CHAPTER 15

HAZARDOUS AREA AND EXPLOSIVE AREA ELECTRICAL INSTALLATIONS

BACKGROUND

15.1 This chapter references the relevant regulations and prescribes minimum requirements for the classification, design, selection, installation, inspection, testing and commissioning of Defence electrical installations in Hazardous Areas and Explosive Ordnance Areas.

15.2 These electrical installations shall also comply with the relevant general requirements described in other chapters of this document.

OBJECTIVES

15.3 The objectives of this chapter are to:

a. Reference the relevant Regulations containing the compliance requirements for Hazardous Areas and Explosive Ordnance Areas electrical installations, and

b. Prescribe other Defence specific requirements.

HAZARDOUS AREAS FOR FLAMMABLE GAS / VAPOUR OR COMBUSTIBLE DUSTS

15.4 The Hazardous Areas recognised by AS/NZS 3000:2007 are:

a. Hazardous Areas (gas or vapour) in which an explosive gas atmosphere is present or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment; and

b. Hazardous Area (dust) in which combustible dust in the form of a cloud is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment.

15.5 The Australian Standards divide the above Hazardous Areas into Hazardous Area Zones 0, 1, 2, 20, 21 and 22.

15.6 Hazardous Area classification is based on flammable gases or vapours or combustible dusts forming an explosive mixture. This occurs when a sufficient quantity is mixed with air in the correct proportions. This mixture can be ignited and may explode.

Hazardous Areas from Combustible Liquids

15.7 Combustible liquids such as diesel are likely to produce hazardous areas under the following conditions:

a. When dissolved flammable liquid vapour or gas may accumulate in the tank head space (refer to supplier Material Safety Data Sheets). AS/NZS 60079.10.1 covers this aspect.
b. When mist or spray is formed. AS/NZS 60079.10.1 does not cover this matter in sufficient detail. Reference shall be made to EI Part 15 of the Model Code of Safe Practice (4th Edition).

c. When the surface temperature of diesel is equal to or above the flash point minus 6°C. AS/NZS 60079.10.1 covers this aspect, clause ZA 5.1 refers.

15.8 Electrical Installations in Hazardous Areas shall comply with AS/NZS 3000, its referenced standards and this policy for the classification, design, selection, installation, inspection, testing and commissioning.

EXPLOSIVE ORDNANCE AREAS

15.9 Explosive Ordnance Areas or Explosives Areas are areas used for the handling, processing and storing of explosive ordnance.

15.10 Explosives already contain an oxidant to form an explosive mixture which can be ignited and explode in any quantity. They are explosive without air.

15.11 Explosives Hazardous Areas are areas in which explosives substance(s) may be exposed.

15.12 Restricted Electrical Areas are Explosive Ordnance Areas where the explosives substances are not exposed.

15.13 Explosives Hazardous Areas and Restricted Electrical Areas are classified in accordance with eDEOP 101. The Hazardous Area classification standards (AS/NZS 60079.10.1 and AS/NZS 60079.10.2) cannot be used to classify Explosives Hazardous Areas and Restricted Electrical Areas.

15.14 All Defence Explosive Ordnance facilities require licensing by the Explosive Ordnance licensing authority prior to use.

15.15 Electrical Installations in Explosive Ordnance Areas shall comply with eDEOP 101 and this policy for the classification, design, selection, installation, inspection, testing and commissioning.

LEGISLATION, REGULATIONS AND STANDARDS

15.16 The Legislation, Regulations and Standards which apply to Hazardous Areas and Explosive Ordnance Areas are shown below.

Commonwealth, State and Territory Legislation

15.17 The Work Health Safety Acts, the Defence Act, the Public Service Act and the various State and Territory Electricity Safety Acts reference either directly or indirectly, the instructions and regulations with which installations in Hazardous Areas and Explosive Ordnance Areas must comply.

Commonwealth, State and Territory Regulations

15.18 Regulations referenced by the State and Territory legislation prescribe compliance with AS/NZS 3000.

15.19 The Model Work Health and Safety Regulations are referenced by the Work Health and Safety legislation and have requirements to manage risks to health and safety associated with a hazardous atmosphere at the workplace.
Defence Instructions

15.20 Defence Instructions (General) - LOG 4-1-006 - Safety of Explosive Ordnance is issued under the Defence Act 1903 and the Public Service Act 1999. This instruction provides Defence policy on all aspects of Explosive Ordnance safety. It applies to personnel in Defence including Australian Public Service employees, Defence contractors and companies undertaking outsourced Defence Explosive Ordnance functions. These instructions reference the Defence Explosives Ordnance Publications (DEOP) which contain the Explosive Ordnance regulations.

Defence Regulations

15.21 The relevant Explosive Ordnance regulations for the requirements of this chapter are contained in eDEOP 101.

15.22 Defence Explosive Ordnance Regulations contained in the Defence Explosives Ordnance Publication eDEOP 101 prescribe the requirements for installations in Explosive Ordnance Areas.

