No. 421 **11 May *2007***

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with Regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Aerospace Operations

registered by Organising Field 10, Physical, Mathematical, Computer and Life Sciences, publishes the following qualification and unit standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the qualification and unit standards. The full qualification and unit standards can be accessed via the SAQA web-site at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the qualification and unit standards should reach SAQA at the address ***below and no later than 11 June* 2007. All** correspondence should be marked Standards Setting – Aerospace Operations addressed to

The Director: Standards Setting and Development
SAQA
Attention: *Mr. D. Mphuthing*
Postnet Suite 248
Private Bag X06
Waterkloof
0145
or faxed to 012 – 431-5144
e-mail: dmphuthing@saqa.org.za

DR. *S.* BHIKHA
DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Diploma: Air Traffic Control

SAQA QUAL ID	QUALIFICATION TITLE		
58579	National Diploma: Air Traffic Control		
SGB		PROVIDER	
SGB Aerospace Operations			
ETQA			
QUALIFICATION TYPE	FIELD	SUBFIELD	
National Diploma	10 - Physical, Mathematical, Computer and Life Sciences	Physical Sciences	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	249	Level 6	Regular-Unit Stds Based

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

The combination of learning outcomes that comprise this qualification will provide the qualifying learner with vocational knowledge and skills appropriate to the context of air traffic management.

The learner will have an understanding of the air traffic management environment that may comprise of one or combination of area control (procedural and/or radar), approach control (procedural and/or radar) and/or ground controlled approach. This qualification will provide the opportunity for learners to develop their practical skills with the essential knowledge required for air traffic management.

The qualifying learner will be able to:

- Synthesise air traffic situations within controlled and uncontrolled airspaces to manage air traffic.
- Control airborne traffic within a complex designated area of responsibility.
- Evaluate the impact and respond to an emergency within a complex designated area of responsibility.
- Develop Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) strategic plan from an appreciation of related philosophies, technologies and techniques.
- Develop an aviation safety management system

This qualification is the last qualification in a pathway of three (3) qualifications for learners in the air traffic management environment. The way in which the pathway can be navigated is through the achievement of clusters of unit standards that leads to the attainment of various military and/or civilian Air Traffic Management (ATM) ratings.

Rationale:

As a result of new generation aircraft, an increase in air traffic and new communication, navigation and surveillance (CNS) technology a demand has arisen for greater public safety as a critical requirement in the aerospace industry.

This qualification contributes to the South African aerospace industry, which impacts on the safety of people and goods for economic development. Learners who have achieved this

qualification will contribute to reduction of risk in the aerospace industry. Qualifying learners that will typically embark on this qualification are Air Traffic Service Assistants (ATSA) or Aerodrome controllers who wish to qualify as Area, Approach or GCA controllers.

This qualification will facilitate the development of a professional community specifically for air traffic management (control/support services) who are able to contribute towards a safe and productive air traffic services environment as well as the safe and efficient management of the co-ordination process of air traffic through applied knowledge, skills, attitudes and values.

This qualification enables the learners to develop competencies such as self-discipline, critical decision-making, safety, situational awareness, judgement, logically reasoning, ethics, integrity, and responsibility, to the operation of safe, efficient and comprehensive national and international aerospace systems.

This qualification has been generated in accordance with the national and international legal framework and also provides a vehicle to bring South African Air Traffic Management standards in line with international best practice.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED TO BE IN PLACE

- National Certificate: Air Traffic Services Support.

Note: This qualification includes the licensing requirements of international and national regulations, which is mandatory before a learner is allowed to proceed with further learning and rating processes.

- ID 244194: Perform Air Traffic Service (ATS) shifl procedures and administration

Recognition of Prior Learning:

The Qualification may be obtained in whole or in part through the process of Recognition of Prior Learning. Learners who may meet the requirements of any Unit Standard in this Qualification may apply for recognition of prior learning to the Relevant ETQA, and will be assessed against the assessment criteria of the exit level outcomes of this Qualification and specific outcomes for the relevant Unit Standard/s.

Anyone wishing to be assessed against this Qualification may apply to be assessed by any assessment agency, assessor or provider institution, which *is* accredited by the relevant ETQA

Access to this qualification:

- Learners with certain physical (visual, auditory etc) impairments may find it difficult to complete the qualification successfully without meeting certain medical requirements.

- National Certificate: Air Traffic Services Support.
  - Note: This qualification includes the licensing requirements of international and national regulations, which is mandatory before a learner is allowed to proceed with further learning and rating processes.

QUALIFICATION RULES

- Learners must complete all 88 credits in the fundamental component.
- Learners must complete all 109 credits in the core component.
- Learners must complete at least 52 credits from the elective component of the qualification.

Learners must choose at least one (1) of two *(2)* unit standards in the specialisation stream within the electives, which creates a learning path. The Learning path must be contextualised in either area or approach procedural control. Once the specific learning path has been completed,

a learner who wishes to move to the other learning path must be assessed for the ability to contextualise the competence in the chosen learning path.

Thereafter learners must choose additional credits from the remaining general elective category to complete the 249-credit value of the qualification.

EXIT LEVEL OUTCOMES

On completion of this Qualification learners are able to:

1. Synthesise air traffic situations within controlled and uncontrolled airspaces to manage air traffic.

2. Control airborne traffic within a complex designated area of responsibility

3. Evaluate the impact and respond to an emergency within a complex designated area of responsibility.

4. Develop Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) strategic plan from an appreciation *of* related philosophies, technologies and techniques.

5. Develop an aviation safety management system.

ASSOCIATED ASSESSMENT CRITERIA

1.

- Air Traffic in a complex air operations environment is assessed in terms of its impact on the current and projected air traffic situation.
  - Range: A complex air operations environment includes but is not limited to Approach control, Area control and Ground Controlled Approach GCA.
- Air traffic control personnel are assessed in order to establish their ability to deal with air traffic in a complex air operations environment.
- Air traffic is controlled in accordance with laid down procedures during a simulated disaster exercise.
- Aeronautical information is interpreted and distributed in order to ensure the safe, expeditious and orderly flow of air traffic.

2.

- A complex air traffic control environment change of watch is conducted in accordance with laid down procedures.
  - Range: Change of watch includes opening, closing, handing-over, taking-over watch, after-hours duties and closure of the facility.
  - Range: Complex air traffic control environment includes but is not limited to radio checks, equipment inspections and self-readiness.
- Air traffic is directed to ensure the safe, expeditious and orderly flow of such air traffic.
- Communication coordination in a complex designated area of responsibility is conducted in accordance with laid down procedures in order to ensure the safe, expeditious and orderly flow of air traffic.
- Radio telephony is conducted in accordance with regulatory procedures.

3.

- A simulated emergency situation within a complex designated area of responsibility is assessed in terms of its impact on the maintenance of the safe, expeditious and orderly flow of air traffic.
- Responses to a simulated emergency situation within a complex designated area of responsibility are formulated to reduce their impact on the safe, expeditious and orderly flow of air traffic.
- Laid down radio telephony procedures are applied during a simulated emergency within a complex designated area of responsibility.

• Emergency procedures are activated in accordance with promulgated organisational procedures during a simulated emergency within a complex designated area of responsibility.

4.

• CNS/ATM fundamental knowledge is demonstrated within an Air Traffic Management operational context
• Planning considerations for CNS/ATM are incorporated in an operational Air Traffic Management scenario.
• The need for a strategic CNS/ATM plan is motivated to inform the development of CNS/ATM initiatives.
• A CNS/ATM strategic plan reflects an appreciation of related philosophies, technologies and techniques within an Air Traffic Management system.
o Range: Appreciation includes but is not limited to SWOT, Comparative Analysis and Critical Evaluation.

