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Specification

Competence & Training in Fixed Plant Engineering

Endorsement & Authorisation

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Summary

This specification defines the requirements for the training and assessment of persons undertaking Fixed Plant engineering work on Network Rail controlled infrastructure. The specification complements the requirements of company standard NR/SP/CTM/001 Competence Management.

Implementation

The provisions of this specification must be implemented from 2nd December 2006 for all Fixed Plant engineering work that may affect the operational safety of Network Rail controlled infrastructure.

Compliance

This Network Rail Specification is mandatory and must be complied with as follows:

- The requirements for Fixed Plant Induction training shall take effect from 30th June 2007.
- Assessment of existing people against the requirements set out in appendix B shall commence by 31st March 2007, shall be complete by 31st March 2009 and shall be maintained from that date forward.

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1 Purpose

This specification sets out the minimum requirements for the assessment of people who undertake Fixed Plant engineering work on Network Rail controlled infrastructure. It defines processes that shall be implemented and the standards that shall be achieved to ensure that people who undertake Fixed Plant engineering tasks are competent to perform the work. Where a person is required to isolate or work near electrical equipment reference should be made to NR/SP/CTM/018 Training & Competence in Traction Power Distribution Engineering

2 Scope

The specification applies to all employees who undertake Fixed Plant engineering work on Network Rail controlled infrastructure. This standard covers the following types of Fixed Plant systems:

- | | |
|--|--|
| <ul style="list-style-type: none"> • L.V. Electrical Installations • Non Traction HV Systems • Uninterruptible Power Supplies • Battery Systems • Fixed & Mobile Generators • Pumping Installations • Compressed Air Systems • Hydraulic Systems • Points Heating Installations | <ul style="list-style-type: none"> • HVAC Systems • Gas Systems in Buildings • Wheelchex Systems • Lifting Equipment • Security Systems • Pressure Vessels • Lifting Equipment • Portable Appliance Testing • Signalling Power Supplies |
|--|--|

3 Reference Documentation

NR/CS/CTM/001	Competence Management.
NR/SP/CTM/005	Quality Assurance in Training Delivery.
NR/SP/OHS/018	Safety requirements for track medical & alcohol & drugs screening & certification.
NR/SP/CTM/018	Training & Competence in Traction Power Distribution Engineering

4 Definitions.

Assessor.

Assessor is a person approved to undertake assessments of people against the requirements of specific Competence Standards.

Assessment.

Assessment is gathering and judgement of evidence to 'prove' or 'determine' a person's Competence as required by a Competence Standard.

Authority to work.

Authority to Work is a document that details the work activities that a person is authorised to complete. It includes the details of a person's competence and details of any restrictions that may apply to the way the person works e.g. requirement for supervision.

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Competence.

The ability to undertake responsibilities and to perform activities to a recognised standard on a regular basis. A combination of practical thinking skills, experience and knowledge, and may include a willingness to undertake work activities in accordance with agreed standards, rules and procedures.

In the context of this specification it also includes the consistent achievement of an identified standard of performance under defined normal, abnormal, and emergency situations; the ability to undertake work to ensure the safety of any person who might be affected by the work; and an appropriate level fitness.

Certificate.

Certificate confirms that specific competence has been demonstrated by an individual against the requirements of a Competence Standard. The certificate forms the basis for the competence to be added to the Authority to work.

Competence Management System (CMS).

Competence Management System is a suitably resourced, logical and integrated cycle of activities within an organisation used to assure competence of those who may, through lack of competence, have a impact on the:

- a) Safe operation and maintenance of Network Rail controlled infrastructure.
- b) Occupational health and safety of workers on or about the Network Rail or.
- c) Safety of other persons affected by their activities.
- d) Performance of Network Rail's business.

Competence Profile.

Competence Profile is a description of the competences that apply to a specific job role or post. The Competence Profile is used to determine the training and assessment requirements for the person occupying the post.

Competence Standard.

Competence Standard is a statement of:

- What a person must be able to do and how well, in order to achieve the intended outcome of work.
- The range of circumstances in which the ability would have to be demonstrated.
- The knowledge required to complete the work.
- The types of evidence needed to ensure that performance is consistent and can be sustained.
- How this would be assessed.

Employee/Person

Employee/Person means a person in scope whose Competence is assessed by an Assessor.

Mentoring Period.

Mentoring period is a period of time between the satisfactory completion of training where the person will undertake the work under supervision of a mentor. This period is used to enable the person to practice the competence and gather evidence ready for assessment.

Person in Scope

Anyone whose current or future role will involve completing tasks associated with Fixed Plant engineering work.

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Persons New to Fixed Plant Engineering Work

Those persons who have not previously undertaken work involving Fixed Plant engineering work. It includes persons that may already be working in, or have worked in, the rail industry before, but in another role, not related Fixed Plant engineering work. New to Fixed Plant engineering work is not related to grade but to previous experience as described above.

Trainer.

A person approved by Network Rail to deliver specific training courses.

Safety Critical Work

Work activities carried out in the railway industry that may affect the health and safety of persons on the transport system and that may have a real time impact on the operational railway.

Verification

Verification is a process by which the quality of assessment decisions and the supporting process are independently assured.

Verifier

Verifier is a person who is competent and authorised to review the assessment process and assure the completed assessment decisions against specific competence standards.

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5 Requirements.

5.1 Deployment.

Employers shall not deploy any Person New to Fixed Plant engineering work on any tasks associated with Fixed Plant engineering work that may have a direct impact on the integrity of the Fixed Plant, until that person has attended and successfully completed the Network Rail Fixed Plant Induction Course.

Additionally people who are not New to Fixed Plant engineering work shall only be deployed on tasks associated with Fixed Plant engineering work provided the person has attended and successfully completed appropriate training or has been assessed as competent to complete the work. Where a person has been trained they may be undertake the work but must be subjected to an appropriate level of supervision.

5.2 Work on or near the line.

Where a person is required to work on or near the line they shall be hold the relevant track safety competence(s).

In addition, persons shall be able to demonstrate medical fitness and be screened for alcohol and drugs in accordance with Network Rail Specification [NR/SP/OHS/018](#): Safety requirements for track safety medical & alcohol screening and certification.

5.3 Training.

Subject to the minimum requirements in 5.1 & 5.2 employers shall have systems in place to identify specific training needs for each Person in Scope. A training framework and specific training modules have been developed to address the common training needs of Persons in Scope. Details of this framework together with normal training progression are contained in Appendix A of this specification. Employers shall use this information to determine what training is appropriate for each Person in Scope.

The following steps shall be used and documented to identify and satisfy specific training needs:

1. Identify deployment requirements for the person concerned.
 - o Take account of specific types of equipment that the person will be required to work on and the type of activities the person will be required to undertake.
2. Establish the current competence of the person with relation to deployment requirements.
3. Establish what development is required and therefore which training modules are appropriate to match the deployment needs.
4. Agree development plan with the person and order in which the training should take place.
5. Arrange training.
6. Person completes relevant training.

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5.4 Mentoring.

Following the successful completion of training, each person shall undertake a period of workplace experience. The detailed mentoring requirements shall be provided in the requirements for each training course. The person's employer shall appoint a mentor who shall be responsible for supporting the workplace experience. Employers shall ensure that appropriate supervision is maintained during the period of mentoring.

