



QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR CONSTRUCTION INDUSTRY

What are Occupational Standards(OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack – Construction UT Tester

SECTOR: CONSTRUCTION

SUB-SECTOR: Real Estate and Infrastructure Construction

OCCUPATION: QUALITY ASSURANCE AND QUALITY CONTROL

REFERENCE ID: CON/Q0404

ALIGNED TO: NCO-2004/3111.10

This job role performs non-destructive tests (Ultrasonic Testing) on structural steel components and welded sections at a construction site.

Brief Job Description: This job role is responsible for performing ultrasonic testing on structural steel components and welded sections. The individual should possess sound technical knowledge, should be able to monitor and maintain safe and quality working practices.

Personal Attributes: This job role requires the individual to be physically and mentally strong enough to oversee the quality control work at a construction site. The individual should be having strong organizational, interpersonal and communication skills, along with comprehensive technical knowledge of quality assurance and quality control operations and ability to supervise construction crew.

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|-------------|---------------------------------|---|-------------------------|------------|
| Job Details | Qualifications Pack Code | CON/Q0404 | | |
| | Job Role | Assistant UT Tester | | |
| | Credits (NSQF) | TBD | Version number | 1.0 |
| | Sector | Construction | Drafted on | 07/08/2015 |
| | Sub-sector | Real Estate and Infrastructure Construction | Last reviewed on | 23/08/2015 |
| | Occupation | Quality Assurance and Quality Control | Next review date | 23/08/2017 |
| | NSQC Clearance on | NA | | |

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| Job Role | Construction UT Tester |
| Role Description | This job role is responsible for performing ultrasonic testing on structural steel components and welded sections. |
| NSQF level | 3 |
| Minimum Educational Qualifications | Preferably 10 th standard, or ASNT level 1 qualified |
| Maximum Educational Qualifications | N.A |
| Training (Suggested but not mandatory) | Recommended training period of 2-4 weeks as per QP of Construction UT Tester Recommended training in basic computer literacy |
| Minimum Job Entry Age | 18 years |
| Experience | Desirable: 1. Trained worker : Nil |
| Applicable National Occupational Standards (NOS) | Compulsory: 1. CON/N0411: Perform ultrasonic testing on structural steel components and welded sections 2. CON/N9001: Work according to personal health, safety and environment protocol at construction site Optional: N.A. |
| Performance Criteria | As described in the relevant OS units |

| Definitions | Keywords / Terms | Description |
|------------------------------|---|---|
| | Sector | Sector is conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests. |
| | Sub-Sector | Sub-Sector is derived from a further breakdown based on the characteristics and interests of its components |
| | Occupation | Occupation is a set of job roles, which perform similar/related set of functions in an industry |
| | Job role | Job role defines a unique set of functions that together form a unique employment opportunity in an organization. |
| | Occupational Standards (OS) | OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the knowledge and understanding they need to meet the standard consistently. Occupational Standards are applicable both in the Indian contexts. |
| | Performance Criteria | Performance Criteria are statements that together specify the standard of performance required when carrying out a task. |
| | Qualifications Pack (QP) | Qualifications Pack comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A Qualification Pack is assigned a unique qualification pack code |
| | Qualification Pack Code | Qualification Pack Code is a unique reference code that identifies a qualifications pack. |
| | National Occupational Standards (NOS) | NOS are Occupational Standards which apply uniquely in the Indian context. |
| | Scope | Scope is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required. |
| | Knowledge and Understanding | Knowledge and Understanding are statements which together specify the technical, generic, professional and organizational specific knowledge that an individual needs in order to perform to the required standard |
| | Organizational Context | Organizational Context includes the way the organization is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility. |
| | Technical Knowledge | Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities. |
| Core Skills / Generic Skills | Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles. | |
| Acronyms | Keywords /Terms | Description |
| | CON | Construction |
| | NSQF | National Skill Qualifications Framework |
| | QP | Qualification Pack |
| | OS | Occupational Standards |
| | TBD | To Be Decided |
| | UT | Ultrasonic Test |

CON/N0411 Perform ultrasonic testing on structural steel components and welded sections

National Occupational Standard



Overview

This NOS covers the skills and knowledge required by a workman to be proficient in performing ultrasonic testing on structural steel components and welded sections.

