



▶ Under the patronage of **H.E. Dr. Abdullah Belhaif Al Nuaimi** - Minister of Infrastructure Development



▶▶ 17th Edition

—
International Operations & Maintenance Conference in the Arab Countries

19, 20, 21 NOV 2019

Le Meridien Dubai Hotel
& Conference Centre
United Arab Emirates

Under the Theme:

**Enhancing Maintenance
Through Big Data Management**



WCM and Certification

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**Norwegian
Society of
Maintenance**



NTNU BRUSSELS OFFICE



TRONDHEIM

ÅLESUND

GJØVIK

NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

KNOWLEDGE FOR A BETTER WORLD

TRONDHEIM | GJØVIK | ÅLESUND
BRUSSELS



NTNU

- Main profile in science and technology
- Academic breadth: humanities, social sciences, medicine, health sciences, science of education, architecture, fine arts and performing arts
- Headquarters in Trondheim with campuses in Gjøvik and Ålesund



▶▶ Key Figures

- 8 faculties, 55 departments and NTNU University Museum
- 7401 person-years (2018)
- More than 42 000 students (2018)
- 7220 completed bachelor's and master's degrees (2018)
- 397 doctoral degrees (2018)

Main profile in science and technology



NTNU will actively contribute to achieve the UN Sustainability Development Goals



►► Certification and education



CONFUCIUS



I AM THANKFUL TO ALL
THOSE WHO SAID NO,
IT'S BECAUSE OF THEM,
I DID IT MYSELF.

- Albert Einstein

"Wherever you go, go with all your heart."
- Confucius

No accreditation certification



Certification EFNMS



The European Federation of National Maintenance Societies

The Requirements as a

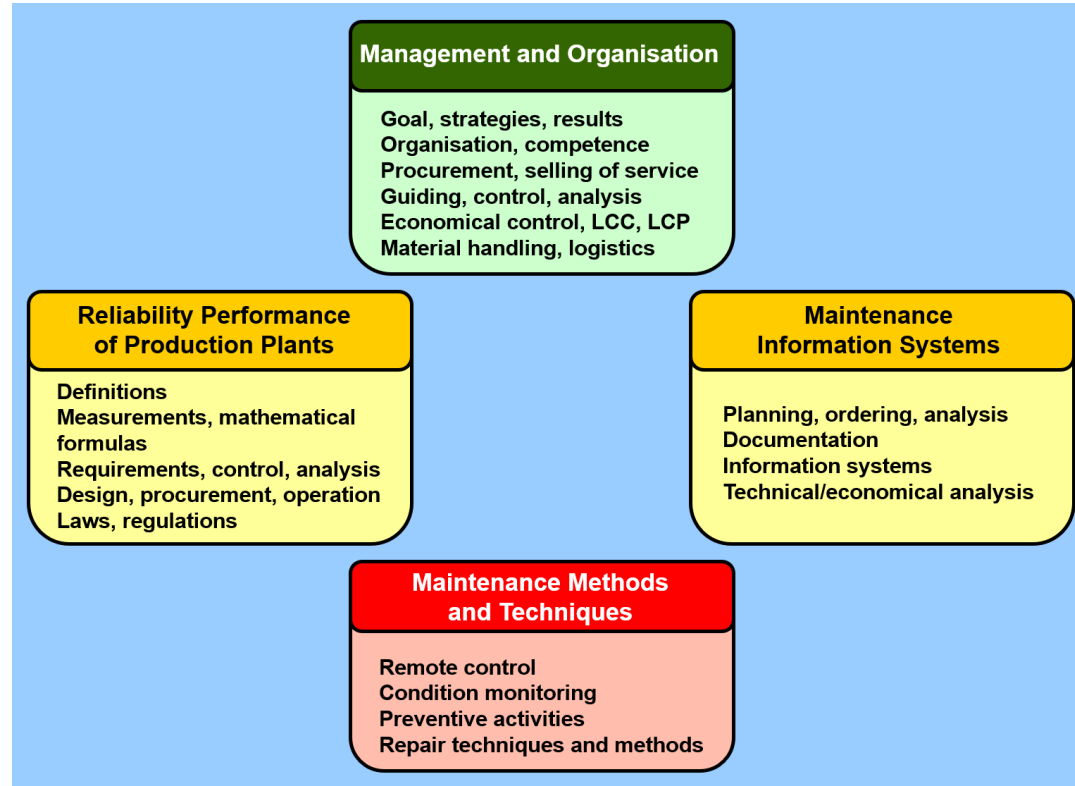
European Expert in Maintenance Management

