



PART OF **nocn** GROUP

QUALIFICATION SPECIFICATION

Suite of Pumping Technology Qualifications

NOCN Level 2 Award in Introduction to Pumping Technology

Qualification No: 601/1564/6

NOCN Level 4 Award in Essentials of Pumping Technology

Qualification No: 601/1583/X

Operational Start Date

1 November 2013

Version

2.2 – November 2019

To know more about NOCN:

- Visit the NOCN website: www.nocn.org.uk
- Call the Customer Service Team: **0300 999 1177**

Introduction

NOCN has been providing a qualification and accreditation service to providers across the UK for over 25 years and is justifiably proud of its reputation as, "...a provider of fully accessible, trusted and flexible qualification and accreditation services".

Over the years, NOCN has worked effectively with our centres for the benefit of learners across the country; with a mutual interest in providing a continuously improving service. NOCN, whilst retaining all the advantage of being a national body, has always provided a personal, bespoke service to its customers and prides itself on its local presence and expertise within communities.

This handbook is a resource for NOCN centres who wish to offer the NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology.

The Level Two qualification is relevant to all employees who need to know the language of the pump industry, either within the pump manufacturing and pump distributing companies or end user organisations.

The Level Four qualification is relevant to all employees who work in a technical engineering role within the pump manufacturing and distribution companies and end user companies.

The qualification specification provides guidance to the training provider on assessment criteria and evidence requirements.

Contents

Introduction	2
1. NOCN Level 2 Award in Introduction to Pumping Technology NOCN Level 4 Award in Essentials of Pumping Technology	4
1.1 Entry Requirements	5
1.2 Qualification Structure	5
1.3 Total Qualification Time (TQT)	
2. Centre Information	7
2.1 Offering these qualifications Recognised Centres, New Centres and External Verification	7
2.2 Required Resources for Delivering these Qualifications Tutor/Assessor, Internal Verifier, External Verifier	8
Continuous Professional Development (CPD)	9
3. Unit Information	10
3.1 Units	11
4. Assessment and Evidence	15
4.1 Fair and Equitable Assessment	15
4.2 Learners with Particular Requirements	16
4.3 Recognised Prior Learning	16
4.4 Functional Skills	16
4.5 Assessment and Evidence for the Units	16
Appendix – Resource suggestions	17

1. NOCN Level 2 Award in Introduction to Pumping Technology NOCN Level 4 Award in Essentials of Pumping Technology

Please note that access to these qualifications in this suite is through British Pump Manufacturers Association only.

For further details, please contact Steve Smith s.smith@bpma.org.uk

The NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology are designed to provide the pump industry sector of the mechanical engineering industry with knowledge specific to pumps and pump systems.

Learners of the Level 2 course will gain knowledge on the specific language, terms descriptions etc. used in pumping technology.

This qualification is suitable for learners **aged 16 years or over**. This qualification will provide learners with an opportunity to:

- Gain knowledge and understanding needed for employment as non-technical personnel in the pumping industry.
- Achieve a standalone qualification that offers recognition of their attainment of knowledge that meets the assessment criteria.
- Progress onto the NOCN Level 4 course for those learners who are undertaking or have undertaken further studies in an appropriate engineering discipline.

Learners of the Level 4 course will gain knowledge and understanding of important technical issues associated with pumping technology.

This qualification is suitable for learners **aged 16 years or over**. This qualification will provide learners with an opportunity to

- Gain knowledge and understanding necessary for employment in a technical role in designing, specifying, sourcing, installing, servicing and maintaining pumping equipment.
- Achieve a standalone qualification that offers recognition of their attainment of knowledge that meets the assessment criteria.
- Improve their ability to act efficiently in technical roles within the sector and can contribute to their further advancement.

1.1. Entry Requirements

There are no formal entry requirements for learners undertaking these courses. Learners will need to be able to understand and operate the Demonstration Course that is provided on the web site. <http://www.bpma.org.uk>

Reasonable adjustments and/or special considerations will be made for those unable to access or use the necessary equipment.

