 486 **8.4 Installation**

### 487 **8.4.1 General**

488 Installation of the Ex Equipment includes verification of proper mounting, appropriate electrical  
489 and non-electrical interconnection and documentation of the installation while Ensuring the Ex  
490 Equipment specifications are appropriate and any Specific Conditions of Use are addressed.

491 Completion an installation can include selection of appropriate materials and tools required for  
492 the task.

### 493 **8.4.2 Examples of typical installation tasks**

494 Examples of typical installation tasks include, but are not limited to:

- 495 – confirmation that Ex Equipment is per specification, or as ordered and is appropriate for the  
496 location, including the consideration of any Specific Conditions of Use;
- 497 – selection and installation of various types of equipment not specified in the design that are  
498 required for the correct installation of Ex Equipment;
- 499 – handling and installation of Ex Equipment;
- 500 – interconnection of electrical systems, cable termination and the use of supports as required;
- 501 – installation of equipment as per design drawings;

- 502 – working safely in a hazardous area including hazard monitoring, evacuation procedures and  
503 the use of permit to work system or safe isolation procedures;
- 504 – testing of installed cables/circuits to ensure safety where required (this can also be  
505 completed in the commissioning process); and
- 506 – documenting the completion of installation as required.

#### 507 **8.4.3 Examples of evidence of installation competence**

508 Installers need to demonstrate competence to the extent necessary to perform their tasks:

509 Examples of evidence of installation competence include, but are not limited to:

- 510 – understanding of installation of and work with Ex Equipment;
- 511 – understanding of the general principles of explosion protection concepts;
- 512 – knowledge of ignition sources
- 513 – understanding of the principles of Types of Protection, marking and appropriate areas of  
514 use;
- 515 – understanding of the equipment installation requirements which could affect the protection  
516 concept;
- 517 – correct use of instruction manuals, equipment certificates and installation documentation;
- 518 – application of proper installation techniques and correctly select any additional materials  
519 when required to complete the task (such as cables, Cable Glands, cable trays, filters, spark  
520 arrestors.);
- 521 – raising of technical queries (TQ) (when required) with the appropriate technical authority;
- 522 – application of permit to work systems and comply with any limitations;
- 523 – understanding of installation requirements in the applicable standards or documents;
- 524 – understanding of inspection and maintenance requirements; and
- 525 – correct use and operation of the appropriate testing equipment and consider any impact this  
526 may have in the hazardous area.

### 527 **8.5 Maintenance**

#### 528 **8.5.1 General**

529 Maintenance personnel should have the knowledge and skills required for the relevant Types  
530 of Protection and types of Ex Equipment involved.

531 It is important that any maintenance procedures in hazardous areas ensure the explosion-  
532 protection features of the Ex Equipment involved is not compromised.

#### 533 **8.5.2 Examples of typical maintenance tasks**

534 Examples of typical maintenance tasks include, but are not limited to:

- 535 – implementation of maintenance programs and schedules, in relation to Ex Equipment and  
536 Specific Conditions of Use;
- 537 – performance of testing as required, fault finding and corrective maintenance;

- 538 – ensuring that the features of each explosion-protection technique are included in the  
539 maintenance schedule and tasks;
- 540 – ensuring the maintenance program considers any environmental conditions, such as  
541 corrosion, that could require an increased frequency in the maintenance of Ex Equipment;
- 542 – recording of all maintenance conducted and results as appropriate;
- 543 – working safely in a hazardous area including hazard monitoring, evacuation procedures and  
544 the use of permit to work system or safe isolation procedures; and
- 545 – interpretation of equipment documentation in relation to maintenance, repair and  
546 replacement.

### 547 **8.5.3 Examples of evidence of maintenance competence**

548 Maintenance personnel need to provide evidence of their maintenance competence to the  
549 extent necessary to perform their tasks.