EFNMS

Specifications for Theoretical Knowledge and Practical Experience

Maintenance Management	- Exists since 1993
Maintenance Supervision	- Exists since 2006
Maintenance Technician Specialists	- Exists since 2000

►► Certification EFNMS Earlier NFV





Personnel Certification

- Certification
 - | Accreditation
- Why personnel certification
 - | Making a career
 - | Required by the companies
 - | Approval of responsible practices
 - | Industry or statutory requirement
 - | Limited lifetime – renewal secures updated knowledge

STANDARDS AND CERTIFICATION

Home > Standards > Certification & conformity > Certification

The facts about certification

Certification can be a useful tool to add credibility, by demonstrating that your product or service meets the expectations of your customers. For some industries, certification is a legal or contractual requirement.

ISO does not perform certification

At ISO, we **develop** International Standards, such as [ISO 9001](#) and [ISO 14001](#), but we are not involved in their certification, and do not issue certificates. This is performed by external certification bodies, thus a company or organization cannot be certified **by** ISO.

However ISO's Committee on Conformity Assessment (CASCO) has produced a number of standards related to the certification process, which are used by certification bodies. Read more about [CASCO Standards](#).

Certification – the provision by an independent body of written assurance (a certificate) that the product, service or system in question meets specific requirements.

Accreditation – the formal recognition by an independent body, generally known as an accreditation body, that a certification body operates according to international standards.

Choosing a certification body

When choosing a certification body, you should:

- Evaluate several certification bodies.
- Check if the certification body uses the relevant [CASCO standard](#)
- Check if it is accredited. Accreditation is not compulsory, and non-accreditation does not necessarily mean it is not reputable, but it does provide independent confirmation of competence. To find an accredited certification body, contact the national accreditation body in your country or visit the [International Accreditation Forum](#)