CON/N0411 Perform ultrasonic testing on structural steel components and welded sections

National Occupational Standard

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| Unit Code | CON/N0411 |
| Unit Title (Task) | Perform ultrasonic testing on structural steel components and welded sections |
| Description | This unit describes the skills and knowledge required to perform ultrasonic testing on structural steel components and welded sections. |
| Scope | <p>The scope covers the following:</p> <ul style="list-style-type: none"> Perform ultrasonic testing on structural steel components and sections to detect deformities present inside the weld, between weld and parent material, rolling defects under the surface of base material |
| Performance Criteria (PC) w.r.t. the Scope | |
| Element | Performance Criteria |
| Perform ultrasonic testing on structural steel components and sections to detect deformities present inside the weld, between weld and parent material, rolling defects under the surface of base material | <p>To be competent, the user / individual on the job must be able to:</p> <p>PC1. read and interpret the quality plan, WPS, fabrication shop drawings etc. to understand the technical specifications, locations of testing and method to be adopted</p> <p>PC2. identify the location of joint or section for conducting the test as per specification</p> <p>PC3. estimate the quantity of materials and time required for completion of test</p> <p>PC4. read and interpret the standard specifications and perform the test in accordance to the same</p> <p>PC5. carry out pre-test cleaning activities using solvents, brushes, scrubs etc. to remove any paint, dust, oil, grease or scale etc. from the test surface</p> <p>PC6. identify the transducers, instruments and calibration standards to be used based upon conditions of testing, location and accessibility of testing and purpose of test</p> <p>PC7. ensure that the instrument is calibrated as per schedule before starting the test</p> <p>PC8. run diagnostic checks using calibration standards to ensure that readings obtained are accurate</p> <p>PC9. apply coating of gel, water or solvent on the surface to be tested appropriately as per manufactures guidelines or standard practices</p> <p>PC10. ensure that the test specimen is properly immersed in solvent in case of immersed type of ultrasonic test</p> <p>PC11. ensure that transducers are properly coated and ready for use</p> <p>PC12. choose normal or angle beam as per test requirement and instructions</p> <p>PC13. set the frequency of ultrasound as per test specifications and requirements</p> <p>PC14. ensure that the position and movement of both pieces is correct and simultaneous in case of dual element transducers</p> <p>PC15. ensure that the single piece transducer is moving appropriately and required test area is covered</p> |

CON/N0411 Perform ultrasonic testing on structural steel components and welded sections

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| | PC16. read the graphs and other details mentioned on the display to compute the v size and type of defect |
| Knowledge and Understanding (K) | |
| A. Organizational Context (Knowledge of the company / organization and its processes) | <p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> KA1. standard practices for quality control works KA2. safety rules and regulations for handling and storing required tools, equipment and materials KA3. personal protection including the use of related safety gears & equipments KA4. service request procedures for tools, materials and equipments KA5. statutory compliance requirement related to working at height KA6. statutory compliance requirement related to workmen engagement |
| B. Technical Knowledge | <p>The user/individual on the job needs to know and understand:</p> <ul style="list-style-type: none"> KB1. different types of testing carried out on fabricated materials KB2. destructive and non-destructive testing, difference, pros and cons KB3. how the sound is transmitted, properties of sound KB4. concept of wave and related parameters KB5. principle of ultrasonic testing KB6. different methods and procedures of performing ultrasonic testing KB7. different equipments used in ultrasonic testing , their range, area of application, classification and principles of operation KB8. how to operate various settings on the instrument and their implication on testing KB9. application of ultrasonic testing KB10. limitations of ultrasonic testing KB11. type of defects inspected by ultrasonic testing KB12. precautions to be taken while conducting ultrasonic testing KB13. importance of cleaning the surface before and after conducting ultrasonic testing test KB14. different methods of cleaning metal surface KB15. interpret the readings and graphs shown on the display KB16. how to classify the sample based upon the test report KB17. how to calibrate the instrument |
| Skills (S) | |
| A. Core Skills/ Generic Skills | Writing Skills |
| | <p>The user/ individual on the job needs to know and understand how to:</p> <ul style="list-style-type: none"> SA1. write in at least two language, preferably in the local language of the site and basic English SA2. provide clear and simple instructions, details & sketches to sub-ordinate SA3. record and document daily productivity report, daily labour attendance & |

CON/N0411 Perform ultrasonic testing on structural steel components and welded sections