550 Examples of evidence of maintenance competence include, but are not limited to:

- 551 – an understanding of those aspects of equipment which affect the Types of Protection and  
552 the related markings;
- 553 – an understanding of the content of Ex Equipment Certificates and Specific Conditions of  
554 Use;
- 555 – an understanding and ability to read and assess engineering drawings and identify  
556 differences to the condition as installed;
- 557 – understanding of the local regulatory requirements for installations;
- 558 – ability to confirm that the Ex Equipment is fit for purpose, correctly installed and suitable for  
559 the location in which it is installed, has not deteriorated or is damaged and has not had any  
560 unauthorised modifications;
- 561 – ability to identify Ex Equipment which has deteriorated or is damaged and is no longer in  
562 compliance with the Type(s) of Protection;
- 563 – detailed knowledge of the additional importance of permit to work systems and safe isolation  
564 in relation to explosion protection;
- 565 – detailed knowledge of the techniques to be employed in the selection and installation of  
566 equipment referred to in this document;
- 567 – ability to update or provide the information for the applicable maintenance record,  
568 verification dossier, facility drawings,
- 569 – knowledge of the maintenance requirements in the applicable standards or documents for  
570 both electrical and non-electrical requirements;
- 571 – knowledge of the overhaul and repair requirements in the applicable standards or  
572 documents for both electrical and non-electrical requirements;
- 573 – knowledge of quality assurance, including the principles of auditing, documentation,  
574 traceability of measurement and instrument calibration; and
- 575 – knowledge of the correct operation and use of the appropriate testing equipment for use in,  
576 or that may impact, the hazardous area;
- 577 – an understanding of the application and limitations of permit to work systems.

578 NOTE The knowledge requirements can vary in respect of:

579 – the relevant standards specific to legacy installations for example; classification / product / installation/  
580 inspection and maintenance.

581 – types of installations including low voltage, high voltage, Types of Protection, engines,

## 582 **8.6 Overhaul and repair activities within service facilities**

### 583 **8.6.1 General**

584 Users of Ex Equipment suitable for use in hazardous areas have a duty to ensure equipment  
585 remains in compliance with applicable regulations, which can include the need to ensure their  
586 equipment is overhauled, repaired and reclaimed and returned to serviceable condition by  
587 persons or organizations competent in the application of standards such as IEC 60079-19.

588 Overhaul and repair are typically conducted offsite or outside a hazardous area and therefore  
589 the requirements for individuals or organizations involved in those specific tasks need to be  
590 verified by the user.

591 Competence should apply to each Type of Protection and Ex Equipment type for which the  
592 person is involved. For example: it is possible for a person to be competent in the field of repair  
593 and overhaul of Ex “d” electric machines only and not be fully competent in repair of Ex “d”  
594 switchgear or Ex “e” electric machines.

595 The responsible person for overhaul and repair activities within the management organization,  
596 accepts responsibility and authority for ensuring that the overhauled/repaired equipment  
597 complies with the Ex Equipment Certificate or any change in status is agreed to by the user.  
598 The person so appointed should have a working knowledge of the appropriate explosion  
599 protection standards and an understanding of this document.

600 Repair operators work under the technical authority of the Responsible Person within the site  
601 management system.

### 602 **8.6.2 Examples of typical overhaul and repair tasks – Individual(s) responsible for** 603 **overhaul and repair**

604 Examples of typical overhaul and repair tasks include, but are not limited to:

605 – explaining to user the status of the Ex Equipment after overhaul and repair and obtain  
606 acceptance of the resulting status before any repair is undertaken;

607 – obtaining approval from the user on the scope of work involved in the repair or reclamation;

608 – confirming the Ex Equipment is in serviceable condition with sufficient verification of  
609 compliance and authorize application of the Ex repair label;

610 – maintaining records such as Ex job records, Type of Protection standards, technical  
611 specifications, schedule drawings, operation and maintenance manuals, spare parts list;

612 – verification of the competence of repair operators periodically; and

613 – participation in the Quality Management System review process.

### 614 **8.6.3 Examples of evidence of overhaul and repair competence – Responsible Person** 615 **for overhaul and repair**

616 Examples of overhaul and repair competence include, but are not limited to:

617 – demonstration of the evidence of competence as detailed in 8.6.5;

618 – demonstrating a working knowledge and understanding of the relevant standards in  
619 explosion protection field;

- 620 – demonstrating a practical understanding of explosion-protection principles and Types of  
621 Protection;
- 622 – demonstrating an understanding and ability to read and assess engineering drawings and  
623 identify differences to the as-built condition;
- 624 – demonstrating an understanding of the local regulatory requirements for overhaul and repair  
625 applicable for equipment and for the location in which it is installed; and
- 626 – demonstrating a knowledge of quality assurance, including principles of traceability of  
627 measurement and instrument calibration.

#### 628 **8.6.4 Examples of typical overhaul and repair tasks - Repair Operator**

629 Examples of typical overhaul and repair tasks include, but are not limited to:

- 630 – identification of the relevant standards from the nameplate or documentation for the  
631 equipment and conduct visual inspection and electrical and non-electrical required tests;
- 632 – communication to the responsible person the requirements to return equipment to  
633 serviceable condition in accordance with the relevant standards;
- 634 – assessment of equipment condition and that it has not had any unauthorised modifications,  
635 completion of approved repairs and provision of inspection and test records, including  
636 traceability of instruments used and pass-fail criteria, to the Responsible Person for  
637 overhaul and repair; and
- 638 – when authorized by the Responsible Person for overhaul and repair, application of the repair  
639 label.