5.

• Safety management system practices are evaluated within an Air Traffic Management operational context.
• Safety management policies and performance management systems are formulated for **use** within an Air Traffic Management structure.
• Performance of a safety management system is analysed within an Air Traffic Management operational context.
• An aviation safety management system is developed within an Air Traffic Management organisation.

Integrated Assessment:

Formative assessments conducted during the learning process will consist *of* written assessments, simulation in a practical environment and a number of self-assessments

Sumrnative assessment consists of written assessments, assignments and simulation in a practical environment, integrating the assessment of all unit standards and embedded knowledge. Summative assessments is only conducted once the learner has demonstrated proficiency during formative assessment.

In particular assessors should check that the learner is able to demonstrate the ability tu consider a range of options and make decisions about:

• Air traffic service that is executed safely, expeditiously and effectively.
• The quality of the observed practical performance as well as the theory and embedded knowledge behind it.
• The different methods that can be used by the learner to display thinking and decision making in the demonstration of practical performance.
• Reflexive competencies.

Assessment practices:

• Assessment of the learner shall be conducted in compliance with International Civil Aviation Organisation (ICAO) guidelines, Civil Aviation Authority (CAA) or Military Aviation Authority (MAA) Regulations.
• Knowledge of TRM elements may be assessed through written, oral or practical assessments
• TRM is integral to flight and flight safety. Procedural elements of TRM are to be assessed throughout the assessment of all outcomes in a holistic and integrated way and therefore should not be assessed as a stand-alone element.
• Range of procedural elements include but are not limited to: Use of checklists, shift briefings, radio transmissions, and coordination.
• Emergencies:

o Assessment of the iearner in emergency and abnormal operations shall be conducted using simulated emergency and abnormal situations.
o Assessment of the learner in simuiated emergencies should be terminated at a paint where successful outcome can be judged, and safe recovery to normal conditions can be achieved.
• Assessment:
o Assessments shall be carried out with the learner acting in controller and non-controller roles.
o The assessment is carried out with reference to the operator's standard operating procedures.
o The learner is expected to demonstrate competency in performing appropriate procedures without all the required resources available.
o Learners will be assessed in their abiiity to deal with simulated abnormal situations.

INTERNATIONAL COMPARABILITY

As wiih most other aviation reiated learning programmes the contents is governed by ICAO and several regional or national agencies such as FAA (USA), JAA (Europe) and CAA. In many instances the respective competencies are loose standing learning programmes presented as modules for easy integration into the respective aviation occupational training programmes. These could in a way serve the same purpose as unit standards developed for the NQF. The advantage of South African qualifications and unit standards is that it provides for a holistic approach to the learner ensuring the development of the whole person as compared to just being able to do a specific task. Research on the NZQF showed a remarkable resemblance with the proposed NQF ATC related qualifications. It does, however, seem that the NZQF unit standards are rather tasky than outcomes based. During the international comparison no other qualifications as such were found, however, the existence of many learning programmes were evident.

The local aviation authority, CAA, has built up a remarkable relationship with many African countries to the extent that most of those countries send their future ATCs to South Africa for training. Zimbabwe seams to be the exception to the rule and maintained a remarkable training capability through the years. Information is shared between the South African and Zimbabwean authorities whilst the training is presented independently.

The international comparison thus focuses on those countries or regions that are governed by the same international agreements, namely the USA, Europe and Zimbabwe, Asia (Jordan and Thailand), Australia and New Zealand, which has a similar qualifications framework as South Africa.

In all instances it was found that their learning programmes lacked a formal fundamental basis in support of the programmes below Level 5. Except for New Zealand, being occupational directed programmes it could not be determined whether levels of complexity had any significance to those countries.

As far as the core of the qualifications are concerned it was found that the contents were very much the same. Differences were in the areas of skills such as first aid in the New Zealand qualification and skills specific to the environment such as cold weather operation of aircraft in the USA, which is not applicable to South Africa.

The USA training providers also seem to provide short courses as opposed to qualifications. An example is drawn from the Pan Am International Flight Academy (PAIFA) http://www.panamacademy.com/airtrafk.asp, which reads as follow:

Air traffic agencies from around the world depend on PAIFA to provide training to their air traffic professionals. Annually, these agencies enroll 500 to 1,000 students in the Academy's comprehensive ATC program. From basic to advanced courses, PAIFA provides specialized ATC and Aviation English classes within your budget and schedule requirements.

Standard and custom-designed courses are taught by experienced, motivated air traffic controllers and instructors. Courses include:

- Initial/Basic Air Traffic Control.
- Tower/Aerodrome Control.
- Approach Control (Non Radar and Radar).
- Area/Enroute Control (Non Radar and Radar).
- Reduced Vertical Separation Minimum (RVSM).
- Supervisory and Management.
- Safety Management.
- Quality Assurance.
- Aeronautical information Services (AIS).
- TC PC Skills.
- Aviation English.

Zimbabwe:

In terms of the Zimbabwean learning programme it was somewhat more difficult to make the comparison as the Zimbabwean programme is curriculum based compared to the South African unit standard based qualification. The impression is that the Zimbabwean learning programme lacks integration but this is probably overcome during the practical phase.

Area Control non-radar (i.e. procedural):

- Course introduction; 30 min.
- Overview of Air Traffic Services; 1 lesson.
- Air Traffic Control Services; 1 lesson.
- Responsibility for control; 1 lesson.
- Airspace classification - ICAO ATS Airspace; 1 lesson.
- Airspace classification - FVHA FIR Airspace Organisation; 1 lesson
- General ATS Operating Practices; 3 lessons.
- Altimeter Setting Procedures; *2* lessons.
- Separation - General Procedures; 1 lesson.
  - Vertical separation; 1 lesson.
- Horizontal separation; 3 lesson.
  - Reduction in Separation Minima; 30 min - 1hr.
  - ATC Clearance; 2 lessons.
- Emergency procedures; 2 lessons.
- R/T Technique & phraseology; 1 lesson.
- Coordination General; 1 lesson.
- Coordination between ATS Units; 1 lesson.
- Coordination - Letters of Agreement; 1 lesson.
- Search and Rescue; 2 lessons.
- CNS/ATM; 2 lessons.
- SSIs; 1 lesson.
- Strip marking; 1 lesson.
- A/C Performance; 1 lesson.
- Human Factors & Limitations in ATC Service; *2* lessons.
- Exercise Debrief and preparation; 1 lesson.

Approach Radar curricula:

- Radar: Basic Principles, history, General provisions; 2 **lessons.**
- Identification procedures; *2* lessons.
- Use of Radar in ATC Service; 2 lessons.
- Radar vectoring, Met report, navigation assistance; 2 lessons.
- General Radar App procedures; **4** lessons.
- Final Approach Procedures; 2 lessons.

- Separation minima and application; 4 lessons.
- Transfer of identitylradar control/communication; 2 lessons.
- Emergencies &failure of equipment; 2 lessons.
- Use of Radar in Aerodrome Controi Service and FIS; 2 lessons.
- Secondary Surveillance Radar; 2 lessons.
- Special radar phraseology; **4** lessons.
- Exercise briefings; *6* lessons.
- Exercise debriefings; 12 lessons.
- Airspace orientation; 2 lessons.
- Strip instruction; 4 lessons.
- Speed control; *2* lessons.
- ACC Radar procedures-familiarization; 4 lessons.
- ACC Non-Radar procedures & coordination- amiliarization; *2* lessons
- Spare time, progress and final test, summary; 16 lessons.
- Practical exercises, see comment on APP.