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| | <p>details regarding work</p> <p>SA4. prepare basic status updates for the superiors in the prescribed format</p> |
| | <p>Reading Skills</p> |
| | <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA5. read one or more language, preferably in the local language of the site</p> <p>SA6. read drawing, specification and standards related to relevant work</p> <p>SA7. read key documents including quality standards and standard working methods</p> <p>SA8. read various, sign boards, safety rules and safety tags, instructions related to exit routes during emergency at the workplace</p> |
| | <p>Oral Communication (Listening and Speaking skills)</p> |
| | <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA9. speak in one or more language, preferably in one of the local languages of the site</p> <p>SA10. listen and follow instructions clearly given by the superior</p> <p>SA11. provide clear instructions to subordinates for completion of task as per work plan, time schedule and quality</p> |
| B. Professional Skills | <p>Decision Making</p> |
| | <p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. estimate required material, time and resources for work</p> <p>SB2. decide alternate course of action in case of hindrance to work</p> <p>SB3. determine appropriate location of joint / segment for conducting the test</p> <p>SB4. determine the transducers, instruments and calibration standards for completion of the test</p> <p>SB5. decide on whether the instruments required for testing are calibrated</p> <p>SB6. determine whether test specimen is appropriately immersed in the solvent</p> <p>SB7. decide on normal or angle beam as per requirements</p> |
| | <p>Plan and Organise</p> |
| | <p>The user/individual on the job needs to know and understand how to:</p> <p>SB8. plan work & organize required resource in coordination with team members and superior</p> <p>SB9. plan work targets, allocate time schedule to sub-ordinates and organize completion of task within allocated time</p> |
| | <p>Customer centricity</p> |
| | <p>The user/individual on the job needs to know and understand how to:</p> <p>SB10. ensure completion of work as per agreed time schedule and quality</p> |

CON/N0411 Perform ultrasonic testing on structural steel components and welded sections

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| | Problem solving |
| | The user/individual on the job needs to know and understand how to: SB11. resolve and solve any conflict within the team SB12. compute the size and type of defect basis readings SB13. report to superiors in case of any defects or shortage in tested components and sections |
| | Analytical Thinking |
| | The user/individual on the job needs to know and understand how to: SB14. assess quantity of materials for day work SB15. optimize resources SB16. minimize wastages SB17. ensure correct positioning of components for testing to avoid safety violations SB18. assess whether readings obtained are accurate basis diagnostic tests |
| | Critical Thinking |
| | The user/individual on the job needs to know and understand how to: SB19. assess complexity of the tasks and provide guidance for carrying out corrective action as per requirement SB20. identify and assess how violation of any safety norms may lead to accidents |

CON/N0411 Perform ultrasonic testing on structural steel components and welded sections

NOS Version Control

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|----------------------------|---|-------------------------|-------------------|
| NOS Code | CON/N0411 | | |
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Construction | Drafted on | 07/08/2015 |
| Industry Sub-sector | Real Estate and Infrastructure Construction | Last reviewed on | 23/08/2015 |
| Occupation | Quality Assurance and Quality Control | Next review date | 23/08/2017 |

CON/N9001 Work according to personal health, safety and environment protocol at construction site

National Occupational Standard



Overview

This NOS covers the skill and knowledge required for an individual to work according to personal health, safety and environmental protocol at construction site.

CON/N9001 Work according to personal health, safety and environment protocol at construction site

National Occupational Standard

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| Unit Code | CON/N9001 |
| Unit Title (Task) | Work according to personal health, safety and environment protocol at construction site |
| Description | This NOS covers the skill and knowledge required for an individual to work according to personal health, safety and environmental protocol at construction site |
| Scope | <p>The scope covers the following:</p> <ul style="list-style-type: none"> Follow safety norms as defined by organization Adopt healthy & safe work practices Implement good housekeeping and environment protection process and activities |
| Performance Criteria (PC) w.r.t. the Scope | |
| Element | Performance Criteria |
| Follow safety norms as defined by organization | <p>To be competent, the user / individual on the job must be able to:</p> <p>PC1. identify and report any hazards, risks or breaches in site safety to the appropriate authority</p> <p>PC2. follow emergency and evacuation procedures in case of accidents, fires, natural calamities</p> <p>PC3. follow recommended safe practices in handling construction materials, including chemical and hazardous material whenever applicable</p> <p>PC4. participate in safety awareness programs like Tool Box Talks, safety demonstrations, mock drills, conducted at site</p> <p>PC5. identify near miss , unsafe condition and unsafe act</p> |
| Adopt healthy & safe work practices | <p>PC6. use appropriate Personal Protective Equipment (PPE) as per work requirements including:</p> <ul style="list-style-type: none"> Head Protection (Helmets) Ear protection Fall Protection Foot Protection Face and Eye Protection, Hand and Body Protection Respiratory Protection (if required) <p>PC7. handle all required tools, tackles , materials & equipment safely</p> <p>PC8. follow safe disposal of waste, harmful and hazardous materials as per EHS guidelines</p> <p>PC9. install and apply properly all safety equipment as instructed</p> <p>PC10. follow safety protocol and practices as laid down by site EHS department</p> |

