

National Vocational Certificate in Metallurgy (Level 4) (Hydrometallurgical Processing - Senior Operator)
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Level of Qualification: 4

Credit total: 457 - 468 (depending on strand and elective)

	Compulsory			Extraction & Solid from liquid separation Strand	
	Set A	Set B	Elective	Compulsory	Elective
level 1 credits available	-	4	-	-	4
level 2 credits available	22	102	80	6	25
level 3 credits available	28	180	78	-	40
level 4 credits available	115	18	-	15	30
level 5 credits available	36	-	-	-	-
minimum totals required	201	137	71	21	36

	Solid from liquid separation & Purification Strand		Purification & Recovery Strand	
	Compulsory	Elective	Compulsory	Elective
level 1 credits available	-	-	-	2
level 2 credits available	6	64	-	49
level 3 credits available	6	213	6	198
level 4 credits available	-	90	-	95
level 5 credits available	-	-	-	-
minimum totals required	12	47	6	42

Registration date: 28 September 2016

Scheduled review date: 2021

Body responsible for the qualification:

Namibia Training Authority (NTA) - Industry Skills Committee for Mining; Quarrying; Construction; Electricity, Gas and Water supply; and Sanitation (MQCEGWS)

Other bodies whose unit standards are included in the qualification:

Namibia Training Authority - NTA

1. Purpose

This Qualification has been developed to assist with the advancement of people across different mining industries in which metallurgical processing operations, with special emphasis on Hydrometallurgy, are carried out. The intention of this qualification is to assist;

- Those who have been in the workplace for a long time, by using the recognition of prior learning process to assess and recognise workplace skills acquired without the benefit of formal education and training;

- New entrants, by describing the learning outcomes required to participate effectively, e.g. in a structured workplace programme;
- Education and training providers, by providing guidance for the development of appropriate learning programmes and assessment documentation;
- Employers, by enabling skills gaps to be identified and addressed ensuring that productivity levels are increased and business objectives achieved.

Training programmes, primarily associated with routine on-the job activities, leading to the award of this qualification will address the on-going demand for qualified senior operators working in a metallurgical plant in Namibia by equipping learners with in-depth knowledge and skills to manage, control and monitor the general operation and performance of complex equipment or a group of medium complexity.

As a result, this qualification provides opportunities for self- or paid employment acting as a reward for contributions to society by facilitating social and economic transformation, empowerment and general upliftment of the metallurgical processing industry and country in general.

The strands of this qualification are designed to recognise the specialised skills associated with Extraction & Solid from liquid separation; Solid from liquid separation & Purification; Purification & Recovery, enabling the qualification to be tailored to meet the demand of particular sections in metallurgical processing operations in the different mining industries.

This qualification is based on the assumption that people entering programmes of study leading towards the certificate have already demonstrated ability in metallurgical processing operations. Consequently, the National Vocational Certificate in Metallurgical Processing (Level 3) (Operator), or the demonstration of equivalent knowledge and skills, is a prerequisite for entry to this qualification.

This qualification represents a stage of progression to higher level qualifications, such as Master Operator, Process Metallurgist, and Metallurgist.

2. Regulations for the qualification

2.1 Summary of qualification requirements

This qualification will be awarded to people who are credited with:

- i. Requirements of the compulsory sets A and B.
- ii. Requirements of the elective set.
- iii. Requirements of the strand compulsory and electives in one (1) of the following strands:
 - Extraction & Solid from liquid separation,
 - Solid from liquid separation & Purification, or
 - Purification & Recovery.