Each employer shall provide to a log book to record what work the person has completed during the workplace experience.

5.5 Assessment.

Following successful completion of the relevant training and mentoring the person shall be assessed against the requirements of the relevant Competence Standard contained in appendix B of this specification.

5.6 Delivery of training.

Persons delivering the training courses listed in appendix A shall be approved by Network Rail in accordance with the requirements of NR/SP/CTM/005 – Quality Assurance in Training Delivery. Trainers shall only use the Network Rail approved training plans and assessments to deliver the training event.

5.7 Completion of assessment.

Assessors shall be approved in accordance with the employing organisation's competence management system prior to undertaking assessments against the competence standards detailed in this specification. Assessors shall plan and complete assessments.

Employers shall have in place verification procedures to ensure that at least 10% of completed assessments are verified.

5.8 Maintaining competence.

Employers shall have systems in place to assure the continued Competence of persons undertaking Fixed Plant engineering work. These systems shall consist as a minimum of:

- a. The use of a log book to record work experience. All Competences detailed in this Specification should be practised at least 4 times in a 12 month period and associated Logbook entries shall be made to confirm the completion of the work.
- b. The implementation of a review or re-assessment regime as defined in section 7.3

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6 Application.

6.1 Competence standards.

Based on a functional analysis Competence Standards have been developed that are suitable to control the risks associated with competent performance of people who are undertaking Fixed Plant engineering work on Network Rail controlled infrastructure. These Competence Standards are contained in the appendix B of this specification.

6.2 Competence profiles.

The Competence Standards are applicable to the job roles associated with teams undertaking maintenance or installation.

Specific competence profiles shall be developed for each role and shall take account of equipment specific needs in a particular geographic location and other non Fixed Plant engineering work competence requirements.

Competence Standards should be selected on the basis of the person's job role and responsibility. A set of profiles (See appendix B) Fixed Plant engineering work competence requirements have been developed to aid this process.

6.3 Training needs.

A training framework and specific training modules applicable to the work activities associated with Fixed Plant engineering work have been developed and brief details of each module are contained in appendix A of this specification. The training framework and specific training modules are directly linked to the competence standards in appendix B.

Persons in Scope who are New to Fixed Plant engineering work shall as a minimum complete Fixed Plant Induction training regardless of what job role the person is undertaking.

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7 Assessment Strategy.

The strategy to be applied to assessment takes account of a number of factors:

- Whether or not the person is new to the job role.
- What training and experience a person has had.
- What different types of equipment the person is required to work on.
- The practicality of gathering observed evidence.
- The risks from incompetent performance.

7.1 Initial Assessment

The following approach shall be used:

Case 1

Where the work is new to the employee's area of responsibility they shall:

- Attend the relevant training and complete end of training assessments.
- Complete a period of work experience under supervision, against objectives set at the end of the training and record the details in their Logbook. During the mentoring period the Mentor shall ensure that both his/her own safety and the safety of the person is maintained at all times in accordance with the Rule Book.
- Be assessed against the requirements laid down in the relevant Competence Standard.
 - If the employee is competent the person completing the assessment shall issue a certificate of competence (See equipment specific endorsements).
 - If the employee is not yet competent.
 - The line manager shall agree and implement a development action plan.
 - The employee may continue workplace experience under supervision.
 - On completion of development action plan the person shall be re-assessed for the specific competence.

Case 2

Where the employee has been previously trained and been completing the work for more than 1 year they shall be assessed for the specific competence using the following as the primary source of evidence:

- Detailed questioning/standard knowledge tests.
- Performance report from the line manager to confirm satisfactory and safe performance across the range of work detailed in the Competence Standard.
- If the employee is competent the person completing the assessment shall issue certificate of competence.
- If the employee is not yet competent they shall be dealt with as described in Case 1.

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7.2 Equipment Specific Endorsements

Where a person has been assessed as competent for one equipment type in a group of similar types and is required to demonstrate competence on other types certificate endorsements shall be added in the following way:

- a. Assessed as competent against "Plant 3: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators" on Electrically Started Set type. The certificate issued will show competence to:
 - Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators
 - o Electrically Started Set type.
- b. The person attends a Hydraulic Emergency Started Set type training course for a different type of Fixed & Mobile Generators and successfully completes end of training assessments. A new certificate shall be issued showing competence to:
 - Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators on
 - o Electrically Started Set
 - o Hydraulic Emergency Started Set type
- c. If the person is not successful in all end of training assessments the person shall follow the arrangements detailed in case 1 c above.

Where a person has worked on more than one equipment type in a group of similar types and is required to demonstrate competence on other types, certificate endorsements shall be added by following the arrangements detailed in Case 2 above.

7.3 Maintaining Competence.

Employers shall have systems in place to assure the continued competence of persons undertaking Fixed Plant engineering and/or isolation work. These systems shall consist as a minimum of:

- a. The use of a log book to record work experience which shall be reviewed by a responsible manager to confirm the person has practised the competence at least four times a year.
- b. The implementation of a re-assessment regime that confirms, at least every 3 years, that:
 - the work completed by the person meets the performance statements in the relevant competence standard
 - the person has the knowledge defined in the relevant competence standard.
 - there have been no incidents accidents or near misses as a result of the person completing the work.

Where continued Competence cannot be confirmed through the review/re-assessment, arrangements shall be made for the competence to be withdrawn. The responsible manager shall develop a plan to restore the person's competence which may include retraining and / or further mentoring and re-assessment.

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Appendix A - Plant Engineering Training Framework

Where a person requires training to develop their competence they shall attend and successfully complete the Network Rail approved Plant engineering training courses. This appendix contains a brief overview of the modules that form the Plant engineering Training Framework.

Plant Engineering Induction

This module is designed to train persons who are new to plant engineering and whose work may involve the assistance in the maintenance of the plant equipment or other duties that may affect the operation of plant equipment. The aim of the module is to provide the basic underpinning knowledge of the plant engineering system components and working methods associated with maintenance of plant engineering assets.

Fixed Plant 1

This module is designed to train persons whose work involves the maintenance, installation and repair of the Fixed Plant engineering equipment. The person is most likely to be in a Team Member role. The aim of the module is to develop the delegate's understanding of:

- LV Electrical Installations
- Fixed & Mobile Generators
- Pumping Installations
- Electric Points Heating
- Battery Systems
- Switch Signalling Supplies

Fixed Plant 2

This module is designed to train persons whose work involves the next level in maintenance, installation and repair of the Fixed Plant engineering equipment. The person is most likely to be in a Team Member role with at least 6 months experience. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- Wheelchex
- Security Systems
- Hydraulic Systems
- Portable Appliance Testing
- Locating Buried Services
- Entering Confined Spaces
- Basic Supervisory Skills inc:
 - Effective Progression
 - Taking & Relinquishing
 - Safe Working Practices

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Fixed Plant 3

This module is designed to train persons whose work involves a further level in maintenance, installation and repair of the Fixed Plant engineering equipment. The person is most likely to be in a Team Leader role with at least 6 months experience. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- Uninterruptible Power Supplies
- HV Equipment