1.2 Qualification Structure

The NOCN Level 2 Award in Introduction to Pumping Technology is a **2** credit qualification and has **16** guided learning hours with a Total Qualification Time (TQT) of **20** hours. Learners **must** achieve **2** credits from the **1** mandatory unit listed below:

Unit Title	Level	Credit Value	Mandatory or Optional	Ofqual Unit Reference Number
Introduction to Pumping Technology	2	2	M	D/505/6594

The NOCN Level 4 Award in Essentials of Pumping Technology is a **9** credit qualification and has **54** guided learning hours with a Total Qualification Time (TQT) of **90** hours. Learners **must** achieve all 9 credits from the **1** mandatory unit listed below:

Unit Title	Level	Credit Value	Mandatory or Optional	Ofqual Unit Reference Number
Essentials of Pumping Technology	4	9	M	L/505/6588

1.3 Total Qualification Time (TQT)

Through consultation with users, TQT has been agreed by considering the total number of learning hours required for the average learner to achieve this qualification.

TQT is split into two areas:

- Guided Learning Hours (GLH):
 - learning activity under the immediate guidance or supervision of a lecturer, supervisor, tutor or other appropriate provider of education or training

- includes the activity of being assessed if the assessment takes place under the immediate guidance or supervision of a lecturer, supervisor, tutor or other appropriate provider of education or training.
- Other Learning Hours (OLH):
 - an estimate of the number of hours a learner will spend, as directed by (but not under the immediate guidance or supervision of) a lecturer, supervisor, tutor or other appropriate provider of education or training, including:
 - preparatory work
 - self-study
 - or any other form of education or training, including assessment.

Examples of GLH activities include:

- Classroom-based learning supervised by a teacher
- Work-based learning supervised by a teacher
- Live webinar or telephone tutorial with a teach in real time
- E-learning supervised by a teacher in real time
- All forms of assessment which take place under the immediate guidance or supervision of an appropriate provider of training
- Exam time

Examples of OLH activities include:

- Independent and unsupervised research/learning
- Unsupervised compilation of a portfolio of work experience
- Unsupervised e-learning
- Unsupervised e-assessment
- Unsupervised coursework
- Watching a pre-recorded podcast or webinar
- Unsupervised work-based learning

The agreed Total Qualification Time has been used to identify the qualification's Credit Value.



2. Centre Information

2.1. Offering these qualifications

Recognised Centres

These qualifications are only available through the British Pump Manufacturers Association. If you would like more information about offering the NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology, please contact: business-enquiries@nocn.org.uk.

New Centres

If you are interested in offering this qualification, but are not yet a NOCN Approved Centre and would like more information about becoming a NOCN centre and offering this qualification please see **Become a Registered Centre** on our website <https://www.nocn.org.uk/customers/nocn-centres/> and click Become a Centre.

2.2. Required Resources for Delivering these Qualifications

As part of the requirement to deliver these qualifications there is an expectation that staff undertaking roles as part of the delivery and assessment of these qualifications have a demonstrable level of expertise.

Tutor/Assessor

NOCN expects that Tutors/Assessors are able to demonstrate the following competencies:

- Be technically competent in an appropriate engineering discipline and/or have experience of delivering training within the area. The minimum expectation is that the level of knowledge should exceed the level of the on-line learning package.
- An extensive knowledge of pump and pump systems, together with a substantial period in a technical role within the industry. The minimum expectation is that the level of knowledge should exceed the level of the on-line learning package.

Centre staff may undertake more than one role, for example, tutor and assessor or internal verifier, but they **cannot** carry out any verification on work that they have previously assessed.

Internal Verification

Internal verification will be carried out by the centre and will include review of the delivery and assessment of the qualifications. The centre must have internal verification policies and procedures in place to ensure that decisions made by assessors are appropriate, consistent, fair and transparent, and that they do not discriminate against any learner. The policies and procedures must be sufficient to secure the quality of the award, ensuring validity, reliability, and consistency.

NOCN expects that an Internal Verifier is able to demonstrate the following competencies:

They should:

- Be technically competent in an appropriate engineering discipline and/or have experience of delivering training within the area. The minimum expectation is that the level of knowledge should exceed the level of the on-line learning package.
- An extensive knowledge of pump and pump systems, together with a substantial period in a technical role within the industry. The minimum expectation is that the level of knowledge should exceed the level of the on-line learning package.

NOCN expects that Internal Verifiers will have experience of assessment and internal verification.

Centre staff may undertake more than one role, e.g. tutor and assessor or internal verifier, but they **cannot** carry out any verification on work that they have previously assessed.

NOCN supports and recognises Centres' internal quality assurance systems which support the above; any system should encourage standardisation and sharing of good practice.

External Verification

Once recognised as a Centre, NOCN will allocate an External Quality Assurer. The External Quality Assurer will have ongoing responsibility for monitoring the Centre's compliance with the requirements of centre recognised status.