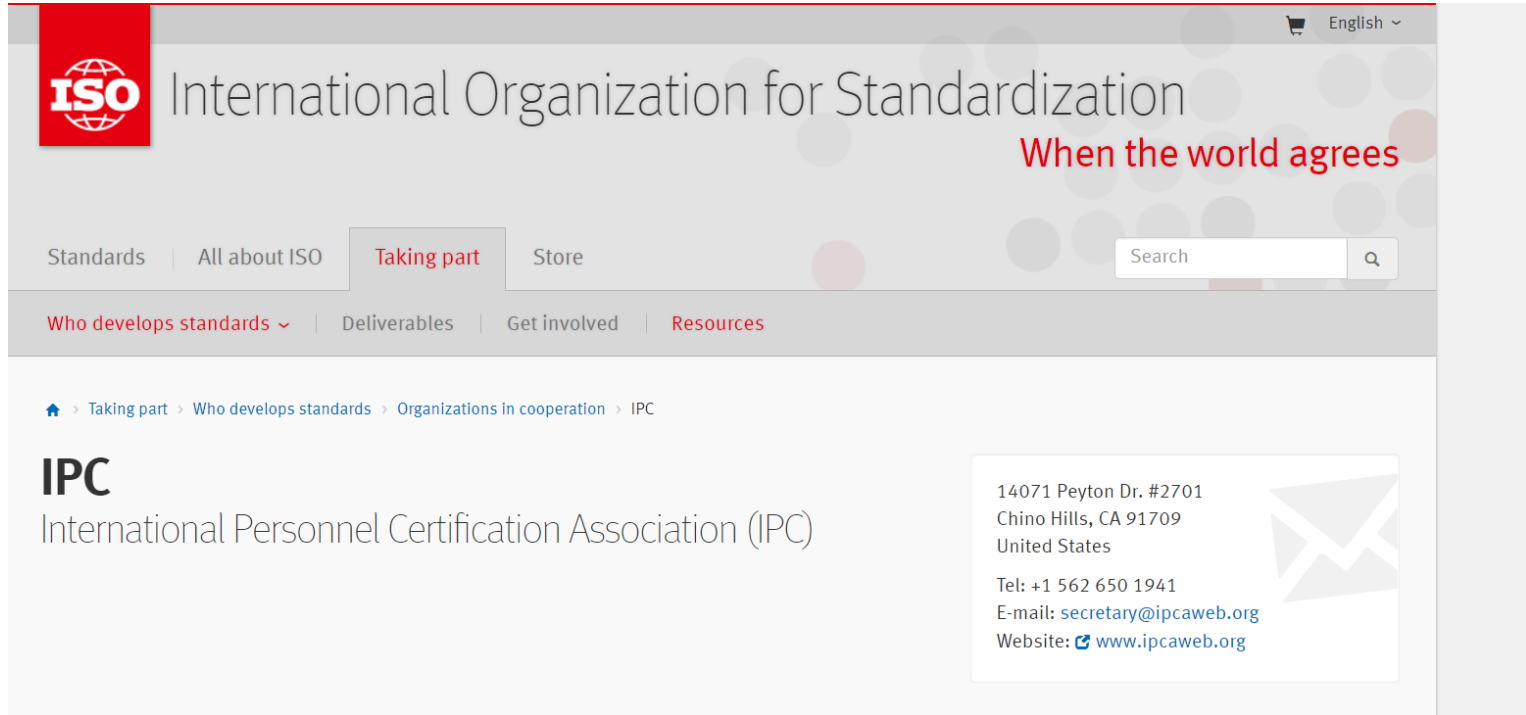
Complaints about certification

ISO is interested to hear from you if you feel that any ISO standard, including [ISO 9001](#) or [ISO 14001](#), is being misused.

Read more about [making a complaint](#) to ISO.

[ISO survey](#)

▶▶ ISO AND IPC



The screenshot shows the ISO website header with the logo and navigation menu. The main content area features the IPC title and contact information for the International Personnel Certification Association.

ISO International Organization for Standardization
When the world agrees

Standards | All about ISO | **Taking part** | Store

Who develops standards ▾ | Deliverables | Get involved | Resources

🏠 > Taking part > Who develops standards > Organizations in cooperation > IPC

IPC

International Personnel Certification Association (IPC)

14071 Peyton Dr. #2701
Chino Hills, CA 91709
United States

Tel: +1 562 650 1941
E-mail: secretary@ipcaweb.org
Website: www.ipcaweb.org

▶▶ IPC

ISSUE: 4

IPC Certification Scheme
"IPC Management Systems Auditors"

IPC-PL-11-006

Page 1 of 16

International Personnel Certification Association



IPC
CERTIFICATION SCHEME

"IPC MANAGEMENT SYSTEMS AUDITORS"

ISSUE 4

▶▶ EN 15628

EUROPEAN STANDARD

EN 15628

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2014

ICS 03.080.10; 03.100.30

Supersedes CEN/TR 15628:2007

English Version

Maintenance - Qualification of maintenance personnel

Maintenance - Qualification du personnel de la
maintenance

Instandhaltung - Qualifikation des Instandhaltungspersonals

This European Standard was approved by CEN on 18 July 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



INTERNATIONAL
STANDARD

ISO/IEC
17024

Second edition
2012-07-01

**Conformity assessment — General
requirements for bodies operating
certification of persons**

*Évaluation de la conformité — Exigences générales pour les
organismes de certification procédant à la certification de personnes*