Pressure Systems

This module is designed to train persons whose work involves maintenance, installation and repair of the pressure system equipment. The person is most likely to be in a Team Member role with at least 6 months experience. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- Compressed Air Systems
- Hydraulic Systems
- Lifting Equipment

Gas Systems

This module is designed to train persons whose work involves maintenance, installation and repair of the gas systems and equipment. The person is most likely to be in a Team Leader role with at least 12 months experience. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- Gas Systems
- Gas Points Heating
- Design Gas Points Heating Installations

Assess Confined Spaces

This module is designed to train persons whose work involves assessing confined spaces. The person is most likely to be in a Team Leader role with at least 12 months experience. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- Assess confined Spaces

HVAC Systems

This module is designed to train persons whose work involves maintenance, installation and repair of the HVAC systems and equipment. The person is most likely to be in a Team Member role with at least 6 months experience. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- HVAC Systems

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Periodic Electrical Inspection

This is City & Guilds Course 2391 – The Inspection, testing and certification of Electrical Installations. It is aimed at those persons in a Team Leader Role who are required to undertake further duties in this area

Fixed Plant Design

This module is designed to train persons whose work involves dealings with the Design Fixed Plant engineering equipment. The person is most likely to be in a Team Leader role with at least 12 months experience or has the appropriate technical qualifications. All training modules are dependant on geographical location and the equipment required to be maintained in that area. The aim of the module is to develop the delegate's understanding of:

- L.V Electrical Installations
- Electric Points Heating Installations

External Statutory Courses

LOLER (Lifting Equipment) and PUWER (Pressure Vessels) are 2 statutory regulations that must be adhered to when working with Lifting Equipment or Pressure Vessels (Plant Units 23 & 24). These courses should be attended by those people required to undertake any such work.

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Appendix B - Competence Standards

Competence Standards applicable to the work activities associated with the Plant Engineering have been developed and are contained within this appendix.

1 Competence Framework

Based on a functional analysis the following Competence Standards have been identified as suitable to control the risks associated with competent performance of people who are undertaking work on Plant equipment on Network Rail controlled infrastructure.

1.1 Maintenance Function

Relevant to all people undertaking the maintenance, faulting and testing of fixed plant engineering on the Network Rail controlled infrastructure

- Plant 1: Undertake Installation, Maintenance, Modification and Repair of L.V. Electrical Installations
- Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators
- Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations
- Plant 4: Undertake Installation, Maintenance, Modification and Repair of Compressed Air Systems
- Plant 5: Undertake Installation, Maintenance, Modification and Repair of Hydraulic Systems
- Plant 6: Undertake Installation, Maintenance, Modification and Repair of Uninterruptible Power Supply Systems
- Plant 7: Inspect Electric Points Heating Installations
- Plant 8: Undertake Installation, Maintenance, Modification and Repair of Electric Points Heating Installations
- Plant 9: Undertake Installation, Maintenance, Modification and Repair of Gas Points Heating Installations
- Plant 10: Undertake Installation, Maintenance, Modification and Repair of Non Traction HV Systems
- Plant 11: Undertake Installation, Maintenance, Modification and Repair of HVAC Systems
- Plant 12: Undertake Installation, Maintenance, Modification and Repair of Gas Systems in Buildings
- Plant 13: Undertake Installation, Maintenance, Modification and Repair of Battery Systems
- Plant 14: Undertake Installation, Maintenance, Modification and Repair of Wheelchex Systems
- Plant 15: Undertake Installation, Maintenance, Modification and Repair of Lifting Equipment
- Plant 16: Undertake Installation, Maintenance, Modification and Repair of Security Systems

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1.2 Testing Function

Relevant to all people undertaking with testing work on plant equipment on the Network Rail controlled infrastructure.

Plant 17: Undertake Periodic Electrical Inspections

Plant 18: Establish the Operational Condition of Pressure Vessels by Detailed Inspection

Plant 19: Establish the Operational Condition of Lifting Equipment by Detailed Inspection.

Plant 20: Undertake Portable Appliance Testing

1.3 Design Function

Relevant to all people undertaking with Design work on plant equipment on the Network Rail controlled infrastructure.

Plant 21: Design LV Electrical Installations

Plant 22: Design Electric Points Heating Installations

Plant 23: Design Gas Points Heating Installations

1.4 Safe & Effective Performance

Relevant to all people undertaking all work on plant equipment on the Network Rail controlled infrastructure.

Plant 24: Take & Relinquish Responsibility for Plant Equipment

Plant 25: Implement & Monitor Safe Working Systems for Plant Maintenance or Installation Activities

Plant 26: Undertake Surveys to detect & avoid Buried Services

Plant 27: Ensure Personal Safety when working in Confined Spaces

Plant 28: Switch Signalling Power Supplies

1.5 Management Function

Relevant to all people dealing with the management of work on plant equipment on the Network Rail controlled infrastructure.

Plant 29: Ensure Effective Progression of Work & Use of Resources during Plant Testing, Maintenance, or Installation Activities

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2. Evidence Requirements.

Sufficient evidence must be collected to enable competence to be assessed against all the performance statements and knowledge and understanding requirements for each element. Evidence must be sufficient to ensure that the person is capable of consistent competent performance.

2.1 Performance Evidence.

The standards of competence in the appendices specify what forms and the quantity of performance evidence which shall be presented for each element.

There are two types of performance evidence:

- Evidence of the way the person carried out activities – evidence of the process involved in demonstrating competence. This takes the form of observation, authenticated log book entries, or performance reports.
- Products of the person's work – items that the person produces or works on or documents produced as part of the activity. The evidence may be in the form of the product itself, or may be a records or photographs generated as part of the work.

2.2 Knowledge Evidence.

The knowledge evidence section of the element specifies the knowledge and understanding necessary for competent performance.

2.3 Knowledge requirements that are common to all Competence Standards.

Candidates must have knowledge and understanding of:

Health and safety legislation, regulations and safe working practices and procedures that must include:

- Relevant sections of the Health and Safety at Work Act.
- Safety Critical Work Regulations.
- Electricity at Work Regulations.
- COSHH.
- Transport and Works Act (Alcohol and drugs).
- Track access restrictions.
- Current rule book.
- Working at Height.
- Confined Spaces.

2.4 Assessment decisions.

Initial assessment decisions shall only be made following the generation of evidence from the person's normal workplace.

Assessment decisions of "competent" shall only be made when:

- All the required performance and knowledge evidence, as defined in the competence standard, has been provided.
- The evidence has been confirmed as accurate, current and attributable to the person concerned.
- Equipment endorsements may be added to a competence certificates following successful completion of training.

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Plant 1: Undertake Installation, Maintenance, Modification and Repair of L.V. Electrical Installations

1. Purpose

The purpose of this competence standard is to define the competence requirements for persons required to undertake installation, maintenance, modification and repair of L.V Electrical Installations.

2. Scope

This competence standard applies in all circumstances where any person is required to install, maintain, fault or test L.V Electrical Installations on Network Rail controlled infrastructure.

The level and extent of responsibility will include their own safety and that of others who might be affected by their work. The person will be expected to refer to others for authorisation when required, will be responsible for the implementation of the instructions and will work within set procedures and specifications. The person is responsible for the quality of their completed work.

