NSW Resources
Resources Regulator

Mining Competencies

Cable Repair Signatory – Licensed activities at coal mines

Competencies

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Amendment schedule		
Date	Version	Amendment
3 Nov 2022	0	Initial draft
15 Jan 2023	0	Review by Manager Competencies & Authorisations
16 Jan 2023	1	Initial publication
24 July 2025	2	Updates to Essential/Desirable examination criteria for “repair reeling, trailing and flexible cables (Cl 2.17)” and “test reeling, trailing and flexible cables and their attachments (Cl 2.18)” following examination panel review at 2025 Annual Review Meeting

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1. Introduction

1.1. Purpose

This document sets out the competencies to be assessed in the process of applying for and being examined to determine whether the applicant will be granted a certificate of competence.

1.2. Competency overview

The Cable Repair Signatory Certificate of Competence Guide provides an overview of the certificate of competence.

Predefined competency requirements for cable repairers are documented within units of competence and community standards. These competency requirements have been specifically considered in the development of this document:

Source documents	Section
Units of competence	2
Competency standard (AS/NZS 4761.1)	3
Technical standard (AS/NZS 1747)	4

The Cable Repair Signatory Certificate of Competence is made up of a combination of performance and knowledge requirements. Performance evidence is made up of both on the job training and experience, which assessed via review of portfolio records. Knowledge requirements are made up of both technical skills and associated non-technical skills (ANTS), which are assessed via oral examination. These requirements are assessed via the following:

Evidence type	Assessment	Further guidance
Performance evidence	Portfolio records	Section 1.3
Knowledge evidence	Oral examination	Section 1.4

1.3. Performance evidence

All performance evidence shall be gathered from relevant work activities and situations—

(a) Through direct observation in an actual work environment;

(b) Through a log/portfolio of work experience relevant to the specified performance for the unit and verified weekly, by a person qualified to supervise the work and validated by an assessor; or

(c) A combination of the above.

All evidence of practical experience for the statutory competency for Cable Repair Signatory is obtained via a Candidate Portfolio.

The evidence of practical experience is supplied with the exam application and requires sign off by a competent person who holds qualifications as a Cert IV Trainer Assessor and statutory competency as a Cable Repair Signatory or Class A/B competent person with a minimum of 2 years' experience managing a cable repair facility.

The candidate must have a minimum of 2 years practical experience repairing cables in accordance with AS/NZS 1747 – see details in Section 4.1 of the Cable Repair Signatory Guide.

Details of the essential elements for repairing reeling, trailing and flexible cables are specified in the Cable Repair Signatory Modules.

1.4. Knowledge evidence

All knowledge evidence shall be gathered from relevant work activities and situations—

(a) Knowledge tests (written or oral), skill tests and technical interviews sampling all aspects of specified knowledge that cover the types of knowledge, factual, technical, procedural and theoretical, appropriate to AQF level 2 or NZQF level 3;
(b) Aspects of performance evidence where the application of basic factual, technical and procedural knowledge at AQF level 2 or NZQF level 3 is evident.
(c) A combination of the above.

Knowledge evidence for the statutory competency for Cable Repair Signatory is obtained via oral examination only. The examination panel is made up of a convenor and two (2) competent Cable Repair Signatories or equivalent.

2. Units of competence

There were units of competence for repairing reeling, trailing and flexible cables that were based within the UEE11 Electrotechnology Training Package, as part of the Australian Qualifications Framework (AQF). These competency modules were deleted from the Electrotechnology Training Package in October 2020 and have not been transferred to another training package. The Resources Regulator is continuing to utilise the last version of these units in the assessment process.

2.1. UEENEEM070A – Repair reeling, trailing and flexible cables

- This competency unit covers sheathing, insulation and conductor repair of reeling, trailing and flexible cables. It requires the ability to work safely and to Standards, follow repair instructions, apply repair techniques and document the repair work.
- This unit is directly equivalent to Unit 2.23 Repair reeling, trailing and flexible cables in the Australian/New Zealand Standard AS/NZS 4761.1:2008 Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards. Equivalence includes endorsement in the explosion-protection techniques listed in the range statement of this unit.
- Unit 2.23 from AS/NZS 4761.1:2008 has been superseded by Unit 2.17 from AS/NZS 4761.1:2018.

2.2. UEENEEM071A – Test reeling, trailing and flexible cables

- This competency unit covers the pre and post repair testing of reeling, trailing and flexible cables. It requires the ability to work safely and to Standards, evaluate the condition of cables, conduct cable tests, write repair specifications, and document test results and cable repair history.

- This unit is directly equivalent to the Unit 2.24 Test reeling, trailing and flexible cables in the Australian/New Zealand Standard AS/NZS 4761.1:2008 Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards. Equivalence includes endorsement in the explosion-protection techniques listed in the range statement of this unit.
- Unit 2.24 from AS/NZS 4761.1:2008 has been superseded by Unit 2.18 from AS/NZS 4761.1:2018.

2.3. UEENEEM072A – Inspect and fit plugs/couplers for reeling, trailing and flexible cables

- This competency unit covers the inspection, component replacement and fitting of plugs/couplers on reeling, trailing and flexible cables. It requires the ability to work safely and to Standards, to evaluate the condition of the plugs/couplers, to identify correct core and pin configurations, to apply repair techniques and to document repair/replacement work.
- This unit is directly equivalent to the Unit 2.25 Inspect and fit plugs/couplers for reeling, trailing and flexible cables in the Australian/New Zealand Standard AS/NZS 4761.1:2008 Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards. Equivalence includes endorsement in the explosion-protection techniques listed in the range statement of this unit.
- Unit 2.25 from AS/NZS 4761.1:2008 has been superseded by Unit 2.19 from AS/NZS 4761.1:2018.

2.4. UEENEEM073A – Verify compliance of repaired reeling, trailing and flexible cables

- This competency unit covers compliance verification of repaired and tested reeling, trailing and flexible cables and their plugs/couplers assemblies by a responsible person. It requires the ability to work safely and to standards, evaluate repairs against required standard and to maintain required repair records.
- This unit is directly equivalent to the Unit 2.26 Verify compliance of repaired reeling, trailing and flexible cables in the Australian/New Zealand Standard AS/NZS 4761.1:2008 Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards. Equivalence includes endorsement in the explosion-protection techniques listed in the range statement of this unit.
- Unit 2.26 from AS/NZS 4761.1:2008 has been superseded by Unit 2.20 from AS/NZS 4761.1:2018.