2.2 Detailed qualification requirements

Compulsory Set A

The following unit standards are required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Metallurgical Processing - Core

Unit No.	Unit Standard Title	Level	Credits
1458	Apply operational maintenance skills	2	10
1461	Transfer bulk fluids into and out of storage facility	2	8
1462	Conduct pump operations	2	4
1489	Perform basic tests as part of metallurgical operations	3	12
1490	Isolate and lock-out plant and equipment	3	10
1491	Control and monitor automated plant and machinery	4	12
1492	Control and monitor a metallurgical plant from a control room	4	15
1493	Manage plant shutdown and restart	4	8
1494	Decommission plant	4	6
1495	Perform calibration checks on laboratory equipment	3	6
1496	Monitor and coordinate waste and process water treatment	4	10
1497	Apply the concept of motivation in a leadership context	4	6
1498	Process and interpret data in the context of metallurgical processing	4	8

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

1569	Perform metallurgical tests	3	6
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FIELD: HEALTH SCIENCES AND SOCIAL SERVICES
Subfield: Preventive Health
Domain: Occupational Health and Safety

Unit No.	Unit Standard Title	Level	Credits
848	Develop procedures to safely control work operations	4	6
849	Monitor procedures to safely control work operations	4	5
850	Supervise the health, safety and welfare of an employee new to the role in the workplace	4	8

851	Advocate and keep pace with improvements in health and safety practice	4	6
852	Develop and maintain individual and organisational competence in health and safety matters	4	8
853	Develop and implement effective communication systems for health and safety information	4	7
855	Conduct a health and safety risk assessment in a workplace	5	10
858	Investigate and evaluate health and safety incidents, accidents, and complaints in the workplace	5	8
859	Promote a positive health and safety culture in workplaces	5	10
860	Review health and safety procedures in workplaces	5	8

Elective Set

A minimum of 71 credits is required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

Unit No.	Unit Standard Title	Level	Credits
1531	Demonstrate mechanical awareness and plant appreciation as part of mineral processing operations	2	20
1539	Handle liquid cyanide safely in a metallurgical plant	3	7
1557	Conduct dense medium separation	2	7
1559	Conduct thickening and clarifying process in a metallurgical plant	3	6
1561	Work safely with instruments that emit radiation	3	6

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1400	Attend to heat exchangers	2	8
1410	Off-load reagents into a storage facility	3	5
1417	Recover a mineral from ore by means of flotation	3	10
1440	Recover metal by electrolytic precipitation	3	4

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Pyrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1503	Demonstrate mechanical awareness and plant appreciation as part of pyrometallurgy operations	2	20

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Metallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1463	Operate compressors in a metallurgical plant	2	4

FIELD: MANUFACTURING, ENGINEERING, AND TECHNOLOGY
Subfield: Lifting, shifting, securing loads
Domain: Lifting Machine Operations

Unit No.	Unit Standard Title	Level	Credits
1089	Sling regular loads and communicate during crane operations	3	20

FIELD: MANUFACTURING, ENGINEERING, AND TECHNOLOGY
Subfield: Lifting, shifting, securing loads
Domain: Crane operation

Unit No.	Unit Standard Title	Level	Credits
1093	Lift and place loads with truck-mounted crane	3	20

FIELD: PHYSICAL PLANNING AND CONSTRUCTION
Subfield: Road Construction and Maintenance
Domain: Road Construction and Maintenance – Machine Operations

Unit No.	Unit Standard Title	Level	Credits
1018	Carry out road construction and maintenance activities using a rotary broom	2	8

FIELD: PHYSICAL PLANNING AND CONSTRUCTION
Subfield: Surface Mining and Quarrying
Domain: Heavy Equipment operations

Unit No.	Unit Standard Title	Level	Credits
1118	Lift, move and place loads with a forklift as part of surface mining and quarrying operations	2	5
1119	Carry out surface mining and quarrying activities using a service vehicle	2	8

Compulsory Set B

All strand specific requirements (Hydrometallurgical Processing Strand) of Q0756 Metallurgy (Level 3) (Operator)

Extraction & Solid from liquid separation Strand**Compulsory**

The following unit standard is required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

Unit No.	Unit Standard Title	Level	Credits
1529	Clarify a solution	2	6

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1447	Control the leaching operation in a metallurgical plant	4	15

Elective Set

A minimum of 36 credits is required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

Unit No.	Unit Standard Title	Level	Credits
1524	Distribute tailings	2	8
1536	Perform size separation in a metallurgical plant	3	6
1537	Control feed distribution by means of a mobile system	3	4
1543	Separate material by means of a magnetic separator	3	8
1548	Make up a heavy medium suspension in a metallurgical plant	2	6
1555	Control medium density in a dense-medium separation process	3	8
1563	Control the de-watering process in a metallurgical plant	4	15