This competence standard shall be used to assess the competence of people maintaining both safety related and non-safety related LV Electrical Installations

This competence standard **does not** cover

- switching operations on signalling power supplies
- periodic electrical inspections
- certification of new / modified installations

3. Competence Standard

This Competence Standard comprises four elements:

- Element 1 Carry out planned maintenance procedures on LV systems.
- Element 2 Diagnose faults in LV Systems
- Element 3 Restore LV Systems to operational condition by repair
- Element 4 Installation or Modification of LV Systems

The first element is concerned with the safe completion of planned maintenance in accordance with instructions. The second element is concerned with the safe completion of locating, diagnosing and repairing faults. The third element deals with testing of the equipment and analysing and interpreting the results to make sure that the equipment meets it's operating requirements. The final element deals with the modification of existing or installation of new LV distribution systems.

To prove competence in this unit, the person must demonstrate their ability to complete maintenance in accordance with instructions, locate, diagnose and repair faults associated with the systems and complete the appropriate testing. The person will have to show they can follow recording, reporting and escalation procedures.

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4. Assessment

4.1 Initial Assessment

Where the activity is new to the employee's area of responsibility evidence shall be used from satisfactory completion of training and mentoring and shall be gathered of the employee working on Fixed Plant Equipment.

Where the employee has been previously trained and has been completing the work for more than one year, performance evidence requirements defined in the element do not apply. The primary source of the evidence will be from detailed questioning supported by performance reports from the employee's Supervisor.

4.2 Re-Assessment

Re-assessment shall be completed at least every 3 years in accordance with the requirements set out in 7.3.

5. Knowledge Evidence this is common to the whole unit

You must have knowledge and understanding of:

1. Engineering specifications associated with LV supplies.
2. How the maintenance adjustment, faulting, repair and testing activity may affect the safe operation of the railway.
3. What procedures need to be followed to ensure operational and personal safety is maintained during the work.
4. How to avoid personal injury during the work.
5. How individual components require installing.
6. How to read engineering drawings and plan an installation.
7. What procedures apply to taking the equipment out of operational service.
8. How the systems are designed to function under normal operating conditions.
9. What each of the component parts contributes to the overall operation of the system.
10. What terminology and methods are used to identify equipment and describe operational status of the system.
11. What tools are required to complete the work and what equipment calibration is required.
12. What maintenance authorisation procedures are and limits of your responsibility and authority.
13. What equipment operating and care and control procedures are applicable to LV supplies.
14. What procedures apply to commissioning new installations.
15. What procedures apply to handing back the equipment to operational service
16. Maintenance reporting documentation and control procedures
17. Installation drawing records, documentation and control procedures
18. Reporting lines and procedures.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 1: Undertake Installation, Maintenance, Modification and Repair of LV Electrical Installations.	
Element 1: Carry out planned maintenance on LV Electrical Installations.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines. - Follow the relevant work instructions and instructions to carry out the required work. - Carry out the maintenance activities within the limits of your personal authority. - Carry out the maintenance activities in the specified sequence and in an agreed time scale. - Confirm that the maintained equipment meets the required operating specification and assess the condition. - Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule. - Complete relevant maintenance records accurately and pass them on to the appropriate person. - Dispose of waste materials in accordance with safe working practices and approved procedures.	Knowledge statements <i>You must have knowledge and understanding of:</i> - What types of defect can occur in electrical installations and how to check for these defects. - What working instructions and related specifications apply to the installations. - What maintenance methods and procedures apply to the installations. - What tests/checks must be undertaken for a complete maintenance activity. - How to recognise when the work required to restore performance to specification exceeds the limits of the maintenance activity. - What the procedures are for dealing with an inability to complete maintenance activity within agreed timescales.
Scope of Competence - Preventive maintenance procedures are to be completed on: - Internal Small Power and Lighting - External Small Power and Lighting - Switchgear and Controlgear - Activities are to: - Determine condition of system - Check security of enclosures and connections - Check Loading against rating - Check status of protective devices including transient and surge suppression equipment. - Protection set correctly - Quality standards to be achieved are as defined in the maintenance specifications.	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 1: Undertake Installation, Maintenance, Modification and Repair of L.V Electrical Installations	
Element 2: Diagnose faults in LV Systems.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Review and use all relevant information on the symptoms and problems associated with the products or assets - Investigate and establish the most likely causes of the faults - Select, use and apply diagnostic techniques, tools and aids to locate faults - Complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved - Determine the implications of the fault for other work and for safety considerations - Use the evidence gained to draw valid conclusions about the nature and probable cause of the fault - Record details on the extent and location of the faults in an appropriate format	Knowledge statements <i>You must have knowledge and understanding of:</i> - Fault diagnostic aids including: - Multimeter - Insulation tester - Fault finding methods and techniques including: - Intrusive - Non-intrusive - Observation - Taking measurements and readings - Analysis methods and techniques including: - Insulation Measurement - Impedance Testing - Load Monitoring - Test equipment operating and care and control procedures including: - Condition - Correct Use - Management - Assessing likely risks arising from faults
Scope of Competence - Type of fault finding techniques or procedures, diagnostic aids and equipment including: - Techniques appropriate to the fault symptoms - Intrusive testing - Non-intrusive testing - Observation - Taking measurements and readings using a Multimeter - Working on Live Equipment - Type and range of problems and faults including but not limited to: - Earth Fault - Disconnected Neutral - Level and complexity of diagnosis including: - High Resistance Contact - Cable Failure	Performance Evidence Requirements Performance evidence must be collected of the person locating failures associated with LV systems caused by: - Over Current - High Resistance - Over Load in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 1: Undertake Installation, Maintenance, Modification and Repair of LV Electrical Installations	
Element 3: Restore LV systems to operational condition by repair.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Follow the relevant specifications for the component to be repaired - Prepare the component for repair - Carry out the repairs within agreed timescale using approved materials and components and methods and procedures - Ensure that the repaired component meets the specified operating conditions - Produce accurate and complete records of all repair work carried out	Knowledge statements <i>You must have knowledge and understanding of:</i> Component repair methods, techniques and procedures associated with LV systems.
Scope of Competence requirements - Type of repairs or repair techniques to be used including: - Adjust - Replace - Renew - Complexity or nature of repairs to be carried out including repairs following: - Insulation Failure - Component failure - Damage	Performance Evidence Requirements Performance evidence must be collected of the person repairing failures associated with LV systems caused by: - earth fault - insulation failure in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 1: Undertake Installation, Maintenance, Modification and Repair of LV Electrical Installations	
Element 4: Installation or Modification of L.V Electrical Systems	
Performance statements <i>You must be able to:</i> - Confirm that conditions are suitable to implement installation methods and procedures - Provide clear and accurate instructions to all relevant people - Obtain accurate information on the installation activities being undertaken - Ensure that the quality assurance systems are correctly implemented - Control the use of resources to achieve the most effective results - Identify opportunities to improve the installations methods and procedures - Ensure that the implementation of the installation methods and procedures complies with all relevant regulations and guidelines.	Knowledge statements <i>You must have knowledge and understanding of:</i> - Implementing installation methods and procedures of LV Electrical Installations - Mounting and connection of equipment - Proving circuits before energisation - Resources required/available - Regulations, guidelines and reporting procedures
Scope of Competence - Installation and modification to be performed on systems such as - Domestic Wiring - External Lighting System - Relocating Supply Kiosk - Installation Activities and Methods are in accordance with working procedures and guidelines including: - Cable Termination - Cable Laying - Mounting enclosures - Labelling - Completing formal processes such as - Circuit proving - Producing installation drawings	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators

1. Purpose

The purpose of this competence standard is to define the competence requirements for persons required to undertake installation, maintenance, modification and repair of Fixed & Mobile Generators.