3. Competency standard

3.1. AS/NZS 4761.1:2018 overview

AS/NZS 4761.1:2018 defines the competencies for working with electrical equipment for hazardous areas (EEHA). This standard includes specific references that directly relate to repairing reeling, trailing and flexible cables for the following clauses:

- 2.17 – Repair reeling, trailing and flexible cables used in coal mining
- 2.18 – Test reeling, trailing and flexible cables and their attachments for use in coal mining

- 2.19 – Inspect, maintain and fit plugs/couplers for reeling, trailing and flexible cables for use in coal mining
- 2.20 – Verify compliance of repaired reeling, trailing and flexible cables and attachments for use in coal mining
- 2.21 – Supply certified explosion-protected equipment for explosive atmospheres

The specific requirements of each of these clauses are explained and applied below.

3.2. Repair reeling, trailing and flexible cables (Cl 2.17)

Details of the task evidence for the repair of electric reeling and trailing cables are specified in Module 1 of the Cable Repair Signatory Modules.

3.2.1. Scope

- This unit specifies the requirements for repairing the sheathing, insulation and conductors of reeling, trailing and flexible cables and performance criteria by which competency is assessed.
- A person competent in this unit will be able to do the following:
    a) Work safely and to standards.
    b) Follow repair instructions.
    c) Apply repair techniques.
    d) Document the repair work.

3.2.2. Elements and performance criteria

- 017.1 – Prepare to repair cable:
    a) 017.1.1 – Safe work methods to repair cables are obtained from workshops, standards and original manufacturer's instructions and understood.
    b) 017.1.2 – Knowledge of mining cable types, features, component functions, typical applications and how they are stored is applied to preparing for the work.
    c) 017.1.3 – Cable to be repaired and instructions on the extent of repairs are received and confirmed with supervising personnel.
    d) 017.1.4 – Materials required for the repair are obtained and checked against received instructions.
    e) 017.1.5 – Tools and equipment needed to carry out the cable repair work are obtained and checked for correct operation and safety.
- 017.2 – Carry out cable repair:
    a) 017.2.1 – Safe work methods to carry out cable repair work are accepted and followed.
    b) 017.2.2 – Knowledge of cable repair methods and procedures are applied and instructions for the extent of repair are followed.
    c) 017.2.3 – Damaged cable material is removed and cables prepared for joining.
    d) 017.2.4 – An acceptable method is applied to splicing and joining armouring, screens and conductive materials.

e) 017.2.5 – Insulation, insulation screening and covering is replaced on all cores and outer sheaths correctly using materials specified in the work instructions.

f) 017.2.6 – The correct method is used to join pliable cable armour.

g) 017.2.7 – Cable sheath is repaired using the correct sheath tape and vulcanized at the required temperature and timed to ensure as new electrical and mechanical properties are retained.

h) 017.2.8 – Cable repair is done in a manner that does not reduce the operating parameters for the cable type.

i) 017.2.9 – Safe work methods for 'house-keeping' at the completion of cables repair work are followed.

- 017.3 – Document cable repair work:

a) 017.3.1 – Cable repair work completion sheets are filled out in accordance with quality assurance procedures.

b) 017.3.2 – Responsible supervisor is notified of the completion of the work in accordance with quality assurance procedures.

3.2.3. Performance evidence

- Evidence shall be gathered for all performance aspects for repairing reeling, trailing and flexible cables for use in mining including:

a) 2.17.6.1.1 – Prepares to repair cables

b) 2.17.6.1.2 – Repairs cables

c) 2.17.6.1.3 – Documents cable repair

3.2.4. Knowledge evidence

- Evidence shall be gathered for all knowledge aspects for repairing, reeling, trailing and flexible cables for use in mining including:

a) 2.17.6.2.1 – Cable types

b) 2.17.6.2.2 – Cable repair preparation and conductor splicing methods

c) 2.17.6.2.3 – Replacement of cable insulation

d) 2.17.6.2.4 – Techniques for joining pliable wire armour

e) 2.17.6.2.5 – Replacing and repairing cable sheath

3.2.5. Oral examination criteria

Every oral examination shall include criteria regarding the repair of reeling and trailing cables. Every examination shall include a minimum of any two (2) of the "Essential" knowledge aspects or any of the "Desirable" aspects from:

- Cable types (see Cl 2.17.6.2.1):

a) Cable construction, materials and features of cable components (ESSENTIAL)

b) Function of each cable component (ESSENTIAL)

c) Conditions under which cables should be stored (DESIRABLE)

d) Standards to which cables are manufactured (ESSENTIAL)

e) Typical applications of specific cables (DESIRABLE)

- Cable repair preparation and conductor splicing methods (see Cl 2.17.6.2.2):
    a) Criteria for determining the section of cable suitable to be joined (ESSENTIAL)
    b) Cable preparation and methods (ESSENTIAL)
    c) Splicing methods and application for power, pilot and earthing conductors (ESSENTIAL)
- Replacement of cable insulation (see Cl 2.17.6.2.3):
    a) Preparation of power conductors prior to the application of insulation (ESSENTIAL)
    b) Types of insulation repair tapes and their application (ESSENTIAL)
    c) Techniques for applying insulation repair tape (ESSENTIAL)
- Techniques for joining pliable wire armour (see Cl 2.17.6.2.4):
    a) Cable manufacturers recommendation (DESIRABLE)
    b) Established workshop procedures (DESIRABLE)
- Replacing and repairing cable sheath (see Cl 2.17.6.2.5):
    a) Techniques used in replacing cable sheath (ESSENTIAL)
    b) Setting up a vulcanizer to vulcanize a repair (ESSENTIAL)
    c) Vulcanizing techniques and issues (ESSENTIAL)

3.3. Test reeling, trailing and flexible cables and their attachments (Cl 2.18)

Details of the essential elements for the testing and fault location in reeling and trailing cables are specified in Module 2 of the Cable Repair Signatory Modules.

3.3.1. Scope

- This unit specifies the requirements for the pre and post-repair testing of reeling, trailing and flexible cables and their attachments, as used in coal mining, and performance criteria by which competency is to be assessed.
- A person competent in this unit will be able to do the following:
    a) Work safely and to standards.
    b) Evaluate the condition of cables.
    c) Conduct cable tests.
    d) Find faults.
    e) Write repair specifications.
    f) Document test results and cable repair history.