Approach (non-radar) procedural controi:

- Departure procedures; 1 lesson.
- Departing traffic and separation of departures; 1 lesson.
- Arrival procedures; 1 lesson.
- Separation of arrivals; 3 lessons.
- Timed approach procedures and holding procedures; 2 lessons.
- instrument approach procedures; 2 lessons.
- Separation of departures and instrument approaches: 1 lesson.
- Visual approaches; 1 lesson.
- Missed approach procedures; 1 lesson.
- Coordination; 2 lessons.
- RCF and emergency procedures; 1 lesson.
- Obstacle clearance criteria: 2 lessons.
- Flight progress strips.
- Determination and application of separation; 3 lessons.
- Deemed separations; **1** lesson.
- Approach simulator exercises; 20 Hours.

New Zealand:

It is only the New Zealand qualification that makes reference to strands of training similar to the South African ATC qualifications that refer to specialisation in the elective component. This does not indicate that it is not being done in the other countries or regions as it can safely be assumed that their approach is specialisation from the onset as in the case of PAIFA. The New Zealand qualifications as in the case of the South African qualifications are also closely linked to the licensing requirements.

Diploma of Air Traffic Control (Aerodrome and Approach Control Rating):

Air Traffic Control:

- Level: *7.*
- Credit: 271.

Entry requirements:

- Applicants must have met the Airways psychometric and operational selection criteria

Outcome statement:

People completing this qualification are able to demonstrate knowledge of aerodrome and approach control procedures in accordance with the Airways Manual of Air Traffic Services and AIPNZ, operate as a safe, reliable, independent air traffic controller in a variable and dynamic aerodrome and approach control environment, manage the personai and situational demands placed on an air traffic controller (ATC), take full responsibility and be accountable for their part in safe and expeditious traffic operations and consider and respond to the interpersonal factors that impact on an operational team dependent on specific and perceived workload and limitations.

Content:

Study includes ATS Licensing subjects; aerodrome control (simulated); ATC skills; approach control (simulated); aerodrome control rating and validation; approach control rating and validation.

Diploma of Air Traffic Control (Area Radar and Area Control Rating):

Air Traffic Control:

- Level: 7.
- Credit: 299

Entry requirements:

- Applicants must have met the Airways psychometric and operational selection criteria,

Outcome statement:

Study includes ATS Licensing subjects; aerodrome control (simulated); ATC skills; area radar control (simulated); area control (simulated); area control rating and validation; area control radar rating and vaiidation.

Content:

People completing this qualification are able to demonstrate knowledge of area radar and area control procedures in accordance with the Airways Manual of Air Traffic Services and AIPNZ, operate as a safe, reliable, independent air traffic controller in a variable and dynamic area radar and area control environment, manage the personal and situational demands placed on an air traffic controller (ATC), take full responsibility and be accountable for their part in safe and expeditious traffic operations and consider and respond to the interpersonal factors that impact on an operational team dependent on specific and perceived workload and limitations.

Thailand:

Centre for CATC.
Bangkok.
Duration: 17 weeks

Purpose of the Course:

To provide students with basic knowledge and experience within Air Traffic Control so that he or she can continue with course STP 053/47/ATCNR (Approach Control non radar) and, after that, continue with Area Control Course followed by On the Job Training at an Air Traffic Control unit in order to become a licensed Air Traffic Controller after successfully completing training.

Objectives:

Given lectures and practical training in an Air Traffic Control Tower simulator, student will have sufficient knowledge of ATC license and aerodrome control to meet the standards prescribed in ICAO Annex 1, Personnel Licensing.

Target Population:

Students graduated from high school without any experience within the field of Air Traffic Control or students with military background (equal to high school) and foreign students with similar background andlor some experience of work within the field of aviation.

Prerequisites:

- High school education or equivalent, or favourable experience and knowledge of aviation profession.
- Proficiency in both written and spoken English.
- Have medical fitness as specified in ICAO Annex 1, Personnel Licensing.

Course Content:

List of Modules; Duration:

- Aerodromes; 5 hours.
- Aircraft, Wake Turbulence and Aircraft Designators; 6 hours.
- Airspace, ATS/ATC Organisation; 4 hours.
- Spelling Alphabet, Codes and Indicators; 9 hours.
- Basic Meteorology and Altimetry; 10 hours.
- Rules of the Air and Basic (radio) Navigation; 16 hours.
- Flight Plans and Flight Progress Strips for Arriving Aircraft; 6 hours
- General Communication Procedures; 10 hours.
- Control of Arriving Aircraft, RWY-in-Use; 7 hours.
- Control of Taxiing Aircraft; 4 hours.
- Control of Arriving IFR Traffic; 38 hours.
- Control of VFR Traffic; 29 hours.
- Flight Progress Strips for Departing Aircraft; 5 hours.
- ATC Clearances; 5 hours.
- Push-back and Start-up Control of Departing Aircraft; 38 hours.
- AIS, ATIS. MET Messages and NOTAMs; 15 hours.
- Control of Departing Traffic; 38 hours.
- Control of Arriving IFR/VFR Traffic Forward Information; 38 hours.
- Aeronautical Ground Lights; 5 hours.
- Control of Departing IFR/VFR Traffic; 37 hours.
- Control of Vehicles and Personnel; 39 hours.
- Helicopter Traffic; 27 hours.
- Aircraft Making Touch-and-Go Landings; 51 hours.
- Wind Shear; 5 hours.
- Emergencies and Abnormal Situations; 36 hours.
- Military Procedures; 27 hours.

18 modules or parts thereof in the Thailand Advanced Air Traffic Control training course are seemingly similar to the content of the National Diploma: Air Traffic Control NQF Level 6.

Jordan:

Centre for QNCATC.
Amman.

Duration: 8 weeks

Purpose of the Course:

This course, followed by a minimum of one month (subject to the conditions prescribed by Jordan Civil Aviation Regulation (JCAR)) practica! experience working under the supervision of an appropriately-rated radar controller, will train air traffic controllers who have already successfully completed courses in both Approach and Area Procedural (non-radar) to execute Radar Control of air traffic within an Approach andlor Area Radar Sector to the standard required by the concerned Licensing Authority.

Objectives:

On the completion of the course, the trainee will be able to:

- Explain the principles of operation of Primary and Secondary Surveillance Radar (SSR) systems.
- Describe the factors which may affect the performance of Primary and Secondary Surveillance Radar systems.
- Describe the methods of displaying SSR derived information.
- Operate radar equipment in accordance to TACC MATC 2 Sect. 5.
- Update and maintain a traffic display *to* the required standard of accuracy.
- Identify radar targets using radar display in accordance with published procedures.
- Apply standard phraseology pertaining to Radar Control.
- Vector aircraft with'n radar control sector.
- Maintain the prescribed radar andlor non-radar separation.
- Sequence and maintain a safe, orderly and expeditious flow of air traffic.
- Monitor known air trafiic to provide aircraft concerned with information or advice relative.
- To any significant deviations from their ATC clearances.
- Carry out transfer of radar identity/control including coordination with Aerodrome-Approach-Area control, adjacent ACCs/sectors or other ATC units in accordance with published procedures.
- Take appropriate action in the event of a miss-approach aircraft, diversions aircraft, radio communication failure, radar equipment failure and emergency aircraft.