#### 640 **8.6.5 Examples of evidence of competence - Repair Operator**

641 Examples of overhaul and repair competence include, but are not limited to:

- 642 – understanding of the applicable principles of explosion protection, Types of Protection, the  
643 content of Ex Equipment Certificates and any Specific Conditions for Use;
- 644 – understanding of nameplate data and marking to accurately identify the relevant standards  
645 to be used in assessing equipment condition and conducting overhauls, repairs, and  
646 reclamations;
- 647 – ability to evaluate equipment to identify any unauthorised modifications, the equipment  
648 condition and any deterioration or damage which may affect the compliance with the Type  
649 of Protection;
- 650 – knowledge of the overhaul and repair requirements in the relevant standards or documents  
651 such as IEC 60079-19; and
- 652 – ability to update or provide the information for the applicable repair record, job report and  
653 Quality Management Systems (QMS) records.

### 654 **8.7 Inspection**

#### 655 **8.7.1 General**

656 Inspection is the examination of an item or installation to determine the conformity to specific  
657 requirements.

#### 658 **8.7.2 Examples of typical inspection tasks**

659 Examples of typical inspection tasks include, but are not limited to:

- 660 – Performance of detailed, close, or visual inspection to confirm compliance with the  
661 applicable standards, manufacturers' instructions, and installation requirements and that  
662 there is no deterioration of the equipment that could affect the Type of Protection;
- 663 – conduct of testing as required according to Clause 8.10; and
- 664 – recording and retention of the results of all inspections including the extent, type and  
665 findings of an inspection and submit the report to management as required.

### 666 **8.7.3 Examples of evidence of inspection competence**

667 Examples inspection competence include, but are not limited to:

- 668 – ability to obtain the relevant information from the engineering drawings to conduct the  
669 inspection;
- 670 – an understanding of those aspects of equipment design which affect the protection concept  
671 and ability to identify Ex Equipment which has deteriorated and is no longer in compliance  
672 with the Type of Protection concept;
- 673 – an understanding of the content of Ex Equipment Certificates and relevant parts of the  
674 applicable standard(s) and to identify that any Specific Conditions of Use are met;
- 675 – understanding of the particular techniques to be employed in the selection and installation;
- 676 – ability to identify differences between the drawings and the condition as installed;
- 677 – an understanding of the local regulatory requirements for installations;
- 678 – knowledge of quality assurance, including the principles of auditing, documentation,  
679 traceability of measurement and instrument calibration;
- 680 – knowledge of the correct operation and use of the appropriate testing equipment for use in,  
681 or that can impact, the hazardous area;
- 682 – detailed knowledge of the application and limitations of permit to work systems and safe  
683 isolation in relation to explosion protection;
- 684 – ability to confirm the equipment is fit for purpose, correctly installed and suitable for the  
685 location in which it is installed, and there have not been any unauthorised modifications;
- 686 – understanding of the applicable principles of explosion protection, Types of Protection and  
687 marking;
- 688 – ability to accurately and clearly record any defect that has been found in such a manner as  
689 to ensure that the repairer can effectively plan and carry out an appropriate repair;
- 690 – knowledge of the inspection and installation requirements in the applicable standards or  
691 documents such as IEC 60079-14; and
- 692 – knowledge of the inspection requirements in the applicable standards or documents such  
693 as IEC 60079-17.

## 694 **8.8 Commissioning**

### 695 **8.8.1 General**

696 Commissioning involves activities undertaken to ensure the verification and functioning of  
697 equipment and facilities forming a system or group of sub-systems, by demonstrating and  
698 recording its conformance with design parameters, regulation and specified operational  
699 requirements, to show that the system is safe and operable.

700 Commissioning can require a combination of some or all the skills including that of inspection,  
701 testing, maintenance, and installation

702 These are some of the basic inspection and checks carried out to demonstrate that plant and  
703 equipment has been fabricated, constructed, and installed correctly as part of construction, pre-  
704 commissioning, and maintenance activities.