The External Quality Assurer will make regular visits to all Centres. During these visits he/she will:

- Monitor the Centre's compliance with the Centre Recognition agreement by reviewing course documentation, meeting managers, tutors, internal quality assurers, learners and administrative staff.

- Verify recommendations for achievement submitted by the centre via Quartzweb.

Refer to the **NOCN Quality Assurance User Guide** for further information on the External Quality Assurance process.

Continuing Professional Development (CPD)

Centres are expected to support their staff, ensuring that their subject knowledge remains current and that their members of staff are up to date with regards to best practice in delivery, assessment and verification.

3. Unit Information

The NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology both consist of 1 mandatory unit which are detailed below.

To achieve these qualifications a learner **must** provide evidence of learning and achievement against **all** of the assessment criteria within each unit. However a number of assessment criteria can be taught and assessed through one activity.

A copy of each of the units follows, with an indication of a scope of learning that would be required to cover the assessment criteria. This list is indicative, not exhaustive.

3.1. Units

Unit Title	Introduction to Pumping Technology
Ofqual unit reference number (code)	D/505/6594
Unit Level	Two
Unit Credit Value	2
GLH	16

This unit has 5 learning outcomes.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The learner will:	The learner can:
1. Know how to use terms relevant to pumping technology.	1.1. Use terms relevant to the pumping industry correctly. 1.2. Identify the appropriate context of terms relevant to pumping technology.
2. Know about different types of pumps.	2.1. Identify types of pumps within the 'pump family tree'. 2.2. Identify the main components of different types of pumps. 2.3. Indicate basic principles of operation for different types of pumps.
3. Know about fluid properties relevant to pumping.	3.1. Identify fluid properties relevant to pumping. 3.2. Indicate the difference between pumps and compressors.
4. Know about different types of pumping systems and their components.	4.1. Identify different types of pumping systems and their components. 4.2. Indicate the function of different types of pumping systems.
5. Understand regulation relating to Pumping Technology.	5.1. Identify Standard Setting bodies for the Pumping Industry. 5.2. Indicate the difference between Directives and Standards.

Scope of learning for the unit

- The learner will be taught and assessed through the BPMA's distance learning package.

- The courses have been carefully constructed to lead the learners through the most important subjects that comprise pumping technology. They are accessed by distance learning with a facility to contact a tutor on each page.

Unit Title	Essentials of Pumping Technology
Ofqual unit reference number (code)	L/505/6588
Unit Level	Four
Unit Credit Value	9
GLH	54

This unit has 5 learning outcomes.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The learner will:	The learner can:
1. Understand phenomena of liquid flow relevant to pumping technology.	1.1. Identify the phenomena of liquid flow relevant to pumping technology. 1.2. Apply mathematical knowledge of the factors affecting liquid flow to pumping technology. 1.3. Apply knowledge of cavitation to pump design and function.
2. Understand the importance of energy conservation when applied to pumping applications.	2.1. State why the application of energy conservation is important in pumping technology. 2.2. Apply knowledge of energy conservation techniques to pumping technology.
3. Understand the principles and applications of the three main types of pumps.	3.1. Identify vital factors for consideration when selecting the correct type of pump for a specific application. 3.2. Apply knowledge of the principles of rotodynamic pumps to their practical applications. 3.3. Apply knowledge of the principles of rotary positive displacement (PD) pumps to their practical applications. 3.4. Apply knowledge of the principles of reciprocating PD pumps to their practical applications.
4. Understand the relationship between a pump and a pumping system.	4.1. Identify vital factors in the relationship between a pump and a pumping system. 4.2. Apply knowledge of the interaction between the pump and the pumping system in a range of circumstances.
5. Be able to select pumps.	5.1. Select appropriate pumps for a range of situations.

LEARNING OUTCOMES	ASSESSMENT CRITERIA
The learner will:	The learner can:

Scope of learning for the unit

- The learner will be taught and assessed through the BPMA's distance learning package.
- The courses have been carefully constructed to lead the learners through the most important subjects that comprise pumping technology. They are accessed by distance learning with a facility to contact a tutor on each page.

4. Assessment and Evidence

The NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology are internally assessed qualifications. Learners must provide evidence of learning and achievement against **all** of the assessment criteria specified within each unit.

The NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology are vocationally based qualifications and as such, the units offer the opportunity for learners to achieve a balanced approach to their knowledge.

The centre must ensure that knowledge based learning is substantive, and relevant to the work or events likely to be encountered in the course of an appropriate job role in the pumping industry.