3.3.2. Elements and performance criteria

- 018.1 – Prepare to test cables:
    - 018.1.1 – Safe work methods to test damaged and repaired cables are obtained and understood.
    - 018.1.2 – Cable to be tested before and after repair is confirmed with supervising personnel.
    - 018.1.3 – Cable repair history and test records are reviewed to identify potential issues and ascertain the viability of repair.
    - 018.1.4 – Tools, equipment and testing devices needed to carry out the tests are obtained and checked for correct operation, safety and currency of calibration certification.
- 018.2 – Determine the extent of cable repairs by fault finding, testing and inspection:
    - 018.2.1 – Safe work methods to carry out cable inspecting and testing are accepted and followed.
    - 018.2.2 – Knowledge of basic electrical quantities, circuits and cable design parameters and how they are tested and measured is applied to cable testing.
    - 018.2.3 – Cable testing devices are handled carefully and set up correctly prior to each test.
    - 018.2.4 – Cables are inspected and tested to ascertain the viability of repairs or extent of repairs required.
    - 018.2.5 – Viability and extent of the cable repair is determined from inspection, test results and cable repair history records.
    - 018.2.6 – Decision on the viability of repair and instructions for the repair of the cable are documented and forwarded to the responsible personnel.
- 018.3 – Test repaired cable:
    - 018.3.1 – Safe work methods to carry out cable testing are accepted and followed.
    - 018.3.2 – Cable testing devices are handled carefully and set up correctly prior to each test.
    - 018.3.3 – Each test reading is taken accurately, interpreted and recorded.
    - 018.3.4 – Actions to rectify any non-complying parameters shown by test results are documented and forwarded to the responsible personnel.
    - 018.3.5 – Safe work methods for the care and storage of test equipment at the completion of testing are followed.
- 018.4 – Document test results, fault finding and cable repair:
    - 018.4.1 – Cable history test records are updated in accordance with quality assurance procedures.
    - 018.4.2 – Responsible supervisor is notified of the completion of the work in accordance with quality assurance procedures.

3.3.3. Performance evidence

- Evidence shall be gathered for all the following performance aspects of testing reeling, trailing and flexible cables for use in mining include:
    - 2.18.6.1.1 – Prepares to test damaged cable
    - 2.18.6.1.2 – Determines the extent of cable repairs
    - 2.18.6.1.3 – Tests repaired cable
    - 2.18.6.1.4 – Updates cable repair history record and notifies the responsible supervisor on the completion of the work

3.3.4. Knowledge evidence

- Evidence shall be gathered for all of the following knowledge aspects for testing reeling, trailing and flexible cables used in mining including:
    - 2.18.6.2.1 – Nature of electricity and electrical circuits
    - 2.18.6.2.2 – Electrical properties of material
    - 2.18.6.2.3 – Electrical parameters of cables and electrical measurement
    - 2.18.6.2.4 – Testing electrical parameters of cables and cable assemblies

3.3.5. Oral examination criteria

Every oral examination shall include criteria regarding the testing of reeling and trailing cables. Every examination shall include a minimum of any two (2) of the “Essential” knowledge aspects or any of the “Desirable” aspects from:

- Nature of electricity and electrical circuits (see Cl 2.18.6.2.1):
    a) Electrical current and charge (DESIRABLE)
    b) Sources of electricity (DESIRABLE)
    c) Effects of current (DESIRABLE)
    d) Single-source single-load circuits (DESIRABLE)
- Electrical properties of material (see Cl 2.18.6.2.2):
    a) Insulating materials (DESIRABLE)
    b) Conducting materials (DESIRABLE)
    c) Semiconducting materials (DESIRABLE)
- Electrical parameters of cables and electrical measurement (see Cl 2.18.6.2.3):
    a) Testing devices (ESSENTIAL)
    b) Cable tests (ESSENTIAL)
- Testing electrical parameters of cables and cable assemblies (see Cl 2.18.6.2.4):
    a) Causes of inaccuracies and overcoming them (ESSENTIAL)
    b) Test device set up and safety procedures (ESSENTIAL)

c) Interpreting test readings (ESSENTIAL)

d) Test results that show a cable complies with standard requirements (ESSENTIAL)

3.4. Inspect, maintain and fit plugs/couplers for reeling, trailing and flexible cables (Cl 2.19)

Details of the essential elements for the inspection, fitting and replacement of parts of explosion protected restrained plugs and receptacles and bolted couplers are specified in Module 3 of the Cable Repair Signatory Modules.

3.4.1. Scope

- This unit specifies the essential requirements for inspecting, maintaining by component replacement, and fitting of plugs/couplers on reeling, trailing and flexible cables used in coal mining, and performance criteria by which competency is assessed.
- A person competent in this unit will be able to do the following:
    a) Work safely and to standards.
    b) Evaluate the condition of the plugs/couplers.
    c) Identify correct core and pin configurations.
    d) Apply maintenance techniques.
    e) Document repair/replacement work.

3.4.2. Elements and performance criteria

- 019.1 – Prepare to inspect and fit plugs/couplers:
    - 019.1.1 – Safe work methods to inspect and fit plugs/couplers are obtained and understood.
    - 019.1.2 – Cable plugs/couplers to be inspected are confirmed with supervising personnel.
    - 019.1.3 – Types of plugs/couplers are identified by marking and explosion-protection certification documentation.
    - 019.1.4 – Special tools, equipment and testing devices needed to carry out the plugs/couplers work are obtained and checked for correct operation and safety
- 019.2 – Inspect plugs/couplers:
    - 019.2.1 – Safe work methods to carry out inspecting plugs/couplers are accepted and followed.
    - 019.2.2 – Knowledge of the explosion-protection types and features for plugs and couplers is applied to the inspection process.
    - 019.2.3 – Plugs/couplers are dismantled and inspected for damage to housings, pins and sockets and defects to explosion-protection parts/components.

    - 019.2.4 – Damage to plugs/coupling housings, pins and sockets and defects to explosion-protection parts/components is documented in accordance with quality assurance procedures.
    - 019.2.5 – Knowledge of explosion-protected equipment certification is applied to obtaining replacement parts required for the repair and in accordance with quality assurance procedures.
    - 019.2.6 – Arrangements are made for maintenance by replacement only of defective items of explosion-protective enclosures/housings in accordance with quality assurance procedures.
- 019.3 – Fit and connect plugs/couplers:
    - 019.3.1 – Safe work methods to carry out the fitting of plugs/couplers are accepted and followed.
    - 019.3.2 – Replacement parts/components are identified as being authorized by the plugs/couplers manufacturer and complying with certification documents.
    - 019.3.3 – Correct phasing for voltage, current and pin configurations are identified.
    - 019.3.4 – Cable is prepared and plugs and couplers fitted ensuring correct termination length, sheath protrusion and clamping are maintained.
    - 019.3.5 – Cable cores are prepared and terminated to correct polarity using compliant connection methods maintaining required creepage and clearances.
    - 019.3.6 – Cable tails, leads and terminations are inspected to ensure they are correct and sound.
    - 019.3.7 – Safe work methods for the care and storage of tools and equipment at the completion of work are followed.
- 019.4 – Complete and document repair work:
    - 019.4.2 – Plug and coupling repair history records are updated in accordance with quality assurance procedures.
    - 019.4.3 – Responsible supervisor is notified of the completion of the work in accordance with established quality procedures.