2. Scope

This competence standard applies in all circumstances where any person is required to install, maintain, fault or test Fixed & Mobile Generators on Network Rail controlled infrastructure.

The level and extent of responsibility will include their own safety and that of others who might be affected by their work. The person will be expected to refer to others for authorisation when required, will be responsible for the implementation of the instructions and will work within set procedures and specifications. The person is responsible for the quality of their completed work.

This competence standard shall be used to assess the competence of people maintaining any of the following Fixed & Mobile Generators:

- Mobile
- Signalling Supplies
- Secure Supplies e.g. station emergency generator

And generators where the starting type may be:

- Electrically started set
- Hydraulic emergency started set
- Pneumatic emergency started set

3. Competence Standard

This Competence Standard comprises six elements:

- | | |
|-----------|--|
| Element 1 | Carry out planned maintenance procedures on Fixed & Mobile Generators. |
| Element 2 | Adjust Fixed & Mobile Generators to meet operating requirements |
| Element 3 | Diagnose faults in Fixed & Mobile Generators |
| Element 4 | Restore Fixed & Mobile Generators to operational condition by repair |
| Element 5 | Conduct specified testing of Fixed & Mobile Generators and analyse and interpret the results |
| Element 6 | Install or Modify a Generating Set |

The first element is concerned with the safe completion of planned maintenance in accordance with instructions. The second element deals with adjusting the equipment to make sure that it meets its operating requirements. The third and fourth elements are concerned with the safe completion of locating, diagnosing and repairing faults. The fifth element deals with testing of the equipment and analysing and interpreting the results to make sure that the equipment meets its operating requirements. The sixth element is concerned with the introduction of new or modification of existing equipment. For diesel generator systems this is crash testing. The sixth element covers installation of new or modification of existing equipment.

To prove competence in this unit, the person must demonstrate their ability to complete maintenance in accordance with instructions, locate, diagnose and repair faults associated with standby generators and complete the appropriate testing. The person will have to show they can follow recording, reporting and escalation procedures.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

4. Assessment

4.1 Initial Assessment

Where the activity is new to the employee's area of responsibility evidence shall be used from satisfactory completion of training and mentoring and shall be gathered of the employee working on Fixed Plant Equipment.

Where the employee has been previously trained and has been completing the work for more than one year, performance evidence requirements defined in the element do not apply. The primary source of the evidence will be from detailed questioning supported by performance reports from the employee's Supervisor.

4.2 Re-Assessment

Re-assessment shall be completed at least every 3 years in accordance with the requirements set out in 7.3.

5. Knowledge Evidence this is common to the whole unit

You must have knowledge and understanding of:

1. Engineering specifications associated with the equipment.
2. How the maintenance adjustment, faulting, repair and testing activity may affect the safe operation of the railway.
3. What procedures need to be followed to ensure operational and personal safety is maintained during the work.
4. How to avoid personal injury during the work.
5. How individual components require installing.
6. How to read engineering drawings and plan an installation.
7. What procedures apply to taking the equipment out of operational service.
8. How the systems are designed to function under normal operating conditions.
9. What each of the component parts contributes to the overall operation of the system.
10. What terminology and methods are used to identify equipment and describe operational status of the system.
11. What tools are required to complete the work and what equipment calibration is required.
12. What maintenance authorisation procedures are and limits of your responsibility and authority.
13. What equipment operating and care and control procedures are applicable to the equipment.
14. What procedures apply to commissioning new installations.
15. What procedures apply to handing back the equipment to operational service
16. Maintenance reporting documentation and control procedures
17. Installation drawing records, documentation and control procedures
18. Reporting lines and procedures.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators.	
Element 1: Carry out planned maintenance on Fixed & Mobile Generators.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines. - Follow the relevant work instructions and instructions to carry out the required work. - Carry out the maintenance activities within the limits of your personal authority. - Carry out the maintenance activities in the specified sequence and in an agreed time scale. - Confirm that the maintained equipment meets the required operating specification. - Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule. - Complete relevant maintenance records accurately and pass them on to the appropriate person. - Dispose of waste materials in accordance with safe working practices and approved procedures.	Knowledge statements <i>You must have knowledge and understanding of:</i> - What types of defect can occur in Fixed & Mobile Generators and how to check for these defects. - What work instructions and related specifications apply to Fixed & Mobile Generators. - What maintenance methods and procedures apply to the Fixed & Mobile Generators. - What tests/checks must be undertaken for a complete maintenance activity. - How to recognise when the work required to restore performance to specification exceeds the limits of the maintenance activity. - What the procedures are for dealing with an inability to complete maintenance activity within agreed timescales. - Condition assessment requirements.
Scope of Competence - Preventive maintenance procedures are to be completed on: - Fixed & Mobile Generators - Activities are to: - Examine for corrosion, deterioration or damage - Check security - Replace / Renew worn parts - Replace Oil - Replace consumable items e.g. filters - Refuel as required - Assess condition - Confirm Operation (Test / Crash Test) - Connect & disconnect Mobile Set to fixed installation. - Quality standards to be achieved are as defined in the maintenance specifications.	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators.	
Element 2: Adjust Fixed & Mobile Generators to meet operating requirements.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines. - Follow the appropriate operating specifications for the equipment being maintained. - Carry out adjustments within the limits of your personal authority. - Make the required adjustments in the specified sequence and in an agreed time scale. - Confirm that the adjusted equipment meets the required operating specification. - Report any instances where the equipment fails to meet the required performance after adjustments or where there are identified defects outside the required adjustments. - Maintain documentation in accordance with organisational requirements.	Knowledge statements <i>You must have knowledge and understanding of:</i> - How to carry out adjustments related to the functions detailed in scope statement 1. - The tools necessary to complete the task. - Work instructions and related specifications relating to Fixed & Mobile Generators. - Maintenance methods and procedures relating to Fixed & Mobile Generators.
Scope of Competence - Type of adjustments to be made include: - AVR Voltage - Governor Speed - Calibration of Voltage Monitors - Quality standards to be achieved are as defined in the maintenance specifications	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person adjusting: - AVR Voltage - Governor Speed - Voltage Monitors in respect of performance statements: a, b, c, d, e, and g. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators.	
Element 3: Diagnose faults in Fixed & Mobile Generators.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Review and use all relevant information on the symptoms and problems associated with the products or assets - Investigate and establish the most likely causes of the faults - Select, use and apply diagnostic techniques, tools and aids to locate faults - Complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved - Determine the implications of the fault for other work and for safety considerations - Use the evidence gained to draw valid conclusions about the nature and probable cause of the fault - Record details on the extent and location of the faults in an appropriate format	Knowledge statements <i>You must have knowledge and understanding of:</i> - Fault diagnostic aids including: - Multimeter - Gauges - Fault finding methods and techniques including - Intrusive - Non-intrusive e.g. Oil Sampling - Observation - Taking measurements and readings - Analysis methods and techniques including: - Comparison with specification - Comparison with operational requirements - Comparison with previous data - Risks associated with rotating machinery - Assessing likely risks arising from faults
Scope of Competence - Type of fault finding techniques or procedures, diagnostic aids and equipment including but not limited to: - Techniques appropriate to the fault symptoms - Intrusive testing - Non-intrusive testing - Observation - Taking measurements and readings using a Multimeter - Type and range of problems and faults including but not limited to: - Failure to start - Failure to take load - Failure to synchronise (where an integral synchronisation panel is provided). - Level and complexity of diagnosis including: - Control system failure - Component failure - Blocked Fuel Lines / Flat Batteries	Performance Evidence Requirements Performance evidence must be collected of the person locating failures associated with generators caused by: - Component Failure - Control system failure in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators.	
Element 4: Restore Fixed & Mobile Generators to operational condition by repair.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Follow the relevant specifications for the component to be repaired - Prepare the component for repair - Carry out the repairs within agreed timescale using approved materials and components and methods and procedures - Ensure that the repaired component meets the specified operating conditions - Produce accurate and complete records of all repair work carried out	Knowledge statements <i>You must have knowledge and understanding of:</i> - Repair / replacement methods of - Engine - Cooling System - Starting System - Exhaust System - Ventilation System - Control System
Scope of Competence requirements - Type of repairs or repair techniques to be used including: - Adjust - Replace - Renew - Complexity or nature of repairs to be carried out including repairs following but not limited to: - Overheating - Fuel Starvation - Pre Heater Failure - Lubrication System Failure - Fuel Line Failure - Damper Failure - Battery Charger Failure - Blocked Filters	Performance Evidence Requirements Performance evidence must be collected of the person repairing failures associated with standby generators caused by: - Flat / Failed Batteries - Fuel Supply Isolated in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators.	
Element 5: Conduct specified testing of Fixed & Mobile Generators and analyse and interpret the results	
Performance statements <i>You must be able to:</i> - Work safely in accordance with the regulations for your work environment. - Follow the appropriate procedures for use of tools and equipment to carry out the required tests. - Set up and carry out the tests using the correct procedures and within agreed timescales. - Ensure that you have the necessary test data on which to conduct the analysis. - Review the results and carry out further tests if necessary. - Analyse the data using approved methods and procedures. - Resolve promptly any inconsistencies in the data. - Check that the data analysis is accurate and thorough and takes account of the test conditions. - Compare the analysis against the product or asset specification and identify any faults or variations from specification. - Record the results of the tests and analysis in the appropriate format.	Knowledge statements <i>You must have knowledge and understanding of:</i> - The knowledge components of element 1. - The load and the consequence of starting the generator directly onto that load. Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence and completing the following tests: - On load test in respect of all performance statements: except statement 'g'. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.
Scope of Competence - Tests to be carried out include: - Failure Circuits - Monitors - Overspeed Systems - Overtemp - AVR / Governor Checks - Data to be used includes: - Measurements - Meter readings	