1564	Control the dense medium separation process in a metallurgical plant	4	15
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FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1399	Demonstrate knowledge of handling and storing cyanide	1	4
1401	Determine relative density by means of a density scale	2	3
1404	Make-up a sodium cyanide solution in a metallurgical plant	3	6
1448	Conduct pipeline pigging	3	8

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Metallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1459	Operate and maintain conveyors at a metallurgical plant	2	8

Solid from liquid separation & Purification Strand

Compulsory

The following unit standards are required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

Unit No.	Unit Standard Title	Level	Credits
1529	Clarify a solution	2	6

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1425	Operate pipeline stations and equipment	3	6

Electives

A minimum of 50 credits is required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

Unit No.	Unit Standard Title	Level	Credits
1524	Distribute tailings	2	8
1535	Treat and dispose of rejects and tailings	3	12
1536	Perform size separation in a metallurgical plant	3	6
1537	Control feed distribution by means of a mobile system	3	4
1538	Handle cyanide solids safely in a metallurgical plant	3	7
1541	Neutralise cyanide spillage	3	8
1543	Separate material by means of a magnetic separator	3	8
1548	Make up a heavy medium suspension in a metallurgical plant	2	6
1551	Carry out acid treatment of carbon	2	8
1555	Control medium density in a dense-medium separation process	3	8
1558	Process lime products	3	14
1563	Control the de-watering process in a metallurgical plant	4	15
1564	Control the dense medium separation process in a metallurgical plant	4	15

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1401	Determine relative density by means of a density scale	2	3
1402	Dispatch metallurgical process by-products	2	4
1403	Adsorb a dissolved metal	3	7
1407	Conduct aeration operations	3	6
1408	Conduct digestion operations	3	6
1411	Off-load organic reagents into a storage facility	3	5
1412	Regenerate organic solvent	3	5
1413	Regenerate resin	2	6
1415	Neutralise waste streams in a metallurgical plant	2	3

1416	Operate a demineralisation plant	3	10
1418	Reclaim and treat water in a metallurgical plant	3	8
1419	Produce sulphuric acid by means of absorption	2	5
1420	Clean sulphur dioxide gas	2	3
1422	Maintain the catalyst in a sulphur dioxide converter	2	3
1423	Replace stellar filter candles	2	4
1424	Operate a drying plant	3	10
1426	Conduct precipitation operations	2	7
1430	Strip precious metals from carbon	3	5
1431	Extract a metal from a solution by means of solvent extraction	3	5
1432	Absorb chlorine gas in a metallurgical plant	3	8
1435	Conduct elution processes	3	12
1436	Shut-down a sulphur dioxide gas system for maintenance	3	10
1437	Monitor and control the sulphuric acid production process	3	15
1438	Generate sulphur trioxide gas by means of a catalytic converting process	3	8
1439	Conduct and monitor solvent extraction process	3	8
1441	Regenerate carbon by means of a regeneration kiln	3	4
1442	Control the carbon adsorption process in a metallurgical plant	4	15
1443	Control the drying operation in a metallurgical plant	4	15
1444	Control the elution process in a metallurgical plant	4	15
1445	Control the flotation process in a metallurgical plant	4	15
1448	Conduct pipeline pigging	3	8

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Metallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1459	Operate and maintain conveyors at a metallurgical plant	2	4
1466	Operate air-blower system	3	6

Purification & Recovery Strand

Compulsory

The following unit standards are required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credit
1425	Operate pipeline stations and equipment	3	6

Electives

A minimum of 42 credits is required

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Mineral Processing

Unit No.	Unit Standard Title	Level	Credits
1525	Hand sort material in a metallurgical plant	1	2
1538	Handle cyanide solids safely in a metallurgical plant	3	7
1541	Neutralise cyanide spillage	3	8
1551	Carry out acid treatment of carbon	2	8
1552	Operate an x-ray sorter	2	2
1558	Process lime products	3	14