3.4.3. Performance evidence

- Evidence shall be gathered for all the following performance aspects for inspecting, maintaining and fitting plugs/couplers for reeling, trailing and flexible cables used in mining including:
    - 2.19.6.1.1 – Prepares to inspect and fit plugs/couplers
    - 2.19.6.1.2 – Inspects condition of plugs/couplers
    - 2.19.6.1.3 – Fits and connects plugs /couplers
    - 2.19.6.1.4 – Updates plug and coupling repair history record and notifies the responsible supervisor on the completion of the work

3.4.4. Knowledge evidence

- Evidence shall be gathered for all of the following knowledge aspects for inspecting, maintaining and fitting plugs/couplers for reeling, trailing and flexible cables used in mining including:
    - 2.19.6.2.1 – Nature of explosion protection in explosive atmosphere areas
    - 2.19.6.2.2 – Methods for preventing ignition of an explosive atmosphere from an electrical source
    - 2.19.6.2.3 – Equipment and circuits protected by the flameproof (Ex ‘d’) enclosure type
    - 2.19.6.2.4 – Equipment and circuits protected by the increased safety (Ex ‘e’) method
    - 2.19.6.2.5 – The purpose and characteristics of the design features of equipment and circuits protected by the intrinsic safety (Ex ‘i’) technique
    - 2.19.6.2.6 – The purpose and characteristics of the design features of equipment protected from dust ignition by enclosure ‘t’
    - 2.19.6.2.7 – The common characteristics of explosion-protection types
    - 2.19.6.2.8 – Standards to which explosion-protected equipment is required to comply
    - 2.19.6.2.9 – Ex certification schemes to accepted standards
    - 2.19.6.2.10 – Features of plugs and couplers
    - 2.19.6.2.11 – Inspection process and techniques
    - 2.19.6.2.12 – Fitting processes and techniques

3.4.5. Oral examination criteria

Every oral examination shall include criteria regarding the inspection, fitting and replacement of plugs/couplers for reeling and trailing cables. Every examination shall include a minimum of any two (2) of the “Essential” knowledge aspects or any of the “Desirable” aspects from:

- Nature of explosion protection in explosive atmosphere areas (see Cl 2.19.6.2.1):
    a) The standard definition of an ‘explosive atmosphere area’ (DESIRABLE)
    b) Conditions in an explosive atmosphere area that will lead to ignition, combustion and propagation of an explosive atmosphere (DESIRABLE)
    c) The explosive nature of flammable substances in the form of gas, vapour, dust, fibres, or flyings (DESIRABLE)
    d) Low and upper explosive limits (LEL/UEL) and flash point of flammable substances encountered in explosive atmosphere areas (DESIRABLE)
    e) The toxic nature of gases and vapours and potentially harmful consequences (DESIRABLE)
    f) The classifications given to explosive atmosphere areas (DESIRABLE)
    g) Electrical equipment as a potential source of ignition (ESSENTIAL)
    h) Characteristics of devices/equipment that require authorization to be taken into an explosive atmosphere area (DESIRABLE)

- Methods for preventing ignition of an explosive atmosphere from an electrical source (see Cl 2.19.6.2.2):
    a) Exclusion method (DESIRABLE)
    b) Explosion containment method – Flameproof ‘d’ enclosure type (ESSENTIAL)
    c) Energy limitation (DESIRABLE)
    d) Avoidance of ignition source (DESIRABLE)
    e) Dilution — ventilation (DESIRABLE)
- Equipment and circuits protected by the flameproof (Ex ‘d’) enclosure type (see Cl 2.19.6.2.3):
    a) How a flameproof-type enclosure works to provide explosion protection (ESSENTIAL)
    b) Features of flameproof enclosures and their function (ESSENTIAL)
    c) Attributes of flameproof enclosures (ESSENTIAL)
    d) Aspects that are vulnerable to voiding the protection due to defective installation or poor maintenance (ESSENTIAL)
- Equipment and circuits protected by the increased safety (Ex ‘e’) method (see Cl 2.19.6.2.4):
    a) How increased safety ‘e’ type works to provide explosion protection (DESIRABLE)
    b) Features of increased safety and their function (DESIRABLE)
    c) Attributes of increased safety (DESIRABLE)
    d) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance (DESIRABLE)
- The purpose and characteristics of the design features of equipment and circuits protected by the intrinsic safety (Ex ‘i’) technique (see Cl 2.19.6.2.5):
    a) How intrinsic safety type works to provide explosion protection (DESIRABLE)
    b) Features of intrinsic safety and their function (DESIRABLE)
    c) Attributes of intrinsic safety (DESIRABLE)
    d) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance (DESIRABLE)
- The purpose and characteristics of the design features of equipment protected from dust ignition by enclosure ‘t’ (see Cl 2.19.6.2.6):
    a) How dust ignition by enclosure type works to provide explosion protection (DESIRABLE)
    b) Features of dust ignition by enclosure ‘t’ and their function (DESIRABLE)
    c) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance (DESIRABLE)
- The common characteristics of explosion-protection types (see Cl 2.19.6.2.7):
    a) Criteria on which equipment protection levels (EPLs) are assigned (DESIRABLE)
    b) The purposes of ‘temperature classification’ and ‘equipment grouping’ (ESSENTIAL)

c) Equipment markings (nameplate) (ESSENTIAL)

d) Limitations of non-metallic or specific alloy enclosures (ESSENTIAL)

e) The purpose and use of conformity and certification/approval for equipment used in explosive atmospheres (ESSENTIAL)

f) Environmental conditions that may impact on explosion-protection techniques (DESIRABLE)

g) The principles and applications of other and mixed explosion protection techniques (DESIRABLE)