CON/N9001 Work according to personal health, safety and environment protocol at construction site

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| <p>Implement good housekeeping practices</p> | <p>PC11. collect and deposit construction waste into identified containers before disposal, separate containers that may be needed for disposal of toxic or hazardous wastes</p> <p>PC12. apply ergonomic principles wherever required</p> |
| <p>Knowledge and Understanding (K)</p> | |
| <p>A. Organizational Context (Knowledge of the company / organization and its processes)</p> | <p>The user/individual on the job needs to know and understand:</p> <p>KA1. reporting procedures in cases of breaches or hazards for site safety, accidents, and emergency situations as per guidelines</p> <p>KA2. types of safety hazards at construction sites</p> <p>KA3. basic ergonomic principles as per applicability</p> |
| <p>B. Technical Knowledge</p> | <p>The user/individual on the job needs to know and understand:</p> <p>KB1. the procedure for responding to accidents and other emergencies at site</p> <p>KB2. appropriate personal protective equipment to used based on various working conditions</p> <p>KB3. importance of handling tools, equipment and materials as per applicable</p> <p>KB4. health and environments effect of construction materials as per applicability</p> <p>KB5. various environmental protection methods as per applicability</p> <p>KB6. storage of waste including the following at appropriate location:</p> <ul style="list-style-type: none"> • non-combustible scrap material and debris • combustible scrap material and debris • general construction waste and trash (non-toxic, non-hazardous) • any other hazardous wastes • any other flammable wastes <p>KB7. how to use hazardous material, in a safe and appropriate manner as per applicability</p> <p>KB8. safety relevant to tools, tackles, & requirement as per applicability</p> <p>KB9. housekeeping activities relevant to task</p> |
| <p>Skills (S)</p> | |
| <p>A. Core Skills/ Generic Skills</p> | <p>Writing Skills</p> |
| | <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA1. write in one or more language, preferably in the local language of the site</p> <p>SA2. fill safety formats for near miss, unsafe conditions and safety suggestions</p> |
| | <p>Reading Skills</p> |
| | <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA3. read in one or more language, preferably in the local language of the site</p> <p>SA4. read sign boards, notice boards relevant to safety</p> |

CON/N9001 Work according to personal health, safety and environment protocol at construction site

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| | Oral Communication (Listening and Speaking skills) |
| | <p>The user/ individual on the job needs to know and understand how to:</p> <p>SA5. speak in one or more language, preferably in one of the local language of the site</p> <p>SA6. listen instructions / communication shared by site EHS and superiors regarding site safety, and conducting tool box talk</p> <p>SA7. communicate reporting of site conditions, hazards, accidents, etc.</p> |
| B. Professional Skills | Decision Making |
| | <p>The user/individual on the job needs to know and understand how to:</p> <p>SB1. not create unsafe conditions for others</p> <p>SB2. keep the workplace clean and tidy</p> |
| | Plan and Organise |
| | SB3. N.A |
| | Customer centricity |
| | SB4. N.A |
| | Problem solving |
| | <p>The user/individual on the job needs to know and understand how to:</p> <p>SB5. identify safety risks that affect the health, safety and environment for self and others working in the vicinity, tackle it if within limit or report to appropriate authority</p> |
| | Analytical Thinking |
| | <p>The user/individual on the job needs to know and understand how to:</p> <p>SB6. assess and analyze areas which may affect health, safety and environment protocol on the site</p> |
| Critical Thinking | |
| <p>The user/individual on the job needs to know and understand how to:</p> <p>SB7. ensure personal safety behavior</p> <p>SB8. respond to emergency</p> | |

CON/N9001 Work according to personal health, safety and environment protocol at construction site

NOS Version Control

| | | | |
|----------------------------|---|-------------------------|-------------------|
| NOS Code | CON/N9001 | | |
| Credits (NSQF) | TBD | Version number | 1.0 |
| Industry | Construction | Drafted on | 07/08/2015 |
| Industry Sub-sector | Real Estate and Infrastructure Construction | Last reviewed on | 23/08/2015 |
| Occupation | Quality Assurance and Quality Control | Next review date | 23/08/2017 |



