

Non-destructive Testing Technician

Occupational Profile for Comment

26 August 2014

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Introduction

The revised qualification landscape

QCTO

The QCTO is a new body established in terms of the NQF and the Skills Development Acts to oversee the establishment and quality assurance of a sub-framework of the NQF for trades and occupations.

It became operational on 1 April 2010 and published its policies in relation to occupational qualifications in June 2011.

Occupational qualifications

Occupational qualifications are a feature of the revised National Qualifications Framework and are designed to address skills needs in the labour market. They will replace legacy occupational qualifications such as those for work-focused unit standards-based qualifications.

Implications

The occupational profile attached to this document will form the basis of a revised curriculum or training schedule which will in future be used to the training of learners who wish to become bank tellers.

Learnerships based on unit standards-based qualifications will also be replaced by the new qualifications.

Curriculum

Occupational qualifications are based on the development of an occupational curriculum which sets specifications for:

- Theory and knowledge
- The practical skills which underpin the work
- The work experience requirements which develop occupational competence

Each of these will contain the internal (provider) assessment requirements as well as the criteria for the accreditation of providers and the approval of workplaces.

External assessment

Occupational qualifications are also based on the development of a set of specifications for an external final integrated summative assessment which in essence is a kind of 'board exam'. The external assessment will be managed and administered by the AQP. The role of the AQP is to develop a national standard for assessment to ensure that the qualification is credible, irrespective of where it is obtained.

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This Occupation

Background

The MerSETA applied to the *Quality Council for Trades and Occupations* to develop an occupational qualification for a Non-destructive Testing Technician.

At a meeting held on 23 April 2014, stakeholders with an interest in this occupation from a variety of sectors confirmed:

- The scope of the occupational qualification
 - merSETA as the QCTO's Development Quality Partner (DQP) to resource, co-ordinate and manage the development process
 - The National Artisan Moderation Body (NAMB as the QCTO's Assessment Quality Partner (AQP) to manage the external assessment process, as required by the revised Skills Development Act
 - The process for nominating a community of expert practitioners (subject matter experts) as well as training providers and public provider staff to the working groups at various stages of the development process
-

Working group meeting 1

The working group met on 13 & 14 August 2014 and developed the Occupational Profile.

The working group consisted of representatives from:

- Eskom – Rotek
 - Liel Consulting
 - Impala Platinum
 - Sasol (synfuels SEC – Engineering Inspection)
 - Beyond NDT
 - SANDR
 - IQS International
 - Transnet Engineering
 - National NDT Services
 - ANDTC
 - CSIR/SAINT
-

Circulation for comment and approval

Attached documents

The occupational profile has been attached for your comment and approval.

Submission of comments

Should you have any questions, comments, suggestions or change requests, please submit these to:

mersetaDQP@merseta.org.za

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Closing date Submissions are due by close of business on Tuesday, **09 September 2014**.

Next steps Based on the occupational profile and task analysis, working groups consisting of practitioners, private colleges and training provider representatives and assessors will develop the curriculum and define the assessment specifications.

The final curriculum, including the profile and task analysis, will be circulated to you for comment once it has been completed.

Replace This occupational qualification, once registered, will replace any current training for the heavy coil winder.

What should I be looking for?

Edit the following section. Then copy and paste it into an email and send it to mersetaDQP@merseta.org.za by Tuesday, **9 September 2014**.

Occupational title Is Non-destructive Testing Technician (NDTT) the most appropriate title?

Delete whichever is not applicable

I agree

I disagree. I would propose:

Occupational Purpose Does this reflect what you think is the key focus of any NDTT's work?

Delete whichever is not applicable

I agree

I disagree. I suggest:

Occupational Task Statements Do these tasks reflect the key performance areas of a NDTT Operator and Technician's work?

If a NDTT Operator or Technician is competent, would you expect him/her to perform these tasks? Or is there something that you would expect in addition, bearing in mind that a national occupational profile cannot reflect organisation-specific duties or tasks?

Delete whichever is not applicable

I agree

I disagree. I suggest:

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Practical skills and work experience

Are the practical skills (off-the-job) or work experience activities (on-the-job) sufficient?

Or are there additional skills they should learn or additional workplace processes and activities the apprentices should be exposed to?