### 705 **8.8.2 Examples of typical commissioning tasks**

706 Examples of typical commissioning tasks include, but are not limited to:

- 707 – testing as required according to 8.10;
- 708 – installation and hook up of equipment;
- 709 – insulation resistance testing of cables and Ex Equipment;
- 710 – high voltage testing of cables where required;
- 711 – cold loop checks (cables continuity tests);
- 712 – performing equipment calibration;
- 713 – performing no-load tests on rotating equipment;
- 714 – energizing electrical switchgear;
- 715 – relay testing and functional testing of electrical interlocks;
- 716 – cause and effect logic testing;
- 717 – load testing;
- 718 – functional testing of instrument loops from field devices to the Human Machine Interfaces  
719 and energised functional checks;
- 720 – alignment of rotating equipment couplings;
- 721 – ensuring guards are correctly secured;
- 722 – ensuring lubrication levels are correct;
- 723 – ensuring no visible signs of leakage from pump or gearboxes seals; and
- 724 – recording and retaining the results of checks and inspections.

### 725 **8.8.3 Examples of evidence of commissioning competence**

726 Examples of commissioning competence include, but are not limited to:

- 727 – Commissioning personnel should demonstrate their competency relevant to the Types of  
728 Protection or Ex Equipment involved. ;
- 729 – understanding, application, and limitations of the permit to work systems; and
- 730 – demonstrating a level of commissioning competency which is related to the tasks being  
731 performed.

## 732 **8.9 Facility Operation**

### 733 **8.9.1 General**

734 Individuals are responsible for the safe the operation of an industrial facility with hazardous  
735 areas. This includes but is not limited to the coordination of multiple roles, tasks, work  
736 requirements, emergency procedures and management reporting.

### 737 **8.9.2 Examples of typical facility operation tasks**

738 Examples of typical facility operation tasks include, but are not limited to:

- 739 – operating and monitoring control of equipment, processes, and areas of industrial facilities  
740 to maintain parameters within prescribed limits during normal and abnormal conditions;
- 741 – initiation of appropriate action when parameters vary outside normal operating limits;
- 742 – managing approval of work, permit to work system or other control procedures of work  
743 conducted by others in the facility;
- 744 – monitoring and approval of entry of personnel;
- 745 – oversight of the movement, transport, storage of equipment and materials within the facility;
- 746 – initiation, coordination, and execution of emergency response procedures;
- 747 – status reporting to facility managers; and
- 748 – review and approval of management of change requests on behalf of the operations  
749 department.

### 750 **8.9.3 Examples of evidence of facility operation competence**

751 Examples of facility operation competence include, but are not limited to:

- 752 – facility operation staff need to demonstrate their abilities which relate to their role and the  
753 exact nature of the facility:
- 754 – use of information sources to identify the hazardous area classification for a part of a facility  
755 and identify the potentially flammable materials that may be present;
- 756 – demonstrating the knowledge of the principles of hazardous area classification to identify  
757 what changes could impact the facility (example of changes: addition of enclosures, change  
758 of use of pipes, change of pump seal types, increased sample frequency, failure of  
759 ventilation, lack of cleanliness, leaking joints);
- 760 – showing sufficient understanding of the applicable hazardous area equipment marking to be  
761 able to establish in which areas equipment may be used, such as gas/dust group and  
762 temperature class confirm whether the equipment can be used in specific locations of a  
763 facility;
- 764 – identifying the suitability of personal, portable or transportable equipment to be used in  
765 various areas of a facility;
- 766 – ascertaining if Ex Equipment is suitable for continued operation (for example understand  
767 and report alarm status, integrity of enclosures, management of leaks, spills,);
- 768 – understanding the actions to take where equipment and process parameter restrictions are  
769 exceeded;
- 770 – understanding emergency response procedures and how to perform required actions;
- 771 – managing / monitoring work at the site to avoid ignitions of a potentially explosive  
772 atmosphere. This includes the ability to:
  - 773 a) assigning competent personnel appropriate to tasks;
  - 774 b) identifying actions at the site that could cause releases of potentially flammable /  
775 explosive materials / atmosphere and specify appropriate controls; This may include,  
776 but is not limited to:
  - 777 c) identifying actions and events that may cause ignition and specify appropriate controls;

- 778 d) understanding the principal sources of ignition (these are identified in documents such  
779 as ISO 80079-36) along with the knowledge and experience to understand how these  
780 may occur in practice at the place of work;

781 NOTE Additional guidance can be found in other documents such as EN 1127-1

- 782 e) originating, verifying, checking, monitoring or controlling measures whether  
783 implemented by self or others;
- 784 f) checking selection and use of tools and equipment for the task being performed;
- 785 g) identifying means by which electrostatic charges may be generated and controlled in  
786 practice at the place of work (for example, clothing, PPE, splash filling, use of plastics,  
787 appropriate hoses, earthing of moveable pumps, pump trucks and persons identified in  
788 documents such as IEC TS 60079-32-1 and other relevant documents);
- 789 h) managing / undertaking portable gas testing, if appropriate, including an appreciation of  
790 the limitations of this technique;
- 791 i) identifying unacceptable levels of cleanliness in a dust environment, as appropriate; and
- 792 j) confirming that the qualifications of the personnel working in a facility are appropriate  
793 for the assigned tasks.