Target Population:

Will be mainly recruited from trainees having compieted Approach and Area Procedural (non-radar) course.

Prerequisites:

- Trainees should have successfully completed Approach and Area Procedural (non-radar) course.
- Trainees should have a command of the language of instruction.

Course Content:

List of Modules; Duration:

- Course Introduction; 2 hours.
- Radar Theory (Technical); 15 hours.
- Equipment Operations; 13 hours.
- Radar Strip Marking; 7 hours.
- Radar Identification; 18 hours.
- SSR; 17 hours.
- Radar Vectoring: 18 hours.

- Radar Separation; 17 hours.
- Radar Sequencing; 28 hours.
- Radar Monitoring; 20 hours.
- Radar Coordination; 19 hours
- Abnormal Situation; 24 hours.
- Closing Ceremony; 2 hours.

Australia:

Diploma of Transport and Distribution (Air Traffic Control):

- TDAE103A; Maintain aircraft radio communications.
- TDAE203A; Use air traffic control communication procedures.
- TDAF103A; Manage human factors in aircraft flight.
- TDAF603A; Respond to abnormal and emergency situations within the aircraft.
- TDAG103A; Work professionally in an air traffic control workplace.
- TDAW1203; Manage air traffic service information displays and ancillary information
- TDAW1303A; Operate air traffic control workstation.
- TDAY2003A; Provide airspace-specific services.
- TDAY2103A; Maintain separation.
- TDAY2203A; Manage traffic.
- TDAZ203A; Perceive traffic and environment information.
- TDAZ303A; Interpret and evaluate traffic and environment.
- TDAZ403A; Prioritise, project and plan tasks and events.
- TDAZ503A; Manage basic situation awareness in the aviation workplace.

The key difference in comparison with the SA qualification (and the NZ) is that this qualification (Australian) makes no distinct provision for specialisation in any of the Air Traffic Control/Support services field. The 14 modules or part thereof in the Australian Diploma of Transport and Distribution (Air Traffic Control) are seemingly similar to the content of the National Diploma: Air Traffic Control NQF Level 6.

Europe:

Access to European qualifications proved difficult, as there is currently very little in the public domain. The CATC (centre for air traffic control) courses include an 'ATC Licence and Aerodrome Control' course.

General:

The key difference in comparison with the SA qualification (and the NZ) is that this qualification makes no distinction between Aerodrome, Area and Approach control services. It is therefore pitched somewhat higher than the proposed qualification.

Content wise the South African ATC qualifications compares favourably with all the compared countries and regions. As with all NQF qualifications a major emphasis is placed on the development of individuals and progression as much as possible. This principle could not be found in any of the qualifications or courses.

As with the pilot qualifications it was decided to follow the ICAO standards, as this would not only govern the training but also the licensing of ATCs.

ICAO Standards:

The ICAO Standards was adopted as the minimum base line and the ICAO recommendations as guidance to further develop the relevant unit standards. In this regard unit standards, where relevant, reflect the ICAO standards as purpose and range statement.

The following sections of ICAO documentation were considered:

General Rules Concerning Pilot Licences and Ratings -Annex 1; Licences and Ratings for Personnel other than Flight Crew Members -Annex 1; Rules of The Air Introduction -Annex 2; Ruies of The Air - General -Annex 2; Distress and Urgency Signals - Annex 2; Interception of Civil Aircraft -Annex 2; Meteorological Service - Definitions and Introduction-Annex 3; Aircraft Observations and Reports -Annex 3; Service for Operators and Flight Crew Members -Annex 3; Information for Air Traffic Services-Annex 3; Operation of Aircraft - Definitions and Introduction - Annex 6; Operation of Aircraft - Flight Operations -Annex 6; Operation of Aircraft - Operating Limits-nnex 6; Operation of Aircraft - Flight Crew -Annex 6; Operation of Aircraft - Dispatcher -Annex 6; Operation *of* Aircraft - Cabin Crew - Annex 6; Operation of Aircraft - Operations Manual -Annex 6; Operation of Aircraft - Extended Rang Operations -Annex 6; Operation of Aircraft - Flight Preparations -Annex 6 Part II; Operation of Aircraft - Carriage of Oxygen -Annex 6; Operation of Helicopters - General Operations -Annex 6 Part III; Operation of Helicopters - Performance -Annex 6 Part III; Operation of Helicopters - Crew-Annex 6 Part III; Operation of Helicopters - Dispatcher-Annex 6 Part III; Operation of Helicopters - Cabin Crew - Annex 6 Part 111; Operation of Helicopters -Operations Manual-Annex 6 Part III; Communication Procedures - Definitions And Introduction -Annex 10 Vol II; Communication Procedures - Aeronautical Fixed Service - Annex 10 Vol II; Communication Procedures - Mobile Service - Annex 10 Vol II; Communication Procedures - Data Link-Annex 10 Vol II; Communication Procedures -Annex 10 Vol II; Air Traffic Control-Definitions And Introduction -Annex 11; Air Traffic Control -Air Traffic Control Service -Annex 11; Air Traffic Control - Flight Information Service - Annex 11; Air Traffic Control - Alerting Service - Annex 11; Air Traffic Control-TIBA - Annex 11; Search and Rescue - Definitions And Introduction - Annex 12 AND Search and Rescue - Operating Procedures -Annex 12.

Conclusion:

The contents of the National Diploma Air Traffic Control compares favourably with the two qualifications provided by New Zealand who use the same systems and applies the same practises as South Africa. Similarly, this South African qualification compares well with vocational learning presented by the USA; also considering that the USA is a major international air traffic service provider that controls high traffic volumes. Likewise countries in Asia have comparable learning programmes. This is also the case when considering the Zimbabwean curriculum based programmes. Within the African continent South Africa is regarded as one of the leaders in the Air Traffic Control field, considering that learners from most Sub-Saharan and SADEC Countries are trained by South African agencies.

Of specific importance is to note that this qualification and unit standards provide for a holistic approach to the learner ensuring the development of the whole person as compared to being confined to a specific and narrowly defined task.

ARTICULATION OPTIONS

This qualification has been developed as an entry-level qualification into Air Traffic Managemen! and is intended to provide a career in its own right, as well as to facilitate progression to other aii traffic qualifications. Learners can move horizontally or vertically between aviation related qualifications, although in most cases, some standards will be required horizontally before moving to another qualification vertically.

This qualification has horizontal articulation with the following qualifications:

- Bachelor of Administration: Aviation Management, NQF Level 6
- Bachelor of Commerce: Aviation Management, NQF Level 6.
- ID 56008: National Dipioma: Aircraft Piloting, NQF Level 6.

This qualification has vertical articulation with the following qualifications:

- Bachelor of Tecnnoiogy: Safety Management. NQF Levei 7.
- Bacheior of Technology: Transportation Management, NQF Level 7.
- Post Graduate Diploma: Transport Management, NQF Level 7.

MODERATION OPTIONS

- Moderation of learner achievements takes place at providers accredited by the applicable ETQA for the provision of programmes that result in the outcomes specified for the "National Diploma: Air Traffic Control NQF Level 6 .

- Anyone moderating the assessment *of* a learner against this Qualification must be registered as a moderator with the relevant ETQA. Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.