- Standards to which explosion-protected equipment is required to comply (see Cl 2.19.6.2.8):
  a) Standards to which the protective features of each type of explosion protection are required to comply (DESIRABLE)
  b) Typical content of equipment (Ex) certificates (ESSENTIAL)
  c) Verification dossiers (DESIRABLE)
- Ex certification schemes to accepted standards (see Cl 2.19.6.2.9):
  a) Purpose and scope of certification schemes (DESIRABLE)
  b) Accepted certification schemes (ESSENTIAL)
  c) Processes for having equipment certified under the acceptable Ex schemes (DESIRABLE)
- Features of plugs and couplers (see Cl 2.19.6.2.10):
  a) Explosion-protection types (ESSENTIAL)
  b) Pin configuration (ESSENTIAL)
  c) Keying systems (ESSENTIAL)
  d) IP ratings (ESSENTIAL)
- Inspection process and techniques (see Cl 2.19.6.2.11):
  a) Parts of plugs and couplers that are required to be inspected (ESSENTIAL)
  b) Inspection procedures (ESSENTIAL)
  c) Condition of each part effecting fitness for service (ESSENTIAL)
- Fitting processes and techniques (see Cl 2.19.6.2.12):
  a) Factors affecting the correct fitting of plugs and couplers (ESSENTIAL)
  b) Cable preparation requirements and techniques (ESSENTIAL)
  c) Conductor termination methods (ESSENTIAL)

3.5. Verify compliance of repaired reeling, trailing and flexible cables and attachments (Cl 2.20)

Details of the essential elements for verifying compliance of repaired reeling, trailing and flexible cables and attachments for use in coal mining are specified in Module 1, 2 and 3 of the Cable Repair Signatory Modules.

3.5.1. Scope

- This unit specifies the requirements for verifying compliance of repaired and tested reeling, trailing and flexible cables and their plug/coupler assemblies and performance criteria by which competency is to be assessed.
- A person competent in this unit will be able to do the following:
    a) Work safely and to standards.
    b) Evaluate repairs against the required standards and required repair records in accordance with the duties of 'the responsible person'.

3.5.2. Elements and performance criteria

- 020.1 – Prepare to verify compliance of repaired cables:
    - 020.1.1 – Safe work methods for the work are obtained and understood.
    - 020.1.2 – Cable repair facility quality assurance system procedures are understood and followed.
    - 020.1.3 – Specifications and instructions for cable repair are received and expected outcomes of the work confirmed with the user.
    - 020.1.4 – Cable history test records are reviewed to identify potential issues and ascertain the viability of repair.
    - 020.1.5 – Certification documentation for plugs/couplers are sought and received in order to check that the equipment complies with the certification.
    - 020.1.6 – Tools, equipment and testing devices needed to verify compliance are obtained and checked for correct operation, safety and currency of calibration certification
- 020.2 – Carry out verification of compliance:
    - 020.2.1 – Safe work methods for the work are accepted and followed.
    - 020.2.2 – Documentation of pre and post repair test results are compared with requirements of compliance standards.
    - 020.2.3 – Compliance verification measurements, tests and inspections carried out on the repaired cable and fitted plug/coupler assemblies in accordance with quality assurance systems procedures.
    - 020.2.4 – Actions are taken to have any non-compliance aspects shown by measurements, tests and inspection results rectified in accordance with quality system procedures.

    - 020.2.5 – Safe work methods for cleaning the work area and storing equipment at the completion of cable repair work are followed.
- 020.3 – Complete and document cable repair work:
    - 020.3.1 – Verification of compliance is documented, including update of cable test history records in accordance with quality assurance procedures.
    - 020.3.2 – Verification of compliance is issued to the appropriate persons in accordance with quality assurance procedures.

3.5.3. Performance evidence

- Evidence shall be gathered for all the following performance aspects for verifying compliance of repaired reeling, trailing and flexible cables and attachments for use in coal mining including:
    - 2.20.6.1.1 – Prepares to verify compliance of repaired cables
    - 2.20.6.1.2 – Verifies compliance of repaired cables and fittings
    - 2.20.6.1.3 – Documents verification of compliance repairs and issues to appropriate person in accordance with quality assurance procedures

3.5.4. Knowledge evidence

- Evidence shall be gathered for all of the following knowledge aspects for verifying compliance of repaired reeling, trailing and flexible cables and attachments for use in coal mining including:
    - 2.20.6.2.1 – Quality assurance systems
    - 2.20.6.2.2 – Compliance documentation system

3.5.5. Oral examination criteria

Every oral examination shall include criteria regarding verifying compliance of repaired reeling, trailing and flexible cables and attachments. Every examination shall include a minimum of any one (1) of the “Essential” knowledge aspects or any of the “Desirable” aspects from:

- Quality assurance systems (see Cl 2.20.6.2.1):
    a) Quality assurance systems overview (DESIRABLE)
    b) Quality procedures for cable, plug and coupler repairs (ESSENTIAL)
- Compliance documentation system (see Cl 2.20.6.2.2):
    a) User records and instructions for repair (ESSENTIAL)
    b) Plug and coupler certification (ESSENTIAL)
    c) Repair history records (ESSENTIAL)

3.6. Supply certified explosion-protected equipment for explosive atmospheres (Cl 2.21)

Details of the essential elements for supplying certified explosion-protected equipment for explosive atmospheres are specified in Module 3 of the Cable Repair Signatory Modules.

3.6.1. Scope

- This unit specifies the requirements for the supply of certified explosion-protected equipment and accessories for a given location and providing advice for the supply of requisite compliant explosion-protected equipment.
- A person competent in this unit will be able to do the following:
    a) Understand explosion-protection strategies including the criteria that define zones of classified hazardous areas.
    b) Advise on the supply of equipment that is certified to the required parameters through a recognized certification scheme.
    c) Comply with statutory requirements.

3.6.2. Elements and performance criteria

- 021.1 – Prepare to supply certified explosion-protected equipment for hazardous areas:
    - 021.1.1 – Zones, grouping and temperature classes of flammable gases, vapours and/or dusts that may be present in the area are established from area classification documentation, project specifications, verification dossiers and/or consultation with the potential client.
    - 021.1.2 – Parameters for explosion-protected equipment in a given location are established from the documentation and in consultation with the potential client.
    - 021.1.3 – Knowledge of area classification criteria, equipment types and certification parameters and recognized certification schemes are applied to preparing to supply certified explosion-protected equipment.
    - 021.1.4 – Manufacturer's technical data including equipment certification is scrutinized for compliance with currently acceptable standards including tests on which the certification is based and compared with the explosion-protective parameters of the equipment required to be supplied.
- 021.2 – Provide advice on suitability of compliant explosion protected equipment:
    - 021.2.1 – Availability, within a given timeframe, of compliant explosion-protected equipment and accessories required to be supplied is established through consultation with the supplier/manufacturer.
    - 021.2.2 – Certification documentation of selected equipment is checked against equipment marking to ensure that the certification corresponds with the explosive-protected equipment and accessories required.
    - 021.2.3 – Advice of suitable wiring systems is based on classification, environmental conditions and compliance with explosion-protection parameters and load and duty requirements.
- 021.3 – Document explosion protective equipment to be supplied:
    - 021.3.1 – Details and availability of equipment to be supplied are documented showing agreement with parameters of equipment required and compliance with currently acceptable standards including tests of which the is based.