Standards

15.23 AS/NZS 3000 and referenced standards apply for the design, construction and verification of electrical installations.

15.24 AS/NZS 3000 and referenced standards prescribe minimum requirements for installations in Hazardous Areas.

15.25 AS/NZS 4761 describes the competencies associated with electrical installations in hazardous areas.

15.26 AS/NZS 60079.14 prescribes the design, selection and installation of Hazardous Area electrical installations.

15.27 AS/NZS 60079.17 prescribes the inspection and maintenance of Hazardous Areas electrical installations.

15.28 AS/NZS 60079.10.1 describes the process of classifying the hazardous area zones associated with flammable gas or vapour atmospheres.

15.29 AS/NZS 60079.10.2 describes the process of classifying the hazardous area zones associated with combustible dust atmospheres.

15.30 AS/NZS 60079.20.1 provides the gas classification and temperature classification for flammable gas or vapour atmospheres.

COMPETENCIES

15.31 The requirements to be competent for the design, selection, installation, testing, inspection, commissioning and maintenance for Hazardous Areas are described in AS/NZS 3000, AS/NZS 60079.14 and AS/NZS 60079.17.

15.32 Classifiers, designers, selectors, installers, testers, inspectors, commissioners and maintainers of Hazardous Areas shall demonstrate competency in accordance with AS/NZS 4761.

15.33 The competency requirements for the classification, design, selection, installation, testing, inspection, commissioning and maintenance for Explosives Areas are described in eDEOP 101 Regulation 6.3 Procedure 1.
ELECTRICAL DESIGN AND INSTALLATION

General

15.34 Refer to Chapter 10 - General Technical Requirements for general electrical installation requirements and Chapter 7 - Design Requirements for general design requirements.

15.35 The design of the electrical installation shall include the classification and shall detail the requirements for the selection, installation, inspection, testing and commissioning.

Classification

15.36 Classifications must be objective, accurate, defensible and carried out by appropriately qualified and experienced personnel. Classifications which are erroneous or incomplete will be rejected. Classifications based on reverse engineering to meet a perceived required outcome will be rejected.

15.37 Classification of hazardous areas for Defence Installations must be based on the examples of common industry situations shown in AS/NZS 60079.10.1:2009 Annex ZA where the examples are relevant. Where there are no relevant examples in this standard, classification shall be by the fundamental principles contained in AS/NZS 60079.10.1:2009 or by relevant example(s) from alternative standards. The applicability of the example(s) shown in the alternative standard(s) must be clearly demonstrated. The classification(s) provided by the alternative standards shall provide a level of safety no less than the fundamental principles contained in AS/NZS 60079.10.1:2009.

15.38 The design documentation and reporting shall include a classification report and drawings which comprehensively document the classifications and their justifications. The classification shall address the specific use and operation of the facility.

15.39 The requirements for the classification of Hazardous Areas are prescribed in the Australian Standards. The responsibility for the classification will rest with different sections in Defence for different installations. It is necessary for the instigator of the work to identify the appropriate delegate in control of the operational facility to accept the classification on behalf of Defence. A record of this acceptance must be obtained prior to commencement of construction of the electrical installation.

15.40 The requirements for the classification of Explosives Areas are prescribed in eDEOP 101. The responsibility for the classification rests with different sections in Defence in different installations. It is necessary for the instigator of the work to identify the appropriate delegate in control of the completed facility to accept the classification on behalf of Defence. A record of this acceptance must be obtained prior to commencement of construction of the electrical installation.

Application of the Classification and Execution of the Works

15.41 The design documentation shall be detailed and relevant to the particular installation. Information that is not applicable to the particular installation shall not be included.

15.42 Refer to Chapter 4 - Documentation Standards for general documentation requirements.

15.43 In addition to any requirements contained in Chapter 4, the following content shall be included in the documentation provided through the course of the project:

   a. The Dossier
b. Detailed design for all new or altered installations regardless of delivery method prior to construction

c. Inclusion of any hazard analysis report as applicable.

15.44 The design documentation shall not rely on performance requirement statements quoting Defence Standards. The documentation shall be self contained and interpret the requirements and application of the Defence Standards for the selectors, installers, inspectors, testers and commissioners.

15.45 The selectors, installers, inspectors, testers and commissioners shall execute the works in accordance with the design documentation requirements.

Dossiers

15.46 Verification dossiers are required for all Hazardous Areas and Explosives Hazardous Areas installations.

15.47 Restricted Electrical Area Dossiers are required for all Restricted Electrical Area installations.

15.48 All new installations shall be provided with a new dossier and all alterations to an existing installation shall be provided with information in a form suitable to amend the relevant dossier in its various forms (digital/printed).