IU Universitetsbiblioteket 2018-08-07

▶▶ 17007 ISO/IEC

INTERNATIONAL
STANDARD

ISO/IEC
17007

First edition
2009-09-15

**Conformity assessment — Guidance for
drafting normative documents suitable
for use for conformity assessment**

*Évaluation de la conformité — Directives pour la rédaction de
documents normatifs appropriés pour l'évaluation de la conformité*

etsbiblioteket 2016-10-19

ACCREDITATION EA

The screenshot shows the EA European Accreditation website. At the top left is the EA logo with the text "EUROPEAN ACCREDITATION". To the right are social media icons for YouTube and Twitter, and a search bar with the text "Searching for...". Below the logo is a navigation menu with the following items: Home, About EA, The MLA, EA Members, MLA & BLA Signatories, Publications, Communication, and Contact Us. The main content area features a large image of a modern building interior with a glass and steel structure. Below the image is the "Latest News" section, which contains three news items, each with a "PUBLISHED ON" date of 20/09/2018 or 19/09/2018. On the right side of the page, there is a "Members Only" section with a login form containing fields for "Username" and "Password", a "Remember me" checkbox, and a "Log in" button. Below the login form is a "Quick Links" section with a dropdown arrow, listing "MLA & BLA Signatories", "Publications", and "EA General Assembly Resolutions".



Norwegian Certification



What is the difference between Accreditation and Certification?

- Accreditation is done by an approved agency that has been accepted as standard and organizations apply for accreditation to prove their worth to outsiders.
- Certification is mostly in the case of individuals though products are also certified by governmental agencies, to maintain quality and to reassure consumers about the reliability and efficiency of these products.
- Educational institutions apply for accreditation with the state university or the Federal university.
- Certificates are awarded to individuals as in IT industry to confirm the skills of people.
- Accreditation is a stamp of approval by a third party about procedures.

Norsk Sertifisering AS

Maintenance Manager

JOB-profile described in IPC Certification Scheme



The IPC Maintenance manager can

- initiate, plan, and organize the development of a maintenance management system in an organization and integrate this system with the existing management system.
- communicate with and train the top management and guide the top management and make the individuals of the organization aware of the responsibility for maintenance in own area of work. The Maintenance Managers are able to monitor the performance of the maintenance processes and ensure maintenance of the organization.

Therefore the maintenance management function covers all activities of the management that determine the maintenance objectives, strategies, and implementation of them by such means as maintenance planning, maintenance improvement of maintenance activities and economics.

Maintenance Manager

Certification requirements

Education and work experience

- a) bachelor's degree or higher and at least 5 years relevant and updated work experience of which two years experience as leader of unit or personnel in a maintenance function or service
or
- b) Technical vocational school or similar and at least seven years relevant and updated work experience as leader of team or personnel in a maintenance function or service

Training

Carried out World Maintenance Class course – 80 hours

Examination

Passed examination as Maintenance manager at the certification body

Code of conduct

Signed a code of conduct

►► Maintenance managers

VEDLIKEHOLD

 **Norsk Forening for Vedlikehold**
www.nfv.no

Maintenance Management

5 MODULER HØST 2018 / VÅR 2019

World Class Maintenance
VEDLIKEHOLDSLEDELSE

Et fremtidsrettet vedlikeholdskonsept for ledende bedrifter i Europa

- Hold deg oppdatert innen fagområdet
- Oppnå en moderne og effektiv vedlikeholdsfunksjon
- Kurset vil gi både en generell og på enkelte områder detaljert innføring i moderne vedlikehold (World Class Maintenance)
- Det faglige innholdet bygger på trender innen internasjonal og nasjonal produksjon og vedlikehold
- Flere ledende bedrifter har bygd opp sine vedlikeholdskonsepter og sine vedlikeholdstrategier basert på kompetanse fra dette kurset
- Kompetansekurs med mulighet for IPC-eksamen
- Besøk hos ledende bedrifter i Nederland og Belgia