- 021.3.2 – Certification documentation details and marking of each item of equipment is compared to ensure the correct equipment is supplied and meets the required parameters.
- 021.3.3 – All relevant documentation for the equipment including certificates and instructions for use, installation and maintenance, is collated for supply with the equipment.

3.6.3. Performance evidence

- Evidence shall be gathered for all the following performance aspects for supplying certified explosion-protected equipment for explosive atmospheres including:
  - 2.21.6.1.1 – Prepares to supply certified explosion-protected equipment
  - 2.21.6.1.2 – Provides advice on supply of compliant explosion-protected equipment and accessories
  - 2.21.6.1.3 – Documents equipment to be supplied

3.6.4. Knowledge evidence

- Evidence shall be gathered for all of the following knowledge aspects for supplying certified explosion-protected equipment for explosive atmospheres including:
  - 2.21.6.2.1 – Explosion-protection strategies and criteria that define zones of classified hazardous areas
  - 2.21.6.2.2 – Wiring systems and accessories
  - 2.21.6.2.3 – Equipment parameters

3.6.5. Oral examination criteria

Every oral examination shall include criteria regarding supplying certified explosion-protected equipment for explosive atmospheres. Every examination shall include a minimum of any one (1) of the “Essential” knowledge aspects or any of the “Desirable” aspects from:

- Explosion-protection strategies and criteria that define zones of classified hazardous areas (see Cl 2.21.6.2.1):
  a) Criteria for classification of Zones 0, 1, 2, 20, 21 and 22 (DESIRABLE)
  b) Zones, grouping and temperature class of flammable gases, vapours and/or dusts that may be present in a hazardous area (DESIRABLE)
  c) Relation of zone ratings to EPL ratings and which takes precedence (DESIRABLE)
- Wiring systems and accessories (see Cl 2.21.6.2.2):
  a) Types of wiring systems suitable in hazardous areas (DESIRABLE)
  b) Criteria for the selection of wiring systems and accessories for a hazardous area (DESIRABLE)
- Equipment parameters (see Cl 2.21.6.2.3):
  a) Criteria to which each type of explosion-protected equipment is required to comply given in the applicable standard (ESSENTIAL)

b) Information given in a certification document (ESSENTIAL)

4. Technical Standard

4.1. AS/NZS 1747:2022 overview

4.1.1. Section 1 – Scope and general

No assessable performance criteria on this section of the standard.

4.1.2. Section 2 – Evaluation before repair and history record

- History records
- Visual examination
- Pre-repair tests
- Inspection of cable accessories
- Practicability of repair

Section 2 of *AS/NZS 1747:2022* provides specific technical information which relates to the following knowledge aspects from *AS/NZS 4761.1:2018*:

- Unit 2.18
- Unit 2.19
- Unit 2.20

Section 2 of *AS/NZS 1747:2022* should be utilised for developing the model answers for oral examination questions relating to the above unit/s.

4.1.3. Section 3 – Repair procedures for cables

- Compatibility of cables to be joined
- Use of cleaning solvents
- Joining by ferrules
- Joining by exothermic welding
- Joining by hard soldering
- Joining by pilot and control conductors
- Joining power conductors
- Joining earth conductors
- Joining PILSWA and XLPE armoured cables
- Replacement of insulation or covering over conductors
- Joining individual metallic or composite earth screens
- Replacement of semiconductive elastomers
- Lay-up of core assembly
- Repair of inner sheath

- Joining pliable armour
- Replacement of sheath
- Vulcanizing

Section 3 of *AS/NZS 1747:2022* provides specific technical information which relates to the following knowledge aspects from AS/NZS 4761.1:2018:

- Unit 2.17

Section 3 of *AS/NZS 1747:2022* should be utilised for developing the model answers for oral examination questions relating to the above unit/s.

4.1.4. Section 4 – Inspection, fitting and replacement of plugs, couplers and other cable accessories

- Plug inspection external
- Plug inspection internal
- Flamepath inspection
- Tail inspection
- Plug fitting
- Compounds

Section 4 of *AS/NZS 1747:2022* provides specific technical information which relates to the following knowledge aspects from *AS/NZS 4761.1:2018*:

- Unit 2.18
- Unit 2.19
- Unit 2.20

Section 4 of *AS/NZS 1747:2022* should be utilised for developing the model answers for oral examination questions relating to the above unit/s.

4.1.5. Section 5 – Testing

- HV connections
- Discharge times
- Test equipment
- Tests to be carried out
- High voltage fault location test
- Continuity and phase rotation tests
- Insulation resistance test
- High voltage proof test
- Symmetrical load test
- Partial break test

- Tests for integrity of outer sheath
- Sheath hardness

Section 5 of *AS/NZS 1747:2022* provides specific technical information which relates to the following knowledge aspects from *AS/NZS 4761.1:2018*:

- Unit 2.18

Section 5 of *AS/NZS 1747:2022* should be utilised for developing the model answers for oral examination questions relating to the above unit/s.

4.1.6. Section 6 – Identification of repairs

- Method of marking
- Information to be marked

Section 6 of *AS/NZS 1747:2022* provides specific technical information which relates to the following knowledge aspects from *AS/NZS 4761.1:2018*:

- Unit 2.17

Section 6 of *AS/NZS 1747:2022* should be utilised for developing the model answers for oral examination questions relating to the above unit/s.

4.1.7. Section 7 – Responsible person

Section 7 of *AS/NZS 1747:2022* provides specific technical information which relates to the following knowledge aspects from *AS/NZS 4761.1:2018*:

- Unit 2.20
- Unit 2.21

Section 7 of *AS/NZS 1747:2022* should be utilised for developing the model answers for oral examination questions relating to the above unit/s.

4.1.8. Other:

- Appendix A (informative) – Computer database cable history
- Appendix B (normative) – Requirements for ferrules
- Appendix C (normative) – Requirements for solder and flux
- Appendix D (informative) – Procedure for exothermic welding
- Appendix E (informative) – Procedure for hard soldering
- Appendix F (normative) – Repair materials and tapes
- Appendix G (informative) – Assessing cable condition
- Appendix H (normative) – Requirements for test equipment
- Appendix I (normative) – Routine tests on test equipment
- Appendix J (normative) – Routine tests on measuring equipment

The *AS/NZS 1747:2022* normative Appendix's provide specific technical requirements/details which are not directly covered by the knowledge aspects from *AS/NZS 4761.1:2018*.