15.49 The completed dossiers shall comply with the relevant requirements of AS/NZS 3000, its referenced standards (AS/NZS 60079.14 and AS/NZS 60079.17), eDEOP 101 and this chapter.

15.50 The dossier shall include in addition to the content required by the Standards and Regulations:

a. Dispensations

b. As-built drawings for the electrical installations, and

c. Ex certificates of conformity (where applicable), and

d. Inspection and test records including time, date, personnel involved, list of test equipment used, calibration record, measurement method, conditions at time of measurement, results and acceptance criteria. Inspections must verify that the installation is consistent with the design and documentation provided in the dossier.

e. Operating/maintenance instructions and records for the operation, maintenance, repair and overhaul of the electrical installations.

f. Competency records, and

g. Lightning protection installation and maintenance records, and

h. Static control measures and maintenance records, and

i. Certificates of electrical safety, and

j. Design and construction certification
ELECTRICAL EQUIPMENT

IECEx or ANZEx Certified Electrical Equipment

15.51 The only permitted electrical equipment in Defence Hazardous Areas and Explosives Hazardous Areas shall be IECEx or ANZEx certified. These are ISO/IEC Type 5 Certification schemes which provide assurance that the product supplied will comply fully with all the requirements of the relevant standards.

AUS Ex Certified Electrical Equipment – NOT ACCEPTABLE

15.52 AUS Ex certified electrical equipment is not acceptable to Defence for use in Defence Hazardous Areas and Explosives Hazardous Areas. This is an ISO/IEC Type 1 Certification scheme which does not provide assurance that the product supplied will comply fully with all the requirements of the relevant standards.

ATEX Approved Electrical Equipment – NOT PERMITTED

15.53 ATEX approved electrical equipment is not permitted in Defence Hazardous Areas and Explosives Hazardous Areas. ATEX is an approval scheme and not an ISO/IEC type Certification scheme and is not one of the acceptable certification standards permitted in AS/NZS 60079.14.

Electrical Equipment without Acceptable Certification – NOT PERMITTED

15.54 Electrical equipment without acceptable certification according to IEC Standards or AS/NZS Standards is not permitted in Defence Hazardous Areas and Explosives Hazardous Areas.

Equipment Protection Levels

15.55 AS/NZS 60079.14 identifies the relationship between Equipment Protection Levels (EPLs) and Zones. The EPLs shown in Table 1 of AS/NZS 60079.14 shall be assigned for Defence installations as the minimum level of safety.

15.56 The risk assessment approach for the selection of EPLs is not to be used to reduce the level of safety for Defence installations. It may be used to increase the level of safety where considered appropriate.

Conformity Assessment Documents

15.57 Conformity Assessment Documents (CAD) for electrical equipment certified to other certification or approval schemes are not acceptable as the basis of acceptance of electrical equipment for use in Defence Hazardous Areas and Explosives Hazardous Areas. There are currently no other ISO/IEC Type 5 Certification schemes for electrical equipment in hazardous areas.

DISPENSATIONS

15.58 Dispensation applications shall be submitted during design of the electrical installation and prior to construction of the electrical installation.

15.59 Departures from the prescriptive requirements of the eDEOP 101 Regulations for electrical installations in Explosives Areas will be considered only upon formal application. These will be considered and may be approved by the Directorate of Ordnance Safety in exceptional circumstances. The dispensation process for this is described in the eDEOP 101.

15.60 Departures from this policy for electrical installations in Hazardous Areas will be considered only upon formal application. These will be considered and may be approved by
ASEE DSRG-ID in exceptional circumstances. A sample dispensation request is included within the MIEE.

15.61 Departures from the State and Territory Regulations cannot be approved by Defence. Any departures shall be approved by the relevant State or Territory Regulator prior to consideration of acceptance by Defence.

SUBMISSIONS

Certificates of Electrical Safety

15.62 The customer’s copy of the Certificate of Electrical Safety (required by the Statutory Electrical Safety Regulator) shall be provided to Defence.
VALIDATION

15.63 The following aspects shall be validated at the appropriate times during the project where works involve electrical installations in Hazardous Areas and Explosives Hazardous Areas:

a. The required competencies are met; and
b. The design meets the functional requirements; and
c. The installation is consistent with the design; and
d. The Dossier meets the minimum requirements of the Standards, Regulations and this chapter; and
e. The as-built documentation accurately reflects the installation.

VERIFICATION, CERTIFICATION AND AUDITS

15.64 Verification, certification, auditing shall be completed and practical completion achieved before any flammable liquids, flammable gases, combustible dusts, explosive ordnance or any other substances are introduced such as to create Hazardous Areas or Explosive Ordnance Areas.

Verification

15.65 Refer to the Standards and Regulations for specific verification requirements related to Hazardous Areas and Explosive Ordnance Areas.

Certification

15.66 Refer to Chapter 6 - Certification and Verification for general certification requirements.

15.67 Refer to the Regulations, Legislation, Regulations and Standards section.