TEKNISK ÅRSRÅD
 **Tekniske Foreningers Servicekontor**

Påmeldingsfrist 21. august

Maintenance Manager Certificate

International Personnel Certification Association

Multilateral Agreement

 **NORSK SERTIFISERING AS**

 **IPC**
International Personnel Certification Association



It is hereby confirmed that
Øystein Ulmo
born 1986-02-08 is 2019-05-16 awarded Maintenance Manager Certificate No. **IPC-NO-MM-021** with expiration date 2022-05-16 and satisfies the requirements of the IPC Certification Scheme included in the normative document of July 18th 2016.
This certificate is issued by Norsk Sertifisering, Norway

www.ipcaweb.org
www.norsksertifisering.no
Enterprise No.: NO 980 106 144 MVA


Frode Ervik Pettersen, Managing Director

►► **MODULES WCM**

The Course (WCM) examples:

Module 1 – Maintenance and Maintenance management ...

Module 2 – Reliability and Analytical Techniques ...

Module 3 - CMMS, Indicators and Methodes, Production Management ...

Module 4 – The Maintenance Function and Processes **Industrial Visits**

Module 5 – Preparation for Exam (and Exam)

WCM Learning Aims examples

- Basic theory RAMS
- Modern Maintenance concept
- Methode, planning, doing evaluate Maintenance
- Risk and reliability / optimisation
- Indicators and documentation
- CMMS
- Standards
- Digitalisation
- Industry 4.0 and maintenance 4.0
- Vulnerability
- Quality
- Predictive maintenance
- Maintenance concept
- Managing Maintenance
- Analyse and evaluate (RAMS)
- Select and use CMMS/MES
- Maintenance project
- Maintenance 4.0/industri 4.0
- Calculation

►► Topics examples education WCM

- WCM
- Aim, strategi, action plans for Maintenance
- Maintenance today and tomorrow
- Asset management
- Terminology
- Maintenance concepts/methods
- Proactive maintenance
- Predictive maintenance
- Maintenance management – closing the loop
- LCC, LCP and processes
- Reliability and analytical techniques
- Maintenance budget/maintenance cost/income
- International standards ISO, IEC and CEN
- Industry 4.0
- Smart Maintenance
- Aging
- Maintenance for the future

►► List of literature examples

- Maintenance Optimisation
- VocTrainMaint • Survey on Maintenance Standards and standards related to Reliability,
- Safety and Quality (Per Schjøllberg ..)
- CEN standards 15368, 17007,13306, ISO 55000, 9000, 14000
- A Wilson Asset management
- VDM
- VocTrainMaint 2 (Per Schjøllberg ..)
- 5S Handbook (Per Schjøllberg ..)
- PAS 55/ISO 55 000
- Safety and risk (Knut Øien ..)
- RNNP, Risiklevel in The North Sea
- NORSOK Z-008 Risk based management and consequence classification
- *Smart maintenance, Industry 4.0 LCC, LCA /ICP, Aging, CMMS, FMEA, FTA, RCA,*
- *German index, The roadmap DIN*

Smart maintenance is about tying many data sources together such as machine condition data, machine criticality, service levels, spare part supply, availability of service engineers, travel time, traffic or weather conditions and more. It's about being able to pull all this data together and to visualize, automate and optimize decision alternatives through software systems. That is smart maintenance. And worth saying, it has never been easier than it is today to benefit from new technologies such as cloud computing



Making maintenance smarter
A Deloitte series on digital manufacturing enterprises