The centre must ensure that the assessment activities are:

Valid The assessment activity **must** be fit for purpose which means that the assessment tasks measure the intended outcomes of the unit. They should afford the learner an opportunity to provide sufficient evidence of learning to meet the assessment criteria at the appropriate level.

Sufficient The assessment activities afford the learner an opportunity to provide sufficient evidence of learning to meet the assessment criteria.

Reliable Assessment activities must generate clear and consistent outcomes across all assessors.

Although the activities may be applied to differing scenarios and in different contexts, with different learners, the evidence sought by the activity must be assessed with a universal standard to ensure that the resulting assessment decisions are consistent across all assessors and centres offering the qualification.

Authentic Evidence presented must be the learner's own work.

4.1. Fair and Equitable Assessment

Assessment within the NOCN Level 2 Award in Introduction to Pumping Technology and the NOCN Level 4 Award in Essentials of Pumping Technology is designed to be accessible and inclusive.

The assessment methodology is appropriate for individual assessment or for groups of learners.

4.2. Learners with Particular Requirements

If you are a NOCN Recognised Centre and have learners with particular requirements, please see the **NOCN Reasonable Adjustments Policy and Procedure** found on the NOCN website at www.nocn.org.uk

This policy gives clear guidance on the reasonable adjustments and arrangements that can be made to take account of disability or learning difficulty without compromising the assessment criteria.

The NOCN Centre Recognition process requires the centre to hold policy statements on Equal Opportunities, Diversity and Disability Discrimination which will be reviewed by NOCN. Please contact assurance@nocn.org.uk for further details.

4.3. Recognised Prior Learning

Recognition of prior learning is an assessment method leading to the award of credit. The process involves considering if a learner can meet the specified assessment requirements for a unit through knowledge, understanding or skills that they possess already, as a consequence, they do not need to undertake a course of learning.

Centres are encouraged to recognise previous achievements and experience, both formal, for example through accredited units or qualifications and informal, for example through continuous learning. This involves the recognition of achievement from a range of activities that will have been assessed through any valid method of assessment.

When using the process of the recognition of prior learning, it is essential that the assessment requirements of a specific unit or, more exceptionally, a qualification have been met. The evidence of learning provided must be sufficient, reliable, authentic and valid.

4.4. Assessment and Evidence for the units

The learner will be taught and assessed through the BPMA's distance learning package.

Appendix – Resources

Required resource

Access to an internet connected computer.

Level 2 Resources

Reading List

FLOW OF FLUIDS - Metric Edition

Crane Limited, 11-12 Bouverie Street, LONDON, EC4Y 8AH

THE BPMA DIRECTORY & BUYERS GUIDE

Published by the BPMA

Available from BPMA at www.bpma.org.uk

A GUIDE TO LCC ANALYSIS FOR PUMPING SYSTEMS

Published by Europump.

Available from BPMA at www.bpma.org.uk

A GUIDE TO SUCCESSFUL APPLICATIONS FOR VARIABLE SPEED PUMPING

Published by Europump.

Available from BPMA at www.bpma.org.uk

A GUIDE TO SYSTEM EFFICIENCY FOR ROTODYNAMIC PUMPING SYSTEMS

Published by Europump.

Available from BPMA at www.bpma.org.uk

ISO 17769 Terms & Symbols

Liquid Pumps - General Terms, Definitions, Quantities, Symbols and Units.

Part 1 for pumps and part 2 for systems.

Health and Safety Compliance - Free Checklist Guides.

Make sure that you are compliant with health and safety regulations with these free, easy-to-access checklist guides, including:

- Conflict Management
- General Health & Safety
- First Aid

PLUS - technical guides including:

- Requirements of a formal risk assessment
- Changes to Noise at Work Limits

Use this web site for your free guide.

<http://www.emedia.co.uk/!/?860865.306718.HRRQEXNC.0>



Electrical Safety At Work - Free Guide

This free guide outlines basic measures to help you control the risks from your use of electricity at work.

Use this web site for your free guide.

<http://www.emedia.co.uk/l/?860928.306718.HRRQEXNC.0>

Level 4 Resources

Some resources have been added to the relevant web page for students to access.

References 1

BBC2 Series EARTH - The power of the Planet.

ISO 17769 Terms & Symbols.

ISO 17769 - 1 for pumps and ISO 17769 - 2 for systems 2012

Flow of Fluids Publication 410M (Metric Edition)

Crane Fluid Systems, Publicity Division, Nacton Road, IPSWICH, IP3 9QH

Cavitation and Bubble Dynamics by Christopher E Brennen
Oxford University Press. 1950.