Assessment Criteria for Construction UT Tester

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Construction UT Tester

Qualification Pack CON/Q0404

Sector Skill Council Construction

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the knowledge part will be based on knowledge bank of questions created by Assessment Bodies subject to approval by SSC
3. Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on assessment criteria.
5. The passing percentage for each QP will be 50%. To pass the Qualification Pack, every trainee should score a minimum of 50% individually in each NOS.
6. The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome.
7. The trainee shall be provided with a chance to repeat the test to correct his procedures in case of improper performance, with a deduction of marks for each iteration.
8. After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity .
9. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack within the specified timeframe set by SSC.
10. Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

| Assessment outcomes | Assessment Criteria for outcomes | Total Mark | Out Of | Marks Allocation | |
|--|---|------------|--------|------------------|------------------|
| | | | | Theory | Skills Practical |
| CON/N0411: Perform ultrasonic testing on structural steel components and welded sections | PC1. Read and interpret the quality plan, WPS, fabrication shop drawings etc. to understand the technical specifications, locations of testing and method to be adopted | 100 | 6 | 2 | 4 |
| | PC2. identify the location of joint or section for conducting the test as per specification | | 6 | 2 | 4 |
| | PC3. estimate the quantity of materials and time required for completion of test | | 6 | 2 | 4 |
| | PC4. Read and interpret the standard specifications and perform the test in accordance to the same | | 6 | 2 | 4 |
| | PC5. carry out pre-test cleaning activities using solvents, brushes, scrubs etc. to remove any paint, dust, oil, grease or scale etc. from the test surface | | 6 | 2 | 4 |
| | PC6. identify the transducers, instruments and calibration standards to be used based upon conditions of testing, location and accessibility of | | 6 | 2 | 4 |

Assessment Criteria for Construction UT Tester

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| | testing and purpose of test | | | |
| | PC7. ensure that the instrument is calibrated as per schedule before starting the test | 6 | 2 | 4 |
| | PC8. run diagnostic checks using calibration standards to ensure that readings obtained are accurate | 6 | 2 | 4 |
| | PC9. apply coating of gel, water or solvent on the surface to be tested appropriately as per manufactures guidelines or standard practices | 6 | 2 | 4 |
| | PC10. ensure that the test specimen is properly immersed in solvent in case of immersed type of ultrasonic test | 6 | 2 | 4 |
| | PC11. ensure that transducers are properly coated and ready for use | 6 | 2 | 4 |
| | PC12. choose normal or angle beam as per test requirement and instructions | 6 | 2 | 4 |
| | PC13. set the frequency of ultrasound as per test specifications and requirements | 7 | 2 | 5 |
| | PC14. ensure that the position and movement of both pieces is correct and simultaneous in case of dual element transducers | 7 | 2 | 5 |
| | PC15. ensure that the single piece transducer is moving appropriately and required test area is covered | 7 | 2 | 5 |
| | PC16. read the graphs and other details mentioned on the display to compute the size and type of defect | 7 | 2 | 5 |
| | Total | 100 | 30 | 70 |
| CON/N9001: Work according to personal health, safety and environment protocol at construction site | PC1. identify and report any hazards, risks or breaches in site safety to the appropriate authority | 5 | 2 | 4 |
| | PC2. follow emergency and evacuation procedures in case of accidents, fires, natural calamities | 5 | 2 | 4 |
| | PC3. follow recommended safe practices in handling construction materials, including chemical and hazardous material whenever applicable | 10 | 3 | 7 |
| | PC4. participate in safety awareness programs like Tool Box Talks, safety demonstrations, mock drills, conducted at site | 5 | 2 | 4 |
| | PC5. identify near miss , unsafe condition and unsafe act | 5 | 2 | 4 |
| | PC6. use appropriate Personal Protective Equipment (PPE) as per work <ul style="list-style-type: none"> • requirements including: • Head Protection (Helmets) • Ear protection • Fall Protection • Foot Protection • Face and Eye Protection, • Hand and Body Protection Respiratory Protection (if required) | 10 | 3 | 7 |
| | PC7. handle all required tools, tackles , materials & equipment safely | 5 | 2 | 4 |
| | 100 | | | |

Assessment Criteria for Construction UT Tester

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|---|--------------|------------|-----------|-----------|
| PC8. follow safe disposal of waste, harmful and hazardous materials as per EHS guidelines | | 5 | 2 | 4 |
| PC9. install and apply properly all safety equipment as instructed | | 15 | 5 | 11 |
| PC10. follow safety protocol and practices as laid down by site EHS department | | 15 | 5 | 11 |
| PC11. collect and deposit construction waste into identified containers before disposal, separate containers that may be needed for disposal of toxic or hazardous wastes | | 10 | 3 | 7 |
| PC12. apply ergonomic principles wherever required | | 10 | 3 | 7 |
| | Total | 100 | 30 | 70 |