5. Appendix A – “ESSENTIAL” oral examination criteria compilation

5.1. Repair reeling, trailing and flexible cables (Cl 2.17)

Every oral examination shall include criteria regarding the repair of reeling and trailing cables. Every examination shall include a minimum of any two (2) of the “Essential” knowledge aspects from:

- Cable types (see Cl 2.17.6.2.1):
    - Cable construction, materials and features of cable components (ESSENTIAL)
    - Function of each cable component (ESSENTIAL)
    - Standards to which cables are manufactured (ESSENTIAL)
- Cable repair preparation and conductor splicing methods (see Cl 2.17.6.2.2):
    - Criteria for determining the section of cable suitable to be joined (ESSENTIAL)
    - Cable preparation and methods (ESSENTIAL)
    - Splicing methods and application for power, pilot and earthing conductors (ESSENTIAL)
- Replacement of cable insulation (see Cl 2.17.6.2.3):
    - Preparation of power conductors prior to the application of insulation (ESSENTIAL)
    - Types of insulation repair tapes and their application (ESSENTIAL)
    - Techniques for applying insulation repair tape (ESSENTIAL)
- Replacing and repairing cable sheath (see Cl 2.17.6.2.5):
    - Techniques used in replacing cable sheath (ESSENTIAL)
    - Setting up a vulcanizer to vulcanize a repair (ESSENTIAL)
    - Vulcanizing techniques and issues (ESSENTIAL)

5.2. Test reeling, trailing and flexible cables and their attachments (Cl 2.18)

Every oral examination shall include criteria regarding the testing of reeling and trailing cables. Every examination shall include a minimum of any two (2) of the “Essential” knowledge aspects from:

- Electrical parameters of cables and electrical measurement (see Cl 2.18.6.2.3):
    - Testing devices (ESSENTIAL)
    - Cable tests (ESSENTIAL)
- Testing electrical parameters of cables and cable assemblies (see Cl 2.18.6.2.4):
    - Test device set up and safety procedures (ESSENTIAL)

- Interpreting test readings (ESSENTIAL)
- Test results that show a cable complies with standard requirements (ESSENTIAL)
- Causes of inaccuracies and overcoming them (ESSENTIAL)

5.3. Inspect, maintain and fit plugs/couplers for reeling, trailing and flexible cables (Cl 2.19)

Every oral examination shall include criteria regarding the inspection, fitting and replacement of plugs/couplers for reeling and trailing cables. Every examination shall include a minimum of any two (2) of the "Essential" knowledge aspects from:

- Nature of explosion protection in explosive atmosphere areas (see Cl 2.19.6.2.1):
  - Electrical equipment as a potential source of ignition (ESSENTIAL)
- Methods for preventing ignition of an explosive atmosphere from an electrical source (see Cl 2.19.6.2.2):
  - Explosion containment method – Flameproof 'd' enclosure type (ESSENTIAL)
- Equipment and circuits protected by the flameproof (Ex 'd') enclosure type (see Cl 2.19.6.2.3):
  - How a flameproof-type enclosure works to provide explosion protection (ESSENTIAL)
  - Features of flameproof enclosures and their function (ESSENTIAL)
  - Attributes of flameproof enclosures (ESSENTIAL)
  - Aspects that are vulnerable to voiding the protection due to defective installation or poor maintenance (ESSENTIAL)
- The common characteristics of explosion-protection types (see Cl 2.19.6.2.7):
  - The purposes of 'temperature classification' and 'equipment grouping' (ESSENTIAL)
  - Equipment markings (nameplate) (ESSENTIAL)
  - Limitations of non-metallic or specific alloy enclosures (ESSENTIAL)
  - The purpose and use of conformity and certification/approval for equipment used in explosive atmospheres (ESSENTIAL)
- Standards to which explosion-protected equipment is required to comply (see Cl 2.19.6.2.8):
  - Typical content of equipment (Ex) certificates (ESSENTIAL)
- Ex certification schemes to accepted standards (see Cl 2.19.6.2.9):
  - Accepted certification schemes (ESSENTIAL)
- Features of plugs and couplers (see Cl 2.19.6.2.10):
  - Explosion-protection types (ESSENTIAL)
  - Pin configuration (ESSENTIAL)
  - Keying systems (ESSENTIAL)
  - IP ratings (ESSENTIAL)
- Inspection process and techniques (see Cl 2.19.6.2.11):

  - Parts of plugs and couplers that are required to be inspected (ESSENTIAL)
  - Inspection procedures (ESSENTIAL)
  - Condition of each part effecting fitness for service (ESSENTIAL)
- Fitting processes and techniques (see Cl 2.19.6.2.12):
  - Factors affecting the correct fitting of plugs and couplers (ESSENTIAL)
  - Cable preparation requirements and techniques (ESSENTIAL)
  - Conductor termination methods (ESSENTIAL)

5.4. Verify compliance of repaired reeling, trailing and flexible cables and attachments (Cl 2.20)

Every oral examination shall include criteria regarding verifying compliance of repaired reeling, trailing and flexible cables and attachments. Every examination shall include a minimum of any one (1) of the "Essential" knowledge aspects from:

- Quality assurance systems (see Cl 2.20.6.2.1):
  - Quality procedures for cable, plug and coupler repairs (ESSENTIAL)
- Compliance documentation system (see Cl 2.20.6.2.2):
  - User records and instructions for repair (ESSENTIAL)
  - Plug and coupler certification (ESSENTIAL)
  - Repair history records (ESSENTIAL)

5.5. Supply certified explosion-protected equipment for explosive atmospheres (Cl 2.21)

Every oral examination shall include criteria regarding supplying certified explosion-protected equipment for explosive atmospheres. Every examination shall include a minimum of any one (1) of the "Essential" knowledge aspects from:

- Equipment parameters (see Cl 2.21.6.2.3):
  - Criteria to which each type of explosion-protected equipment is required to comply given in the applicable standard (ESSENTIAL)
  - Information given in a certification document (ESSENTIAL)

5.6. Technical standards (AS/NZS 1747:2022)

Every oral examination shall include criteria from the normative Appendix's in AS/NZS 1747:2022. Every examination shall include a minimum of any one (1) of the knowledge aspects from:

- Normative Appendix:
  - Appendix B (normative) – Requirements for ferrules
  - Appendix C (normative) – Requirements for solder and flux
  - Appendix F (normative) – Repair materials and tapes