Delete whichever is not applicable

I agree that these broadly define what apprentices should learn and be exposed to in the work place

I disagree. I suggest:

External assessment

Is this the most cost-effective and reliable way of assessing the competence of a learner NDTT?

Delete whichever is not applicable

I agree

I disagree. I suggest:

Any other points

I would like to suggest the following:

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OFO code	To be determined
Occupation	Non-Destructive Testing Technician (NDTT)
Specialisation	No

Note to people reading this profile:

During discussions at the meeting it was unanimously agreed upon that someone working within this industry would in all likelihood use four to five of the thirteen non-invasive testing methods commonly used. Some methods are very specific to the contexts. Some of these contexts are construction, power generation, chemical (oil and gas), manufacturing, aerospace, nuclear, railroad, automotive.

According to the discussions, it was unnecessary and impossible, given the time constraints, for any learner to master all 15 methods. Four or five methods were sufficient to become quite skilled in the industry. However, these 4 or 5 methods would not make the individual into a complete Non-destructive Testing Technician; s/he would need to acquire ALL the methods to obtain this title.

It was also agreed that the qualification should be designed to include 15 part qualifications, each of which would be based on a ND testing method. This was because the knowledge, practical skills and work experience involved in each method are significantly different, with hardly any overlap. However, a part qualification must have a minimum of 25 credits (250 notional hours).

Further, in each part qualification (based on a separate method) two related occupations ought to be incorporated, the operator and the technician. While there is an overlap between the work of an operator and that of a technician, there are also differences. The operator works under the supervision of a technician who in turn, works under a technologist. Hence, in each ND method there will be two strands; one for operator and the other for technician. The knowledge, practical skills and work experience for each will be specified.

In terms of international categorisation, the operator is at NDT Level 1 while the technician is at NDT Level 2.

Occupational Purpose

The NDT Technician applies a wide range of non-invasive analysis techniques used in science, engineering and industry to evaluate the properties of a material, component or system. The NDT Technician is able to set up and calibrate equipment (up to a point depending on the nature of the calibration), conduct the inspection according to procedures, interpret, evaluate and document results in all the testing method(s). The NDT Technician trains and supervises NDT Operators. The NDT Technician can also organise and document the results of the inspection and must be familiar with all applicable codes, standards, and other documents that control the NDT method(s) being utilised.

The ND operator, on the other hand, will simply follow instructions prescribed to them by the technician. They will merely record the results and, if any anomalies are detected, would escalate them to the technician.

Alternative Titles

Industry to be consulted

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Occupational Tasks

1. Performing tests and interpreting whether indications are relevant or non-relevant, according to prescribed procedures (NQF Level 3) **[This is for the NDT Operator – NDT Level 1] NQF Level to be confirmed.**
2. Developing instructions and applying technical methods to examine materials (NQF Level 4) **[This is for the NDT Technician – NDT Level 2] NQF Level to be confirmed.**

Task 1: Performing tests and interpreting whether indications are relevant or non-relevant according to prescribed instructions (NQF Level 3)

Unique Product or Service:

Accurate interpretation/reporting/recording of NDT testing information/findings/data

Work Knowledge Focus Areas for Operator (NDT Level 1) and Technician (NDT Level 2)

- Workplace fundamentals (This will constitute a short introduction to the world of work etc.)
- Safety, health, environment and quality (SHEQ) (toxicity, radiation safety, electrical safety, potential for injury, personal protection equipment)
- Hand and power tools
- Codes, standards, limitations etc
- Basic principles of NDT
- Fields of application of common methods
- Range and limitations of common methods, including the subject method
- New developments in NDT
- Materials
- Physical and mechanical properties of materials (metallic and non-metallic)
- Structures of metals and alloys
- Indications, discontinuities and defects
- In-service and manufacturing discontinuities
- NDT test methods (15)
 - ✓ visual testing
 - ✓ radiographic testing
 - ✓ ultrasonic testing
 - ✓ eddy current testing (electromagnetic testing)
 - ✓ (liquid) penetrant testing
 - ✓ magnetic particle testing
 - ✓ leak testing (hydraulic pressure tests excluded)
 - ✓ acoustic emissions testing
 - ✓ infrared thermographic testing
 - ✓ ground penetrating radar
 - ✓ laser testing (holography/shearography/profilometry)
 - ✓ guided wave testing
 - ✓ magnetic flux leakage