- Moderation must include both internal and external moderation of assessments at exit points of the Qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement *of* the competence described both in individual Unit Standards as well as the integrated competence described in the Qualification.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

For an applicani to register as an assessor, the applicant needs:

- A minimum *of* two years relevant occupational experience.
- Well-developed interpersonal skills, subject matter and assessment experience.
- Well-developed subject matter expertise within aviation.
- Competent in the exit level outcomes of the National Diploma: Air Traffic Control NQF Levei 6
- To be a registered assessor with the relevant Education and Training Quality Assurance Body.
- Detailed documentary proof of educational qualification, practical training undergone, and experience gained by the applicant must be provided (Portfolio of evidence). Assessment competencies and subject matter experience of the assessor can be established by recognition of prior learning.

NOTES

- Communication Level 4 ideally in ICAO defined English in accordance with South African Civil Aviation Authority requirements.
- Learners who are not competent in the language proficiency standard for ICAO defined operational English at ICAO Level 4 will find it difficult to meet licensing requirements.

Definitions:

ICAO English:

The International Civil Aviation Organisation (ICAO) requires that all applicants for a pilots licences, all current pilot licence holders, Air Traffic Controllers and Station Operators Licences shall demonstrate, in a manner acceptable to the licensing authority, the ability to speak and understand the English language used for radiotelephony communications in compliance with the holistic descriptions contained in the ICAO Operational level (level 4) of the ICAO Language Proficiency Rating Scale Document.

ICAO Operational Level 4 English:

- Pronunciation (Assumes a dialect and/or accent intelligible to the aeronautical community): Pronunciation. stress, rhythm and intonation are influenced by the first language or regional variation but only sometimes interfere with ease *of* understanding.

• Structure (Relevant grammatical structures and sentence patterns): Basic grammatical structures and sentence patterns are used creatively and are usually well controlled. Errors may occur, particularly in unusual or unexpected circumstances, but rarely interfere with meaning.

• Vocabulary: Vocabulary range and accuracy are usually sufficient to communicate effectively on common, concrete and work related topics. Can often paraphrase successfully when lacking vocabulary in unusual or unexpected circumstances.

• Fluency: Produces stretches of language at an appropriate tempo. There may be occasional loss of fluency on transition from rehearsed or formulaic speech to spontaneous interaction, but this does not prevent effective communication. Can make limited use of discourse markers or connectors. Fillers are not distracting.

• Comprehension: Comprehension is accurate on common, concrete and work related topics when the accent or variety used is sufficiently intelligible for an international community of users When the speaker is confronted with a linguistic or situational complication or an unexpected turn of events, comprehension may be slower or require clarification strategies.

• Interaction: Responses are usually immediate, appropriate and informative. Initiates and maintains exchanges even when dealing with an unexpected turn of events. Deals adequately with apparent misunderstandings by checking, confirming or clarifying.

Terms, Definitions and Abbreviations:

• ADS service; A service using aircraft information provided by means of automatic dependant surveillance.
• Advisory airspace; Airspace of defined dimensions, or designated route, within which air traffic advisory service is available.
• Aerodrome; A defined area on land or water (including any buildings, installations and equipment) intended *to* be used either wholly or in part for the arrival, departure and surface movement of aircraft.
• Aerodrome control service; Air Traffic Control service for aerodrome traffic.
• Aerodrome control tower; A unit established to provide air traffic control service to aerodrome traffic.
• Aerodrome traffic; All traffic on the manoeuvring area of an aerodrome and all aircraft flying in the vicinity of an aerodrome.
• Aerodrome flight information service (AFIS); A service provided by a radio operator on behalf of the ATS.
• Aeronautical information publication (AIP); A publication issued by or with the authority of a State and containing aeronautical information *of* a lasting character essential to air navigation.
• Airborne collision avoidance system (ACAS); An aircraft system based on secondary surveillance radar (SSR) transponder signals that operate independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are quick with SSR transponders.
• Aircraft; Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against earth's surface.
• Air-ground communications; Two-way Communications between aircraft and station or locations on the surface of the earth.
• Air report (AIREP); A report from an aircraft in flight prepared in conformity with requirements for position and operational and/or meteorological reporting.
• Air traffic; All aircraft in flight or operating on the manoeuvring area of an aerodrome.
• Air traffic advisory service; Service provided within advisory airspace *to* ensure separation, in so far as practical between aircraft which are operating on IFR flight plans.
• Air traffic control clearance; Authorisation for an aircraft to proceed under conditions specified by an Air Traffic Control Unit.
• Air traffic control instruction; Directives issued by air traffic for the purpose of requiring a pilot to take a specified action.

- Air traffic control service; A service provided for the purpose ot:
  - Preventing collisions:
    - Between aircraft.
    - On the manoeuvring area between aircraft and obstructions.
  - Expediting and maintaining an orderiy flow of air traftic.
- Air traffic control unit; A generic term meaning variously. area control centre, approach control unit or aerodrome control tower.
- Air traffic flow management (ATFM); The service established with the objective of contributing *to* a safe, orderly and expeditious flow of Air Traffic by ensuring that ATC capacity is utilised to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.
- Air traffic management (ATM); The dynamic, integrated management of air traffic and airspace-safely, economically and efficiently-through the provision of facilities and seamless services in collaboration with ail parties.
- Air traffic service (ATS); A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).
- Air traffic services unit (ATSU); A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.
- Air traffic services airspaces; Airspaces of defend dimensions, alphabetically designed, within which specific types of flights any operate and for which air traffic services and rules of operation are specified.
- Airway; A control area or portion thereof established in the form of a corridor.
- Alerting service; A service provided to notify appropriate organisations regarding aircraft in need of search and rescue aid, and assist such organisations as required.
- Alphanumeric characters; A collective term for letters (Alphanumerics) and figures (digits).
- Area control service; A service for controlled flights in control areas.
- Approach control service; A service for arriving and departing controlled flights.
- Area control centre (ACC); A unit established to provide ATC Service to controlled flights in controlled airspace and advice and information to other flights under its jurisdiction.
- Area navigation (RNAV); A method of navigation which permits aircraft operation on any desired flight path within the coverage of station-referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of this.
- Area navigation route; An ATS route established for the use of aircraft capable of employing area navigation.
- Approach control unit; A unit established to provide ATC Service to controlled flights arriving at, or departing from, one or more aerodromes.
- Aerodrome control unit; A unit established to provide air traffic control service to aerodrome traffic.
- Appropriate ATS authority; The relevant authority designated by the State responsible for providing air traffic service in the airspace concerned.
- Apron; A defined area, on a land aerodrome intended to accommodate aircraft for the purpose of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.
- ATS surveillance service; Term used to indicate a service provided directly by means of an ATS surveillance system.
- ATS Surveillance system; A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system the enables the identification of aircraft.
- Automatic terminal information services (ATIS); The provision of current, routine information to arriving and departing and departing aircraft by means of continuous and repetitive broadcasts throughout the day or a specified portion thereof.
- Control area; A controller airspace extending upwards from a specified limit above the earth.
- Controlled aerodrome; An aerodrome at which air traffic control service is provided to aerodrome traftic.
- Controlled airspace; An airspace of defend diminutions within which air traffic controlled services is provided in accordance with the airspace classifying.
- Controlled flight; Any flight that is subject to an air traffic control clearance.

• Controller-pilot data link communications (CPDLC); A means of communication between controller and pilot, using data link for ATC communications.

o Control zone; A controlled airspace extending upwards from the surface of the earth to a specified upper limit.

• Data processing; A systematic sequence of operations performed on data.

• Error; An action or inaction by an operational person that leads to deviations from organisational or operational person intentions or expectations.

• Error management; The process of detecting and responding to errors with countermeasures that reduce or eliminate the consequences of errors, and mitigate the probability of further errors or undesired states.