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Hydrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credits
1402	Dispatch metallurgical process by-products	2	4
1403	Adsorb a dissolved metal	3	7
1407	Conduct aeration process	3	6
1408	Conduct digestion operations	3	6
1411	Off-load organic reagents into a storage facility	3	5
1412	Regenerate organic solvent	3	5
1413	Regenerate resin	2	6
1414	Strip base metals from titanium blanks in an electro-winning process	3	3

1415	Neutralise waste streams in a metallurgical plant	2	3
1416	Operate a demineralisation plant	3	10
1418	Reclaim and treat water in a metallurgical plant	3	8
1419	Produce sulphuric acid by means of absorption	2	5
1420	Clean sulphur dioxide gas	2	3
1421	Dry sulphur dioxide gas by means of absorption	2	4
1422	Maintain the catalyst in a sulphur dioxide converter	2	3
1423	Replace stellar filter candles	2	4
1424	Operate a drying plant	3	10
1426	Conduct precipitation operations	2	7
1430	Strip precious metals from carbon	3	5
1431	Extract metal from a solution by means of solvent extraction	3	5
1432	Absorb chlorine gas in a metallurgical plant	3	8
1434	Conduct electrometallurgy operations	3	8
1435	Conduct elution processes	3	12
1436	Shut-down a sulphur dioxide gas system for maintenance	3	10
1437	Monitor and control the sulphuric acid production process	3	15
1438	Generate sulphur trioxide gas by means of a catalytic converting process	3	8
1439	Conduct and monitor solvent extraction process	3	8
1441	Regenerate carbon by means of a regenerator kiln	3	4
1442	Control the carbon adsorption process in a metallurgical plant	4	15
1443	Control the drying operation in a metallurgical plant	4	15
1444	Control the elution process in a metallurgical plant	4	15
1445	Control the flotation process in a metallurgical plant	4	15
1446	Control the process of uranium recovery from solution in a metallurgical plant	4	15

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY
Subfield: Metallurgy
Domain: Pyrometallurgical Processing

Unit No.	Unit Standard Title	Level	Credit
1511	Produce metal bar by means of a casting process	3	12

1516	Operate furnaces	4	20
1517	Load a charge into a furnace	3	8

FIELD: MANUFACTURING, ENGINEERING AND TECHNOLOGY

Subfield: Metallurgy

Domain: Metallurgical Processing

Unit No.	Unit Standard Title	Level	Credit
1466	Operate air-blower system	3	6

3. Credit recognition and transfer arrangements

Credits for any version of a unit standard with the same identification number will be recognised in the award of this qualification.

4. Special Arrangements

- 4.1** Special Arrangements apply to the accreditation of providers offering learning pathways to and/or undertaking assessments relating to all unit standards listed in this qualification under the Subfield of Metallurgy. These Special Arrangements are available from:

Industry Skills Committee - MQCEGWS
 Rand Street
 Khomasdal
 Namibia
 Telephone number: 061-207 8550
 Facsimile number: 061-207 8551
 Email info@nta.com.na

- 4.2** Special Arrangements may apply to the accreditation of providers offering learning pathways to and/or undertaking assessment relating to all unit standards listed in this qualification in other Subfields and Domains. These Special Arrangements are available from:

Namibia Qualifications Authority
 44 Bismarck St.
 Windhoek
 Namibia
 Telephone number: 061-384116
 Facsimile number: 061-384114
 Email: info@namqa.org

Namibia Training Authority
 Rand Street
 Khomasdal
 Namibia
 Telephone number: 061-207 8550
 Facsimile number: 061-207 8551
 Email info@nta.com.na

- 4.3** Regardless of the above, providers seeking accreditation through the relevant authorities must have or have confirmed access to all equipment and facilities detailed in the Special Notes, Performance Criteria and/or Range Statements in the unit standards that are included in this qualification.

5. Transition arrangements

5.1 Non National Qualifications Framework transition

None.

5.2 National Qualifications Framework transition

This is the first version of this qualification.