## 794 **8.10 Testing of installed Ex Equipment**

### 795 **8.10.1 General**

796 Where there is a requirement for lifecycle integrity testing there should be an understanding of  
797 the limitations that exist and the hazards that can be created by the execution of the tests. This  
798 is in addition to understanding the Ex Equipment being inspected, requirements for facilities  
799 with hazardous areas in relation to permit to work and clearances, hazard monitoring and  
800 evacuation procedures, and plant and electrical isolation.

### 801 **8.10.2 Examples of typical testing of installed Ex Equipment tasks**

802 Examples of typical testing of installed Ex Equipment include, but are not limited to:

- 803 – planning for and conducting testing in a hazardous area;
- 804 – identifying the Occupational Health and Safety (OH&S) procedures to be followed;
- 805 – determining if the area is safe for the tests to be carried out;
- 806 – defining the characteristics, suitability and limitations of the testing equipment being used;
- 807 – defining or identify the appropriate pass-fail criteria for each test procedure;
- 808 – documentation of results of the installation tests in a verification dossier; and
- 809 – developing procedures and options for dealing with test results that show non-conformance.

### 810 **8.10.3 Example of evidence of typical testing of installed equipment competence**

811 Examples of testing of installed equipment include, but are not limited to:

- 812 – understanding the aspects of commissioning, maintenance, and inspection; and
- 813 – ability to conduct testing, interpret, record results and report accordingly where corrective  
814 action is required for item such as cables, piping (corrosion), ventilation system testing,  
815 verification of the direction of rotation of machines.

## 816 **8.11 Responsibility for specific Ex compliance functions**

### 817 **8.11.1 General**

818 Organizations may appoint a specific person(s) as responsible for ensuring installations comply  
819 with Ex requirements and regulations. Compliance functions can include management,  
820 implementation, audit, and analysis.

821 NOTE 1 for example, IEC 60079-14 and IEC 60079-17 have historically used the terms "Responsible Person",  
822 "Operative" and "Technical Person with Executive Function" to describe specific tasks which can be addressed by  
823 the roles defined in this document.

824 NOTE 2 Certain tasks require different levels of knowledge, skills, and competencies to enable them to meet the  
825 requirements of the relevant standards and legal requirements required in the country of operation.

### 826 **8.11.2 Examples of typical compliance functions**

827 Examples of compliance functions include, but are not limited to:

- 828 – identification of the applicable legal requirements for safe operation of the facility;
- 829 – ensure an effective Safety Management System (SMS) is in place for the control of ignition  
830 sources;
- 831 – establishing an overview of the tasks necessary for Ex compliance;
- 832 – identification of and maintain the content requirements of the verification dossier where  
833 required;
- 834 – development, maintenance, and monitoring of an inspection methodology and strategy  
835 appropriate for the facility; and
- 836 – monitoring of inspection reports, initiating and prioritizing any remedial actions.

### 837 **8.11.3 Examples of evidence of compliance function competence**

838 Examples of compliance function competence include, but are not limited to:

- 839 – demonstration of knowledge of the applicable legal requirements for the jurisdiction  
840 involved;
- 841 – demonstration of a practical understanding of the requirements for Ex areas, explosion  
842 protection principles and installation, maintenance, and repair requirements;
- 843 – demonstration of knowledge of risk evaluation and mitigation methodology;
- 844 – knowledge of the roles, responsibilities of all other (applicable to an Ex facility) tasks;
- 845 – demonstration of a general understanding of engineering and ability to read and assess  
846 engineering drawings; and
- 847 – demonstration of an ability to communicate effectively with plant and engineering  
848 management regarding equipment in hazardous areas issues.

## 849 **8.12 Management (accountable administration)**

### 850 **8.12.1 General**

851 The term management is here used to define the person(s) or organization given accountability  
852 and responsibility on behalf of the owners to ensure that a facility is designed, built,  
853 commissioned, safely operated and fulfils all legal requirements.

854 Technical knowledge of the hazardous area operations in a facility is not a prerequisite  
855 requirement for management (accountable administration), however this does require they