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 2: Undertake Installation, Maintenance, Modification and Repair of Fixed & Mobile Generators.	
Element 6: Installation or Modification a Generator set	
Performance statements <i>You must be able to:</i> - Confirm that conditions are suitable to implement installation methods and procedures - Provide clear and accurate instructions to all relevant people - Obtain accurate information on the installation activities being undertaken - Ensure that the quality assurance systems are correctly implemented - Control the use of resources to achieve the most effective results - Identify opportunities to improve the installations methods and procedures - Ensure that the implementation of the installation methods and procedures complies with all relevant regulations and guidelines.	Knowledge statements <i>You must have knowledge and understanding of:</i> - Implementing installation methods and procedures for generators - Mounting and connection of equipment - AVR and Governor operation - Proving circuits before energisation - Resources required/available - Regulations, guidelines and reporting procedures
Scope of Competence - Installation and modification to be performed on systems such as - Fuel Tanks - Control Systems - Alternators - Installation Activities and Methods are in accordance with working procedures and guidelines including: - Cable Termination - Mounting enclosures - Pipework identification - Labelling - Completing formal processes such as - Testing Mechanical Protection - Producing installation drawings	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations

1. Purpose

The purpose of this competence standard is to define the competence requirements for persons required to undertake installation, maintenance, modification and repair of Pump sets and their associated control systems.

2. Scope

This competence standard applies in all circumstances where any person is required to install, maintain, fault or test Pumps on Network Rail controlled infrastructure.

The level and extent of responsibility will include their own safety and that of others who might be affected by their work. The person will be expected to refer to others for authorisation when required, will be responsible for the implementation of the instructions and will work within set procedures and specifications. The person is responsible for the quality of their completed work.

This competence standard shall be used to assess the competence of people maintaining any of the following Pumps:

- Fixed Pump Sets
- Borehole Pumps > 50kW
- Borehole Pumps < 50kW
- Vertically Mounted Spindle Pumps

3. Competence Standard

This Competence Standard comprises five elements

- Element 1 Carry out planned maintenance procedures on Pumps.
- Element 2 Adjust Pumps to meet operating requirements
- Element 3 Diagnose faults in Pumps
- Element 4 Restore Pumps to operational condition by repair
- Element 5 Install or Modify Pumping Installations

The first element is concerned with the safe completion of planned maintenance in accordance with instructions. The second element deals with adjusting the equipment to make sure that it meets its operating requirements. The third and fourth elements are concerned with the safe completion of locating, diagnosing and repairing faults. The fifth element is concerned with the introduction of new or modification of existing equipment.

To prove competence in this unit, the person must demonstrate their ability to complete maintenance in accordance with instructions, locate, diagnose and repair faults associated with pumping installations and complete the appropriate testing. The person will have to show they can follow recording, reporting and escalation procedures.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

4. Assessment

4.1 Initial Assessment

Where the activity is new to the employee's area of responsibility evidence shall be used from satisfactory completion of training and mentoring and shall be gathered of the employee working on Fixed Plant Equipment.

Where the employee has been previously trained and has been completing the work for more than one year, performance evidence requirements defined in the element do not apply. The primary source of the evidence will be from detailed questioning supported by performance reports from the employee's Supervisor.

4.2 Re-Assessment

Re-assessment shall be completed at least every 3 years in accordance with the requirements set out in 7.3.

5. Knowledge Evidence this is common to the whole unit

You must have knowledge and understanding of:

1. Engineering specifications associated with the equipment.
2. How the maintenance adjustment, faulting, repair and testing activity may affect the safe operation of the railway.
3. What procedures need to be followed to ensure operational and personal safety is maintained during the work.
4. How to avoid personal injury during the work.
5. How individual components require installing.
6. How to read engineering drawings and plan an installation.
7. What procedures apply to taking the equipment out of operational service.
8. How the systems are designed to function under normal operating conditions.
9. What each of the component parts contributes to the overall operation of the system.
10. What terminology and methods are used to identify equipment and describe operational status of the system.
11. What tools are required to complete the work and what equipment calibration is required.
12. What maintenance authorisation procedures are and limits of your responsibility and authority.
13. What equipment operating and care and control procedures are applicable to the equipment.
14. What procedures apply to commissioning new installations.
15. What procedures apply to handing back the equipment to operational service
16. Maintenance reporting documentation and control procedures
17. Installation drawing records, documentation and control procedures
18. Reporting lines and procedures.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations

Element 1: Carry out planned maintenance on Pumps.