- Theory
- Discussion
- Standards
- Practical examples
- Literature



Oil and Gas 4.0 era: A systematic review and outlook

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IIoT

Intelligentization

ABSTRACT

Recently, with the development of "Industry 4.0", "Oil and Gas 4.0" has also been put on the agenda in the past two years. Some companies and experts believe that "Oil and Gas 4.0" can completely change the status quo of the oil and gas industry, which can bring huge benefits because it accelerates the digitization and intelligentization of the oil and gas industry. However, the "Oil and Gas 4.0" is still in its infancy. Therefore, this paper systematically introduces the concept and core technologies of "Oil and Gas 4.0", such as big data and the industrial Internet of Things (IIoT). Moreover, this paper analyzes typical application scenarios of the oil and gas industry chain (upstream, midstream and downstream) through examples, such as intelligent oilfield, intelligent pipeline, and intelligent refinery. It is concluded that the essence of "Oil and Gas 4.0" is a data-driven intelligence system based on the highly digitization. To the best of our knowledge, this is the first academic peer-reviewed paper on the "Oil and Gas 4.0" era, aiming to let more oil and gas industry personnel understand its benefits and application scenarios, so as to better apply it to practical engineering in the future. In the discussion section, this paper also analyzes the opportunities and difficulties that may be brought about by the "Oil and Gas 4.0" era. Finally, relevant policy recommendations are proposed.

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Predictive Maintenance 4.0

Predict the unpredictable



Smart maintenance

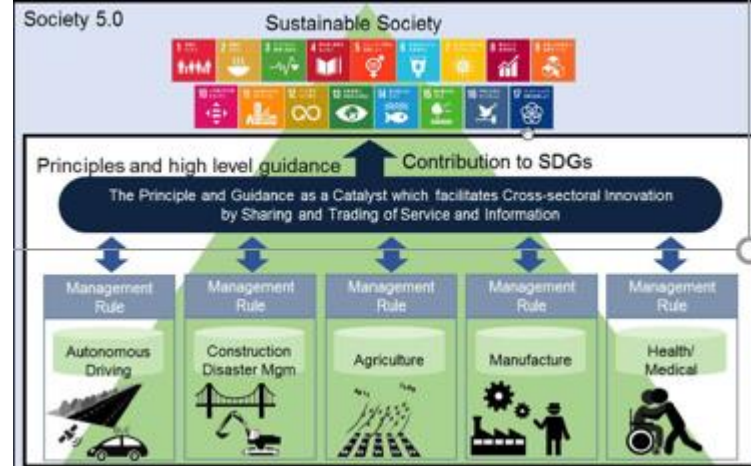
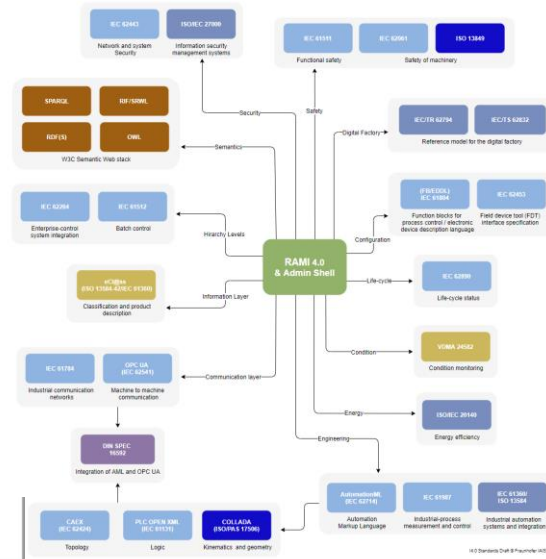
Taking uptime to new heights with high quality spare parts and field services

BUSINESS WHITE PAPER



DIN/DKE - ROADMAP

GERMAN STANDARDIZATION
ROADMAP
Industrie 4.0
Version 3



Asset Maintenance Management

A Guide to Developing Strategy & Improving Performance



Dr. Alan Wilson

Asset Management

focusing on developing maintenance strategies and improving performance

Dr Alan Wilson



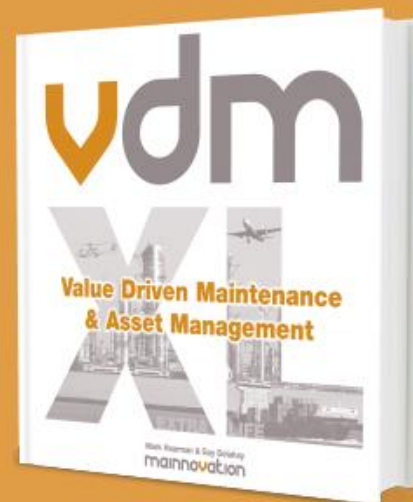
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We are VDM^{XL}