• Estimated time of arrival (ETA); For IFR flights, the time at which it is estimated that the aircraft will arrive over that designated point, defined by reference to navigation aids, from which it is intended that an instrument approach procedure will be commenced, or, if no navigation aid is associated with the aerodrome, the time at which the aircraft will arrive over the aerodrome. For VFR flights, the time at which it is estimated that the aircraft will arrive over the aerodrome.

• Expected approach time (EAT); The time at which ATC expects that an arriving aircraft. following a delay, will leave the holding point to complete its approach for a landing.

• Filed flight plan (FPL); The flight plan as filed with an ATS unit by the pilot or his designated representative, without any subsequent changes.

e Flight information service; A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

• Flight level; Surfaces of constant atmospheric pressure, which is related to a specific pressure datum 1013.2 Hectopascal (hPa) and is separated from other such surfaces by specific pressure intervals.

• Flight plan; Specified information provided to Air Traffic Service units relative to the intended flight or portion of a flight of an aircraft.

• Flow control; Measures designated to adjust the flow of traffic into a given airspace, along a given route, or abound for a given aerodrome, *so* as to ensure the most effective utilisation of the airspace.

• Forecast; A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

• Heading; The direction in which the longitudinal axis of an aircraft is pointed, usually expressed in degrees from North (true, magnetic, compass or grid).

• Height; The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

• Holding procedure; A pre-determined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance.

• Human factors; Are specifically related to people in their living and working situations, about their relationship with machines. procedures and with their environment and their relationships with other people both individually and in groups.

• IFR flight; A flight conducted in accordance with the instrument flight rules.

• Incident; An occurrence, other than an accident, associated with the operation of an aircrafi which affects or could affect the safety of operation.

• Instrument approach procedures (IAP); A series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route, to a point from which a landing can be completed and, thereafter, if a landing is not completed, to a position at which holding or en-route obstacle criteria apply.

• instrument meteorological conditions (IMC): Meteorological conditions expressed in terms of visibility, distance from could and ceiling, less than the minima specified for visual meteorological conditions.

• International NOTAM office; An office designated by a State for the exchange of NOTAM internationally.

• Level; A generic term relating to the vertical position of an aircraft in flight and meaning variously height, altitude or flight level.

• Manoeuvring area; That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

- Meteorological information; Meteorological report, analysis, forecast and any other statement relating to existing or expected meteorological conditions.
- Meteoroiogical report; A statement of observed meteorological conditions related to a specified time and location.
- Missed approach procedure; The procedure to be followed if the approach cannot be continued.
- NOTAM; A notice distributed by means of telecommunications containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.
- Obstacle clearance altitude/height (OCA/H); The lowest altitude (OCA), or alternatively, the lowest height above the elevation of the relevant runway threshold, or above the aerodrome elevation, as applicable (OCH), used in establishing compliance with the appropriate obstacle clearance criteria.
- Onward clearance time (OCT); The time at which it is expected that an aircraft which has been instructed to hold during the en-route phase of flight will be cleared to resume its flight.
- Precision approach radar (PAR); Primary radar equipment used to determine the position of an aircraft during final approach, in terms of lateral and vertical deviations relative to a nominal approach path, and in range relative to touchdown.
- Primary radar; A radar system which uses reflected radio signals.
- Primary surveillance radar (PSR); A surveillance radar system which uses reflected radio signals.
- Radar; A radio detection device which provides information on range, azimuth andlor elevation of objects.
- Radar approach; An approach, executed by an aircraft, under the direction of a radar controller.
- Radar control: Term used to indicate that radar-derived information is employed directly in the provision of air traffic control service.
- Radar controller; A qualified air traffic controller holding a radar rating appropriate to the functions to which he is assigned.
- Radar display; An electronic display of radar derived information depicting the position and movement of aircraft.
- Radar handover; Transfer of responsibility for the control of an aircraft between two controllers using radar, following identification of the aircraft by both controllers.
- Radar identification; The situation which exists when the radar position of a particular aircraft is seen n a radar display and positively identified by the radar controller.
- Radar monitoring; The use of radar for the purpose of providing aircraft with information and advice relative io significant deviations from the nominal flight path, including deviations from the terms of the air traffic control clearances.
- Radar position indication (RPI); The visual indication, in non-symbolic andlor symbolic form, on a radar display of the position of an aircraft obtained by primary andlor secondary surveillance radar.
- Radar position symbol (RPS); The visual indication, in symbolic form, on a radar display of the position of an aircraft obtained after automatic processing of positional data derived from primary and/or secondary surveillance radar.
- Radar separation; The separation used when aircraft position information is derived from radar sources.
- Radar services; Term used to indicate a service provided directly by means of radar.
- Radar vectoring; Provision of navigational guidance to aircraft in the form of specific headings, based on the use of radar.
- Reporting point; A specified geographical location in relation to which the position of an aircraft can be reported.
- Required navigation performance (RNP); A statement of the navigation performance necessary for operation within a defined airspace.
- Runway; A defined rectangular area, on a land aerodrome prepared for the landing and take-off of aircraft.

- Runway visual range (RVR); The range over which the pilot of an aircraft on the centre line of a runway can see the runways surface marking or the lights deiineaiing the runway or identify it's centre line.
- Runway incursion; Any occurrence at an aerodrome involving the incorrect presence *of* an aircraft. vehicle or person on the protected area of a surface designated for the landing and takeoff of aircraft.
- Secondary radar; A radar system wherein a radio signal transmitted from the radar station initiates the transmission of a radio signal from another station.
- Secondary surveillance radar **(SSR)**; A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.
- Special VFR flight; A VFR flight cleared by air traffic control to operate within a control zone under meteorological conditions below the VMC.
- Standard instrument arrival (STAR); A designated instrument flight rule (IFR) arrival route linking a significant point, normally on an ATS route, with a point from which a published instrument approach procedure can be commenced.
- Standard instrument departure (SID); A designated instrument flight rule (IFR) departure route linking the aerodrome or a specified runway *of* the aerodrome with a specified significant point, normally on a designated ATS route, at which the on-route phase of a flight commences.
- Surveillance radar; Radar equipment used to determine the position of an aircraft in range and azimuth.
- Taxiing; Movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing.
- Taxiway; A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:
  - Aircraft stand taxi lane A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
  - Apron taxiway A portion of a taxiway system location an apron and intended to provide a through taxi route across the apron.
  - Rapid exit taxiway A taxiway connected to a runway at an acute angle and designated to allow ianding aeroplanes to turn off at higher speeds than are achieved on other exit taxiways and thereby minimising runway occupancy times.
- Track; The projection on the earth's surface of the path of an aircraft, direction of which the path at any point is usually expressed in degrees from North (true, magnetic or grid).
- Team resource management; Strategies for the best use of all available resources that include information, equipment and people to optimise safety and efficiency within a specific work environment.
- Traffic information; Information issue by an Air Traffic Services unit to alert a pilot to other known or observed air traffic which may be in proximity to the position or intended route of flight and to help the pilot avoid a collision.
- Transfer of control point; A defined point located along the flight path of an aircraft, at which the responsibility for providing air traffic control service to the aircraft is transferred from one control unit or control position to the next.
- VFR flight; A flight conducted in accordance with the visual flight rules.
- Visibility; Visibility for aeronautical purposes is the greater of:
  - The greatest distance at whicn a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background.
  - The greatest distance at which lights in the vicinity of 1000 candelas can be seen and identified against an unlit background.
- Visual approach; An approach by an IFR flight when either part or all of an instrument approach procedure is not completed and the approach is executed with visual reference to terrain.
- Visual meteorological conditions (VMC): Meteorological conditions expressed in terms of visibility, horizontal and vertical distance from cloud ceiling, equal to or better than the specified minima.
- Way-point; A specified geograpnical location used to define an area navigation route or the flight path of an aircraft employing area navigation, either:

- Fiy-by waypoint; A way point which requires turn anticipation to allow tangential interception Of the next segment from a route or procedure.
- Flyover way point; A way point which a turn is initiated in order to joint the next segment of a route or procedure

- ALARP: As low as reasonably practicable.
- ASR: Air safety report.
- ARMA: Africa Indian Ocean Regional Monitoring Agency.
- ATCI Manual: Air traffic control instruction manual.
- ARCC: Aeronautical rescue co-ordination centre.
- ATMSD: Air traffic management service delivery.
- ASD: Air situation display.
- ATSPL: Air traffic service personnel licensing.
- ACC: Area control centre.
- ACAS: Airborne collision avoidance system.
- ADC: Air data computer.
- ADF: Automatic direction finding.
- ADR: Advisory route.
- ADS: Automatic dependent surveillance.
- ADS-B: Automatic dependant surveillance broadcast.
- ARINC: Aeronautical radio incorporated.
- AFIS: Aerodrome flight information service.
- AFISU: AFIS Unit.
- AFS: Aeronautical Fixed Service.
- AFTN: Aeronautical fixed telecommunications network.
- AH: Artificial horizon.
- ATNS: Air Traffic and Navigation Services.
- AFI: African-Indian Ocean region.
- AAD: Assigned altitude deviation.
- AOC: Aircraft operating certificate.
- ASE: Altimetry system error.
- ATC: Air traffic control.
- ATCU: Air traffic control unit.
- ATD: Actual time of departure.
- ATFM: Air traffic flow management.
- ATIS: Automatic terminal information service.
- ATS: Air Traffic Services.
- ATM: Air traffic management.
- ATSU: Air traffic service unit.
- ATN: Aeronautical telecommunication network.
- AMSS: Aeronautical mobile satellite system.
- ATZ: Aerodrome Traffic Zone.
- AWY: Airway.
- APIRG: African planning and implementation regional group.
- CAP: Civil Aviation Authority.
- CAR: Civil Aviation Regulations.
- CATS: Civil Aviation Technical Standards.
- c/s: Callsign.
- CPDLC: Controller-Pilot Data Link Communications.
- CTA: Control Area.
- CVOR: Conventional very high frequency omni-directional range.
- CNS: Communication, Navigation and Surveillance.
- CTR: Control Zone.
- DR: Dead reckoning.
- CRM: Collision Risk Model.
- DEP: Depart. Departure or Departed.

DLA: Delay or Delayed.
D/F: Direction finding.
DME: Distance measuring equipment.
DVOR: Doppler very high frequency omni-directional range.
DOT: Department of Transport.
DAIW: Danger area infringement warning.
EAT: Expected Approach Time.
ETA: Expected Time of Arrival.
ETD: Expected Time of Departure.
FIM: Flight information manual.
EICAS: Engine indication and crew alerting system.
FMC: Flight Management Computer.
FANS: Future air navigation system.
FIR: Flight Information Region.
FL: Flight Level.
FLAS: Flight level allocation system.
FDP: Primary fiight display.
FOM: Figure of Merit.
FPL: Flight Plan.
ft: Feet.
GCA: Ground Controlled Approach.
GNSS: Global navigation satellite system.
GPS: Global positioning system.
GMU: GPS monitoring unit.
HMU: Height monitoring unil.
GAT: General air Traffic.
HF: High Frequency.
HPa: Hectopascals.
ICAO: International Civil Aviation Organisation.
IAS: Indicated Airspeed.
IFR: Instrument Flight Rules.
ILS: Instrument Landing System.
IMC: instrument MET Conditions.
INS: Inertial navigation system.
IRS: Inertial Reference System.
km: Kilometre(s).
kts: Knots.
MAA: Military Aviation Authority.
MLS: Microwave landing system.
MASPS: Minimum aviation system performance standards.
MEL: Minimum equipment list.
MFD: Multi-function display.
MNPS: Minimum navigation performance specificationr.
MSAW: Minimum safe altitude warning.
MTCA: Medium term conflict alert.
MET: Meteoroiogical
NOTAM: Notices to airmen.
ND: Navigation display.
NAT: North Atlantic region.
NDB: Non-Directional Radio Beacon
NM: Nautical Mile.
OCA/H: Obstacle Clearance Altitude/Height.
OCT: Onward Clearance Time.
OAT: Operational air traffic
PSR: Primary Surveillance radar.
PAPI: Precision Approach Path Indicator.

- PPI: Plan position indicator.
  QDM: Magnetic heading.
- QDR: Magnetic bearing.
- QFE: Atmospheric pressure at airfield elevation (on runway threshold).
  QNH: Altimeter subscale setting to obtain elevation when on the ground.
- RCF: Radio Communication Failure.
- RT: Radiotelephony.
- RDP: Radar data processor.
- RMA: Regional monitoring agency.
- RPL: Repetitive flight plans.
- *RNAV:* Area navigation.
- RNP: Required navigation performance.
- RVR: Runway Visual Range.
- RVSM: Reduced vertical separation minima.
- SVFR: Special visual flight rules.
- SMS: Safety management system.
  SAR: Search and Rescue.
- SID: Standard Instrument Departure.
- SMR: Surface Movement Radar.
- SRA: Surveillance Radar Approach.
- SANDF: South African National Defence Force.
- SAPS: South African Police Services.
- SSR: Secondary Surveillance Radar.
- STAR: Standard Instrument Arrival.
- STCA: Short-term conflict alert.
- THR: Threshold.
- TMA: Terminal Control Area.
  TIBA: Traffic information broadcast alert.
- TAS: True Airspeed.
- TODA: Take-off Distance Available.
- TORA: Take-off Run Available.
- TWR: Aerodrome Control Tower.
- TRM: Team resource management.
- TSI: Turn and slip indicator.
- TLS: .Transponder landing system.
- UHF: Ultra High Frequency.
- TVE: Total vertical error.
- UTC: Universal Time Constant (Co-ordinated Universal Time Constant).
- VDF: VHF Direction Finding.
- VFR: Visual Flight Rules.
- VIP: Very important person.
- VSAT: Very small aperture terminal.
- VHF: Very High Frequency.
- VMC: Visual MET Conditions.
- VOR: VHF Omni-Range.
- VORTAC: VOR/tactical air navigation.
- VSI: Vertical speed indicator.
- WAC: World aeronautical charts.
- WGS: World Geodetic System.