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- ✓ radiological testing
- ✓ vibration analysis
- Specialised equipment required for ND test methods
- Principles, procedures, characteristics, systems of NDT methods (in other words all the relevant theory)
- Rope access, working at heights, scaffolding, ladders

Occupational Responsibilities (Practical skills):

- i) Perform **operator** activities

The learner will be required to:

- a. Set-up NDT equipment (include quality control checks, consumables, etc)
- b. Demarcate the inspection zones and areas in accordance with procedures
- c. Perform visual testing and record findings
- d. Perform radiographic testing and record findings
- e. Perform ultrasonic testing and record findings
- f. Perform eddy current testing and record findings
- g. Perform penetrant testing and record findings
- h. Perform magnetic particle testing and record findings
- i. Perform leak testing and record findings
- j. Perform acoustic emissions testing and record findings
- k. Perform infrared thermographic testing and record findings
- l. Perform ground penetrating testing and record findings
- m. Perform laser testing (holography/shearography/profilometry and record findings
- n. Perform guided wave testing and record findings
- o. Perform magnetic flux leakage and record findings
- p. Perform radiological testing and record findings
- q. Perform vibration analysis and record findings

Occupational Contexts (Work experience):

- i) Processes to perform ND tests
- ii) Meeting processes

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Task 2: Developing instructions and applying technical methods to examine materials (NQF Level 4)

Unique Product or Service:

Evaluation of selected/specific material and component integrity

Knowledge Focus Areas for Technician

Covered above

Occupational Responsibilities:

- i) Perform **technician** activities
 - a. Translate NDT codes, standards, specifications and procedures into NDT instructions
 - b. Set-up NDT equipment (include quality control checks, consumables, etc)
 - c. Demarcate the inspection zones and areas in accordance with procedures
 - d. Perform visual testing and record findings
 - e. Perform radiographic testing and record findings
 - f. Perform ultrasonic testing and record findings
 - g. Perform eddy current testing and record findings
 - h. Perform penetrant testing and record findings
 - i. Perform magnetic particle testing and record findings
 - j. Perform leak testing and record findings
 - k. Perform acoustic emissions testing and record findings
 - l. Perform infrared thermographic testing and record findings
 - m. Perform ground penetrating testing and record findings
 - n. Perform laser testing (holography/shearography/profilometry and record findings
 - o. Perform guided wave testing and record findings
 - p. Perform magnetic flux leakage and record findings
 - q. Perform radiological testing and record findings
 - r. Perform vibration analysis and record findings
 - s. Assess the adequacy of the test performed (recognise limitations etc.)
 - t. Evaluating the result using, if necessary, additional technology
 - u. Write a detailed report
 - v. Supervise the operator

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Occupational Contexts:

- i) Processes to produce procedures and to perform ND tests
- ii) Processes to assess the adequacy of the test performed and to evaluate the result
- iii) Processes to supervise operators

External Assessment Strategy (External Assessment) for Operators

Integrated Assessment Focus Areas to be Assessed Externally

Weighting

1.	Perform one of 15 ND tests (NQF Level of each method to be determined)	
		100

External Assessment Process

The external assessment will be conducted through a combination of a written assessment and a practical task/s - based on the ND testing method studied by the learner - at a registered assessment centre. The written examination will be concluded at the registered assessment centre and marked by registered assessors. The practical task/s will also be assessed by registered assessors. The combination of the written and practical assessment will be conducted over a period of one to two working days.

External Assessment Strategy (External Assessment) for Technicians

Integrated Assessment Focus Areas to be Assessed Externally

Weighting

1.	Translate NDT codes, standards, specifications and procedures into NDT instructions (NQF Level 4)	
2.	Perform one of 15 ND testing methods (NQF Level 3/4, depending on learner's choice.)	
3.	Assess the adequacy of the test performed and evaluating the result (NQF Level 4)	
		100

External Assessment Process

The external assessment will be conducted through a combination of a written assessment and practical task/s - based on the ND testing method studied by the learner - at a registered assessment centre. The written examination will be concluded at the registered assessment centre and marked by registered assessors. The practical tasks will also be assessed by registered assessors. The combination of the written and practical assessment will be conducted over a period of one to two working days.