ISO 6708 Pipework components -Definition and selection of DN (nominal size).

NPSH for Rotodynamic Pumps. ISBN: 1 85617 356 9
by Europump & Hydraulic Institute. Available from the BPMA.

HI Pumps - Centrifugal and Vertical Pumps for NPSH Margin.

Edge, KA, Boston OP, Xiao S, Longvill MJ & Burrows CR.

Pressure pulsations in reciprocating pump piping systems.

Part 2: Experimental investigations and model validation. Proc IMechE, Part I, vol 211,
239-250, 1997

Shu, J-J, Burrows CR & Edge KA. Pressure pulsations in reciprocating
pump piping systems. Part 1: modelling. Proc IMechE, Part I, vol 211,
229-237, 1997

<http://journals.pepublishing.com/content/kj50p4l0j63q/?p=ad1a7d0a95fc45888066fbf30379edaa&p>

Filters and Filtration Handbook ISBN 1 85617 078 0 by Elsevier Science Limited.

Flow Measurement Engineering Handbook. ISBN0-07-042366-0 R W Miller
McGraw Hill

Variable Speed Pumping ISBN 1-85617-449-2
by Europump & Hydraulic Institute. Available from the BPMA.

Hydraulic and Compressible Flow Turbo Machines. A.T.Sayers. ISBN 0-07-707219-7
McGraw Hill

ISO 10816 - 7 Mechanical Vibration - Evaluation of machine vibration by measurements

on non-rotating parts - Part 7: Rotodynamic pumps for industrial applications with nominal power above 1kW. (bearing housing vibration).

BS EN 733 End-suction centrifugal pumps, rating up to 10 bar with bearing bracket.
:Nominal duty point, main dimensions.

ISO 2858 End-suction centrifugal pumps (rating 16 bar) - Designation, nominal duty point and dimensions.

Hydraulic Institute Engineering Data Book www.pumps.org

ISO 17766 Centrifugal pumps handling viscous liquids - Performance corrections.

ISO 13710 Reciprocating positive displacement pumps for use in the petroleum and natural gas industries - Technical specifications.

ISO 16330 Reciprocating positive displacement pumps. Technical requirements

EN 60335-2-54, Household and similar electrical appliances — Safety
EN 60335-2-79

ESDU 64001 Guide to stress concentration data. ISBN 1-86246-279-8

Roarks Formulas for Stress & Strain. <http://www.roarksformulas.com>

Variable Speed Drives and Motors - Measuring Efficiency in Power Drive Systems
GAMBICA Technical Guide - see <http://www.gambica.org.uk/MCBFQ184149>

ISO 3601 O-rings

Mechanical Seal Practice for Improved Performance IMechE Guide

Seals and Sealing Handbook Elsevier

Study on improving the energy efficiency of pumps 'SAVE'
Available from the BPMA. Free of charge.

European guide to pump efficiency for single stage centrifugal pumps.

WEEE Waste Electrical and Electronic Equipment
EU Directives 2002/95/EC & 2002/96/EU

Pump Life Cycle Costing ISBN: 1-880952-58-09
by Europump & Hydraulic Institute. Available from the BPMA.

System Efficiency
by Europump & Hydraulic Institute. Available from the BPMA.

Metallurgy for Engineers by E.C. Rollason published by Edward Arnold.

Hylomar Universal Blue Sealant

Hylomar Limited www.hylomar.com

ISO 5199 Technical Specifications for centrifugal pumps - Class II

ISO 14847 Rotary positive displacement pumps - Technical requirements

ISO 16330 Reciprocating positive displacement pumps and pump units - Technical requirements

Construction Products Directive (89/106/EEC) - CPD

Drinking Water Directive (98/83/EC) - DWD

Water Supply (Water fittings) Regulations 1999

Water Byelaws Scotland 2003

NACE National Association of Corrosion Engineers. (MRO 175 for Oil & Gas Apps)
www.nace.org

ATEX - Equipment intended for use in potentially explosive atmospheres.
Directive 94/09/EC (ATEX)

http://ec.europa.eu/enterprise/mechan_equipment/machinery/welcdir.htm

http://ec.europa.eu/enterprise/mechan_equipment/machinery/direct/dir98-37.htm

www.pipeflow.co.uk

adapted from Pumping Manual Elsevier Advanced Technology

IEC 60034-2-1 2007.



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