Performance statements

You must be able to:

- Work safely at all times, complying with health and safety and other relevant regulations and guidelines.
- Follow the relevant work instructions and instructions to carry out the required work.
- Carry out the maintenance activities within the limits of your personal authority.
- Carry out the maintenance activities in the specified sequence and in an agreed time scale.
- Confirm that the maintained equipment meets the required operating specification.
- Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule.
- Complete relevant maintenance records accurately and pass them on to the appropriate person.
- Dispose of waste materials in accordance with safe working practices and approved procedures.

Scope of Competence

- Preventive maintenance procedures are to be completed on:
 - Pump Impeller and Housing
 - Pump Motor
 - Pump Fixings / Mountings
 - Pump control panel
 - Level sensors, limit switches etc.
 - Pipe work / Valves / Filters
 - Sump / Interceptors / Weirs
- Activities are to include:
 - Examination for corrosion, deterioration, damage and leakage
 - Confirmation correct operation
 - Check for vibration / noise
 - Condition assessment
 - Check sump/interceptors for sediment / blockage
 - Check drainage paths clear
 - Test Alarms / Telemetry
- Quality standards to be achieved are as defined in the maintenance specifications.

Knowledge statements

You must have knowledge and understanding of:

- What types of defect can occur in Pumps and how to check for these defects.
- What work instructions and related specifications apply to Pumps.
- What maintenance methods and procedures apply to the Pumps.
- Isolating pump sets (Electrical & Mechanical).
- Removing submersible pumps from sumps.
- What tests/checks must be undertaken for a complete maintenance activity.
- How to recognise when the work required to restore performance to specification exceeds the limits of the maintenance activity.
- What the procedures are for dealing with an inability to complete maintenance activity within agreed timescales.

Performance Evidence Requirements

Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1.

The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations	
Element 2: Adjust Pump system to meet operating requirements.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines. - Follow the appropriate operating specifications for the equipment being maintained. - Carry out adjustments within the limits of your personal authority. - Make the required adjustments in the specified sequence and in an agreed time scale. - Confirm that the adjusted equipment meets the required operating specification. - Report any instances where the equipment fails to meet the required performance after adjustments or where there are identified defects outside the required adjustments. - Maintain documentation in accordance with organisational requirements.	Knowledge statements <i>You must have knowledge and understanding of:</i> - How to carry out adjustments related to the functions detailed in scope statement 1. - Calibrate level sensors. - Adjusting control relay/PLC timings. - Work instructions and related specifications relating to Pumps. - Maintenance methods and procedures relating to Pumps.
Scope of Competence - Type of adjustments to be made include: - Control System Settings - Control Sensor Setting - Quality standards to be achieved are as defined in the maintenance specifications	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person adjusting: - Calibrating Sensors - Setting Duty cycles in respect of performance statements: a, b, c, d, e, and g. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations	
Element 3: Diagnose faults in Pumps.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Review and use all relevant information on the symptoms and problems associated with the products or assets - Investigate and establish the most likely causes of the faults - Select, use and apply diagnostic techniques, tools and aids to locate faults - Complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved - Determine the implications of the fault for other work and for safety considerations - Use the evidence gained to draw valid conclusions about the nature and probable cause of the fault - Record details on the extent and location of the faults in an appropriate format	Knowledge statements <i>You must have knowledge and understanding of:</i> - Fault diagnostic aids including: - Multimeter - Gauges - PLC Alarm Outputs - Fault finding methods and techniques including - Intrusive - Non-intrusive - Observation - Taking measurements and readings - Analysis methods and techniques including: - Comparison with specification - Comparison with operational requirements - Comparison with previous data - Assessing likely risks arising from faults
Scope of Competence - Type of fault finding techniques or procedures, diagnostic aids and equipment including - Techniques appropriate to the fault symptoms - Intrusive testing - Non-intrusive testing - Observation - Defeating control logic - Measuring motor currents - Type and range of problems and faults including but not limited to: - Noise - Failure to maintain sump level - Level and complexity of diagnosis including: - Unbalanced Rotor - Failed Sensor - Motor Overheating	Performance Evidence Requirements Performance evidence must be collected of the person diagnosing faults associated with pumping systems caused by but not limited to: - Fouled float sensor - blocked filter in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.

Ref	NR/SP/CTM/016
Issue	1
Date	December 2006

Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations.	
Element 4: Restore Pumps system to operational condition by repair.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Follow the relevant specifications for the component to be repaired - Prepare the component for repair - Utilise specialist contractor / manufacturer where required - Carry out the repairs within agreed timescale using approved materials and components and methods and procedures - Ensure that the repaired component meets the specified operating conditions - Produce accurate and complete records of all repair work carried out	Knowledge statements <i>You must have knowledge and understanding of:</i> - Component repair methods, techniques and procedures associated with Pumping systems. - Control philosophy for particular pump set. - Know when pump bearing refurbishment or motor re-wind is required. - Relay or PLC control systems. - Telemetry/Alarm systems.
Scope of Competence requirements - Type of repairs or repair techniques to be used including: - Component Replacement - Cable Replacement - Pump removal for refurbishment - Complexity or nature of repairs to be carried out including repairs following: - Overheating - Stalling - Bursting - Not Starting	Performance Evidence Requirements Performance evidence must be collected of the person repairing failures associated with pumping systems caused by: - Fouled float sensor - blocked filter in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.

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Plant 3: Undertake Installation, Maintenance, Modification and Repair of Pumping Installations.	
Element 5: Install or Modify Pumping Installations	
Performance statements <i>You must be able to:</i> - Confirm that conditions are suitable to implement installation methods and procedures - Provide clear and accurate instructions to all relevant people - Obtain accurate information on the installation activities being undertaken - Ensure that the quality assurance systems are correctly implemented - Control the use of resources to achieve the most effective results - Identify opportunities to improve the installations methods and procedures - Ensure that the implementation of the installation methods and procedures complies with all relevant regulations and guidelines.	Knowledge statements <i>You must have knowledge and understanding of:</i> - Implementing installation methods and procedures for pumps - Mounting and connection of equipment - Pump testing - Proving control system - Resources required/available - Regulations, guidelines and reporting procedures
Scope of Competence - Installation and modification to be performed on systems such as - Strainer - Motor - Rising Main - Level Sensors - Control Panels - Installation Activities and Methods are in accordance with working procedures and guidelines including: - Cable Termination - Mounting enclosures - Pipework identification - Labelling - Completing formal processes such as - Testing Mechanical Protection - Producing installation drawings	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

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Plant 4: Undertake Installation, Maintenance, Modification and Repair of Compressed Air Systems

1. Purpose

The purpose of this competence standard is to define the competence requirements for persons required to undertake installation, maintenance, modification and repair of Compressed Air Systems.

2. Scope

This competence standard applies in all circumstances where any person is required to install, maintain, fault or test Compressed Air Systems on Network Rail controlled infrastructure.