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	*243275*	Analyse and apply safety principles in aviation	Level6	5
Core	244193	Evaluate. anaiyse. interpret and communicate information in a *complex* designated area of responsibility	Level 6	15
Core	244191	Conduct air traffic control for traffic combinations	Level6	*20*

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Core	244196	Analyse and critically evaluate safety management systems	Level 6	6
Core	117428	Assess risk	Level 7	15
Core	117429	Assessing risk impact	Level 7	15
Core	119031	Assess and analyse an incident	Level 5	6
Core	117439	Disseminate information	Level 6	15
Core	244197	Synthesising Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) technologies and systems for planning purposes	Level 6	12
Elective	114488	Coordinate government communication activities	Level 5	6
Elective	114493	Manage interactive communication between public and government	Level 6	7
Elective	244195	Conduct air traffic control for traffic combinations with the aid of radar	Level 6	5
Elective	244192	Conduct ground controlled approaches of air traffic with the aid of radar	Level 6	20
Elective	115759	Conduct moderation of outcomes-based assessments	Level 6	10
Elective	120153	Apply knowledge of aircraft systems integration and data buses	Level 6	12
Elective	243285	Analyse operations at a major airport	Level 6	15
Elective	10591	Conduct interpersonal management	Level 6	6
Elective	14176	Establish, manage and debrief disaster teams	Level 6	25
Elective	15224	Empower team members through recognising strengths, encouraging participation in decision making and delegating tasks	Level 5	4
Elective	11510	Provide close protection of designated persons	Level 5	40
Elective	15229	Implement codes of conduct in the team, department or division	Level 5	3
Elective	15223	Implement training needs for teams and individuals to upgrade skills levels	Level 5	3
Elective	116810	Manage assessment in a learning organisation	Level 6	10
Elective	12156	Apply government communication processes and assess communication effects	Level 5	5
Elective	117392	Conduct a range of audits	Level 5	6
Elective	119345	Apply principles, regulations and legislation underlying supply chain management in the public sector	Level 5	15
Elective	116367	Apply basic human resources practices	Level 6	8
Elective	10597	Implement operational management principles and techniques	Level 6	8
Elective	117874	Guide learners about their learning, assessment and recognition opportunities	Level 5	6
Fundamental	117438	Inform policy	Level 6	15
Fundamental	117434	Conduct research	Level 7	15
Fundamental	117988	Apply the Strategic Process during Planning	Level 5	3
Fundamental	119034	Develop an incident management plan	Level 5	6
Fundamental	10071	Develop a strategic plan	Level 6	15
Fundamental	12138	Conduct an organisational needs analysis	Level 6	10
Fundamental	7848	Manage the induction of new staff	Level 5	5
Fundamental	115334	Maintain good relations with internal and external clients	Level 6	6
Fundamental	230078	Apply the principles of ethics to a business environment	Level 6	10
Fundamental	15233	Harness diversity and build on strengths of a diverse working environment	Level 5	3

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Conduct air traffic control for traffic combinations

SAQA US ID	***UNIT STANDARD TITLE***		
244191	Conduct air traffic control for traffic combinations		
SGB		***PROVIDER***	
SGB Aerospace Operations			
FIELD		***SUBFIELD***	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	***UNIT*** STANDARD ***TYPE***	***NQFLEVEL***	CREDITS
Undefined	Regular	Level 6	120

SPECIFIC OUTCOME 1
Demonstrate understanding of the air traffic control requirements considering traffic combinations.

SPECIFIC OUTCOME 2
Demonstrate knowledge and application of air traffic control procedural modelling methods,

SPECIFIC OUTCOME 3
Demonstrate understanding of control procedures

SPECIFIC OUTCOME 4
Implement air traffic control in accordance with prescribed procedures.

SPECIFIC OUTCOME 5
Hand over control of aircraft

SPECIFIC OUTCOME 6
Demonstrate understanding of basic radar control procedures.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Conduct ground controlled approaches *of air traffic with the* aid *of* radar

SAQA US ID	UNIT STANDARD TITLE		
244192	Conduct ground controlled approaches of air traffic with the aid of radar		
SGB		PROVIDER	
SGB Aerospace Operations			
FIELD		SUBFIELD	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	20

SPECIFIC OUTCOME 1
Demonstrate an understanding of the use of radar in providing ground controlled approaches considering traffic combinations.

SPECIFIC OUTCOME 2
Accept control *of* air traffic

SPECIFIC* OUTCOME *3
Demonstrate understanding of ground controlled approach procedures.

SPECIFIC OUTCOME 4
Implement ground controlled approaches in accordance with prescribed radar procedures

SPECIFIC OUTCOME 5
Hand over control of aircraft.

SPECIFIC OUTCOME 6
Implement ground controlled approach procedures.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Evaluate, analyse, interpret and communicate informatian in a complex designated area of responsibility

SAQA US ID	*UNIT STANDARD TITLE*		
244193	Evaluate. analvse. interoret and communicate information in a complex		
SGB		*PROVIDER*	
SGB Aerospace Operations			
FJELD		*SUBFIELD*	
Sciences			
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	15

SPECIFIC OUTCOME 1
Demonstrate knowledge and application of data analysis methods for air traffic management.

SPECIFIC OUTCOME 2
Demonstrate knowledge and application of air traffic control procedural modelling methods.

SPECIFIC OUTCOME 3
Demonstrate knowledge and application of methods used for presenting and communicating data and analysing results.

SPECIFIC OUTCOME 4
Demonstrate understanding of basic aerodrome control procedures.

SPECIFIC OUTCOME *5*
Demonstrate understanding of air traffic control procedures

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Perform Air Traffic Service (ATS) shift procedures and administration

SAQA US ID	*UNIT STANDARD TITLE*		
244194	Perform Air Traffic Service (ATS) shift procedures and administration		
SGB		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	15

SPECIFIC OUTCOME *1*
Demonstrate knowledge and understanding *of* the air traffic control workplace and its resources.

SPECIFIC OUTCOME 2
Evaluate and confirm self-readiness to perform air traffic control duties

SPECIFIC OUTCOME 3
Demonstrate air traffic control shift-specific practices,

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Conduct air traffic control far traffic combinations with the aid of radar

SAQA US ID	*UNIT STANDARD TITLE*		
244195	Conduct air traffic control for traffic combinations with the aid of radar		
SGB		*PROVIDER*	
SGB Aerospace Operations			
FIELD		*SUBFIELD*	
10 - Physical. Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	5

SPECIFIC OUTCOME 1
Demonstrate an understanding of the use of radar in providing air traffic control considering traffic combinations.

SPECIFIC OUTCOME 2
Accept control of air traffic

SPECIFIC OUTCOME 3
Demonstrate understanding *of* radar control procedures.

SPECIFIC OUTCOME 4
Implement air traffic control in accordance with prescribed radar procedures.

SPECIFIC OUTCOME 5
Hand over control of aircraft.

SPECIFIC OUTCOME 6
Implement radar control procedures

SAQA US ID	UNIT STANDARD TITLE		
244196	Analyse and critically evaluate safety management systems		
SGB		PROVIDER	
SGB Aerospace Operations			
FIELD		SUBFIELD	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	6

SPECIFIC OUTCOME 1
Demonstrate knowledge of safety management systems.

SPECIFIC OUTCOME *2*
Formulate safety management policies and performance management systems.

SPECIFIC OUTCOME 3
Analyse the performance of a safety management system.

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Synthesising Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) technologies and systems for planning purposes

SAQA US ID	UNIT STANDARD TITLE		
244197	Synthesising Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) technologies and systems for planning purposes		
SGB		PROVIDER	
SGB Aerospace Operations			
FIELD		SUBFIELD	
10 - Physical, Mathematical, Computer and Life Sciences		Physical Sciences	
ABET BAND	UNIT STANDARD TYPE	NQF LEVEL	CREDITS
Undefined	Regular	Level 6	12

SPECIFIC OUTCOME 1
Demonstrate an understanding of operational CNS/ATM fundamentals.

SPECIFIC OUTCOME *2*
Incorporate operationai planning for CNS/ATM

SPECIFIC OUTCOME 3
Rationalise the need for strategic planning in *CNSIATM.*