- Appendix H (normative) – Requirements for test equipment
- Appendix I (normative) – Routine tests on test equipment
- Appendix J (normative) – Routine tests on measuring equipment

6. Appendix B – “DESIRABLE” oral examination criteria

6.1. Repair reeling, trailing and flexible cables (Cl 2.17)

Every oral examination shall include criteria regarding the repair of reeling and trailing cables. An examination may include any of the “Desirable” knowledge aspects from:

- Cable types (see Cl 2.17.6.2.1):
  - Conditions under which cables should be stored (DESIRABLE)
  - Typical applications of specific cables (DESIRABLE)
- Techniques for joining pliable wire armour (see Cl 2.17.6.2.4):
  - Cable manufacturers recommendation (DESIRABLE)
  - Established workshop procedures (DESIRABLE)

6.2. Test reeling, trailing and flexible cables and their attachments (Cl 2.18)

Every oral examination shall include criteria regarding the testing of reeling and trailing cables. An examination may include any of the “Desirable” knowledge aspects from:

- Nature of electricity and electrical circuits (see Cl 2.18.6.2.1):
  - Electrical current and charge (DESIRABLE)
  - Sources of electricity (DESIRABLE)
  - Effects of current (DESIRABLE)
  - Single-source single-load circuits (DESIRABLE)
- Electrical properties of material (see Cl 2.18.6.2.2):
  - Insulating materials (DESIRABLE)
  - Conducting materials (DESIRABLE)
  - Semiconducting materials (DESIRABLE)

6.3. Inspect, maintain and fit plugs/couplers for reeling, trailing and flexible cables (Cl 2.19)

Every oral examination shall include criteria regarding the inspection, fitting and replacement of plugs/couplers for reeling and trailing cables. An examination may include any of the “Desirable” knowledge aspects from:

- Nature of explosion protection in explosive atmosphere areas (see Cl 2.19.6.2.1):
  - The standard definition of an ‘explosive atmosphere area’ (DESIRABLE)

- Conditions in an explosive atmosphere area that will lead to ignition, combustion and propagation of an explosive atmosphere (DESIRABLE)
- The explosive nature of flammable substances in the form of gas, vapour, dust, fibres, or flyings (DESIRABLE)
- Low and upper explosive limits (LEL/UEL) and flash point of flammable substances encountered in explosive atmosphere areas (DESIRABLE)
- The toxic nature of gases and vapours and potentially harmful consequences (DESIRABLE)
- The classifications given to explosive atmosphere areas (DESIRABLE)
- Characteristics of devices/equipment that require authorization to be taken into an explosive atmosphere area (DESIRABLE)

- Methods for preventing ignition of an explosive atmosphere from an electrical source (see Cl 2.19.6.2.2):
  - Exclusion method (DESIRABLE)
  - Energy limitation (DESIRABLE)
  - Avoidance of ignition source (DESIRABLE)
  - Dilution — ventilation (DESIRABLE)
- Equipment and circuits protected by the increased safety (Ex ‘e’) method (see Cl 2.19.6.2.4):
  - How increased safety ‘e’ type works to provide explosion protection (DESIRABLE)
  - Features of increased safety and their function (DESIRABLE)
  - Attributes of increased safety (DESIRABLE)
  - Aspects that are vulnerable to voiding the protection due to poor installation or maintenance (DESIRABLE)
- The purpose and characteristics of the design features of equipment and circuits protected by the intrinsic safety (Ex ‘i’) technique (see Cl 2.19.6.2.5):
  a) How intrinsic safety type works to provide explosion protection (DESIRABLE)
  b) Features of intrinsic safety and their function (DESIRABLE)
  c) Attributes of intrinsic safety (DESIRABLE)
  d) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance (DESIRABLE)
- The purpose and characteristics of the design features of equipment protected from dust ignition by enclosure ‘t’ (see Cl 2.19.6.2.6):
  a) How dust ignition by enclosure type works to provide explosion protection (DESIRABLE)
  b) Features of dust ignition by enclosure ‘t’ and their function (DESIRABLE)
  c) Aspects that are vulnerable to voiding the protection due to poor installation or maintenance (DESIRABLE)

- The common characteristics of explosion-protection types (see Cl 2.19.6.2.7):
    a) Criteria on which equipment protection levels (EPLs) are assigned (DESIRABLE)
    b) Environmental conditions that may impact on explosion-protection techniques (DESIRABLE)
    c) The principles and applications of other and mixed explosion protection techniques (DESIRABLE)
- Standards to which explosion-protected equipment is required to comply (see Cl 2.19.6.2.8):
    a) Standards to which the protective features of each type of explosion protection are required to comply (DESIRABLE)
    b) Verification dossiers (DESIRABLE)
- Ex certification schemes to accepted standards (see Cl 2.19.6.2.9):
    a) Purpose and scope of certification schemes (DESIRABLE)
    b) Processes for having equipment certified under the acceptable Ex schemes (DESIRABLE)

6.4. Verify compliance of repaired reeling, trailing and flexible cables and attachments (Cl 2.20)

Every oral examination shall include criteria regarding verifying compliance of repaired reeling, trailing and flexible cables and attachments. An examination may include any of the "Desirable" knowledge aspects from:

- Quality assurance systems (see Cl 2.20.6.2.1):
    - Quality assurance systems overview (DESIRABLE)

6.5. Supply certified explosion-protected equipment for explosive atmospheres (Cl 2.21)

Every oral examination shall include criteria regarding supplying certified explosion-protected equipment for explosive atmospheres. An examination may include any of the "Desirable" knowledge aspects from:

- Explosion-protection strategies and criteria that define zones of classified hazardous areas (see Cl 2.21.6.2.1):
    - Criteria for classification of Zones 0, 1, 2, 20, 21 and 22 (DESIRABLE)
    - Zones, grouping and temperature class of flammable gases, vapours and/or dusts that may be present in a hazardous area (DESIRABLE)
    - Relation of zone ratings to EPL ratings and which takes precedence (DESIRABLE)
- Wiring systems and accessories (see Cl 2.21.6.2.2):
    - Types of wiring systems suitable in hazardous areas (DESIRABLE)
    - Criteria for the selection of wiring systems and accessories for a hazardous area (DESIRABLE)

6.6. Technical standards (AS/NZS 1747:2022)

Every oral examination shall include criteria from the normative Appendix's in AS/NZS 1747:2022. An examination may include any of the knowledge aspects from:

- Informative Appendix:
    a) Appendix A (informative) – Computer database cable history
    b) Appendix D (informative) – Procedure for exothermic welding
    c) Appendix E (informative) – Procedure for hard soldering
    d) Appendix G (informative) – Assessing cable condition