The level and extent of responsibility will include their own safety and that of others who might be affected by their work. The person will be expected to refer to others for authorisation when required, will be responsible for the implementation of the instructions and will work within set procedures and specifications. The person is responsible for the quality of their completed work.

This competence standard shall be used to assess the competence of people maintaining any compressed air systems.

3. Competence Standard

This Competence Standard comprises four elements:

- Element 1 Carry out planned maintenance procedures on Compressors.
- Element 2 Diagnose faults in Compressors
- Element 3 Restore Compressors to operational condition by repair
- Element 4 Install or Modify Compressor Systems

The first element is concerned with the safe completion of planned maintenance in accordance with instructions. The second and third elements are concerned with the safe completion of locating, diagnosing and repairing faults. The fourth element is concerned with the introduction of new or modification of existing equipment.

To prove competence in this unit, the person must demonstrate their ability to complete maintenance in accordance with instructions, locate, diagnose and repair faults associated with the compressor and the associated pipe work and complete the appropriate testing. The person will have to show they can follow recording, reporting and escalation procedures.

4. Assessment

4.1 Initial Assessment

Where the activity is new to the employee's area of responsibility evidence shall be used from satisfactory completion of training and mentoring and shall be gathered of the employee working on Fixed Plant Equipment.

Where the employee has been previously trained and has been completing the work for more than one year, performance evidence requirements defined in the element do not apply. The primary source of the evidence will be from detailed questioning supported by performance reports from the employee's Supervisor.

4.2 Re-Assessment

Re-assessment shall be completed at least every 3 years in accordance with the requirements set out in 7.3.

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5. Knowledge Evidence this is common to the whole unit

You must have knowledge and understanding of:

1. Engineering specifications associated with the equipment.
2. How the maintenance adjustment, faulting, repair and testing activity may affect the safe operation of the railway.
3. What procedures need to be followed to ensure operational and personal safety is maintained during the work.
4. How to avoid personal injury during the work.
5. How individual components require installing.
6. How to read engineering drawings and plan an installation.
7. What procedures apply to taking the equipment out of operational service.
8. How the systems are designed to function under normal operating conditions.
9. What each of the component parts contributes to the overall operation of the system.
10. What terminology and methods are used to identify equipment and describe operational status of the system.
11. What tools are required to complete the work and what equipment calibration is required.
12. What maintenance authorisation procedures are and limits of your responsibility and authority.
13. What equipment operating and care and control procedures are applicable to the equipment.
14. What procedures apply to commissioning new installations.
15. What procedures apply to handing back the equipment to operational service
16. Maintenance reporting documentation and control procedures
17. Installation drawing records, documentation and control procedures
18. Reporting lines and procedures.

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Plant 4: Undertake Installation, Maintenance, Modification and Repair of Compressed Air Systems	
Element 1: Carry out planned maintenance on Compressors.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines. - Follow the relevant work instructions and instructions to carry out the required work. - Carry out the maintenance activities within the limits of your personal authority. - Carry out the maintenance activities in the specified sequence and in an agreed time scale. - Confirm that the maintained equipment meets the required operating specification. - Report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule. - Complete relevant maintenance records accurately and pass them on to the appropriate person. - Dispose of waste materials in accordance with safe working practices and approved procedures.	Knowledge statements <i>You must have knowledge and understanding of:</i> - What types of defect can occur in Compressors and how to check for these defects. - What work instructions and related specifications apply to Compressors. - What maintenance methods and procedures apply to the Compressors. - Isolating compressors. - Depressurising pipe work. - What tests/checks must be undertaken for a complete maintenance activity. - How to recognise when the work required to restore performance to specification exceeds the limits of the maintenance activity. - What the procedures are for dealing with an inability to complete maintenance activity within agreed timescales.
Scope of Competence - Preventive maintenance procedures are to be completed on: - Compressor Drive and Housings - Driers - Compressor Control Panel - Pipe work / Valves - Activities are to: - Examine for corrosion, deterioration, damage or leakage - Confirmation of correct operation - Condition Assessment - Drainage of Condensate - Quality standards to be achieved are as defined in the maintenance specifications.	Performance Evidence Requirements Performance evidence must be collected through differing types of workplace evidence, of the person completing all relevant maintenance procedures in respect of performance statements: a, b, c, d, and f for all applicable items in scope statement 1. The remaining performance statements may be assessed by using a range of assessment methods including witness testimony, documented questioning or evidence from training.

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Plant 4: Undertake Installation, Maintenance, Modification and Repair of Compressed Air Systems	
Element 2: Diagnose faults in Compressors.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Review and use all relevant information on the symptoms and problems associated with the products or assets - Investigate and establish the most likely causes of the faults - Select, use and apply diagnostic techniques, tools and aids to locate faults - Complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved - Determine the implications of the fault for other work and for safety considerations - Use the evidence gained to draw valid conclusions about the nature and probable cause of the fault - Record details on the extent and location of the faults in an appropriate format	Knowledge statements <i>You must have knowledge and understanding of:</i> - Fault diagnostic aids including: - Multimeter - Gauges - Ultrasound Testing - Fault finding methods and techniques including - Intrusive - Non-intrusive - Observation - Taking measurements and readings - Analysis methods and techniques including: - Comparison with specification - Comparison with operational requirements - Comparison with previous data - Assessing likely risks arising from faults
Scope of Competence - Type of fault finding techniques or procedures, diagnostic aids and equipment including: - Techniques appropriate to the fault symptoms - Intrusive testing - Non-intrusive testing - Observation - Taking measurements and readings using a Multimeter - Type and range of problems and faults including: - Failed Pressure Switch - Seized Motor - Leaking Seals - Level and complexity of diagnosis including: - Component failure - Damage	Performance Evidence Requirements Performance evidence must be collected of the person locating failures associated with compressed air systems caused by: - Failed Motor - Pipe work Failed in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed. Adequately diagnose fault and rectify.

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Plant 4: Undertake Installation, Maintenance, Modification and Repair of Compressed Air Systems	
Element 3: Restore Compressors to operational condition by repair.	
Performance statements <i>You must be able to:</i> - Work safely at all times, complying with health and safety and other relevant regulations and guidelines - Follow the relevant specifications for the component to be repaired - Utilise specialist contractor / manufacturer where required - Prepare the component for repair - Carry out the repairs within agreed timescale using approved materials and components and methods and procedures - Ensure that the repaired component meets the specified operating conditions - Produce accurate and complete records of all repair work carried out	Knowledge statements <i>You must have knowledge and understanding of:</i> - Component repair methods, techniques and procedures associated with Compressors. - Control philosophy for particular compressor. - Know when motor bearing refurbishment or re-wind is required. - Relay or PLC control systems. - Testing Pipe work
Scope of Competence requirements - Type of repairs or repair techniques to be used including: - Renew Pipe work / Seals - Replace Contactors - Adjust pressure limits - Complexity or nature of repairs to be carried out including repairs following: - Component failure - Damage	Performance Evidence Requirements Performance evidence must be collected of the person repairing failures associated with Compressed air systems caused by: - Component Failure - Damage including, but not limited to: in respect of all performance statements. This evidence shall normally be supplied by performance reports with copies of relevant fault reports supplied to confirm that the work has been completed.