Norsk Sertifisering AS - NSAS

NSAS is accredited in accordance with ISO/IEC 17024 – general requirements for bodies operating certification of persons; within following areas

- Quality Manager
- Quality Auditor
- Quality Lead Auditor
- Environmental Manager
- Risk Manager
- International Safety Management Auditor
- Inspection of playground equipment
- **Maintenance Manager**
- Occupational Health and Safety Manager
- Diversity Manager



Other international certificates

Based on the national accredited certificate, the candidates also can get international certificates from **IPC** International Personnel Certification Association and **EOQ** European Organization for Quality.

▶▶ PEPSICO



Tuesday Jan 22"

7:20 Assembly in the hotel lobby. We leave at 7:25 to the 'Diamant' underground tram station.

7:30 Tram ride (line 3) to the Left river bank of the Schelde where the bus is waiting at the 'P&R Melsele' terminal station.

8:00 Bus leaves at the P&R Melsele

10:00 Visit to The PepsiCo Veurne plant

We are welcomed by Mr. Bert Pieters, engineering manager and Mr. Johan Delmoitie, European Reliability & Maintenance Lead Snacks & Grains division. The plant produces the famous Lays and Doritos chips. In 2016, Bert Pieters received the Belgian Maintenance Manager of the Year 2016 award. He was awarded this prize as an acknowledgement for his excellent achievements in the field of maintenance and the best practices applied at the PepsiCo Veurne plant.



Maintenance Manager Certificate

International Personnel Certification Association

Multilateral Agreement



It is hereby confirmed that

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This certificate is issued by Norsk Sertifisering, Norway

www.ipcaweb.org

www.norsksertifisering.no

Enterprise No.: NO 980 106 144 MVA

Frode Ervik Pettersen, Managing Director

SECTION 5 COMPETENCE ASSESSMENT

5.1 The IPC examination system

5.1.1 The IPC examination system requires that the applicant shall pass a written and an oral examination part. Both parts of the examination shall be assessed separately and have to be passed.

5.1.2 If the nature of the examined subject in Risk Management is unsuitable for oral examination, the PCB may chose to omit the oral examination and compensate for this by increasing the comprehensiveness of the written examination.

5.1.3 The IPC examination svstem is flexible and allows various examination types for both

5.2 Written examination

5.2.1 The written examination may be one, or a combination of several, of the following examination methods. Questions shall be within the area of competence described in this scheme document.

5.2.2 Multiple choice questions: Multiple Choice is a form of assessment in which applicants are asked to select the right answer from several alternatives.

5.2.3 Short open questions: A short open question is a form of assessment in which the applicant is asked to write the answer within a space of 2 – 3 lines. Typical questions are to describe the meaning of a concept, the purpose of a requirement or similar.

5.3 Oral examination

5.3.1 In the concept “oral examination” is also included witnessing, workplace observation and similar, often called practical examination.

5.3.2 To be able to handle appeals or complaints, the PCB must ensure evidence of the examination, for example by video recording or by using two examiners.

5.3.3 For oral examination the applicant is given adequate time to prepare for the exam.

5.3.4 Video conference is acceptable if the results of the examination remain valid. In this case the PCB must guarantee the certainty of the applicant identity and that he works without any aid, except for allowed aids to be specified by the PCB.

▶▶ CONCLUSION

A wise man learns by the experiences of others; an ordinary man learns by his own experience; a fool learns by nobody's experiences.

Thank you for your attention!

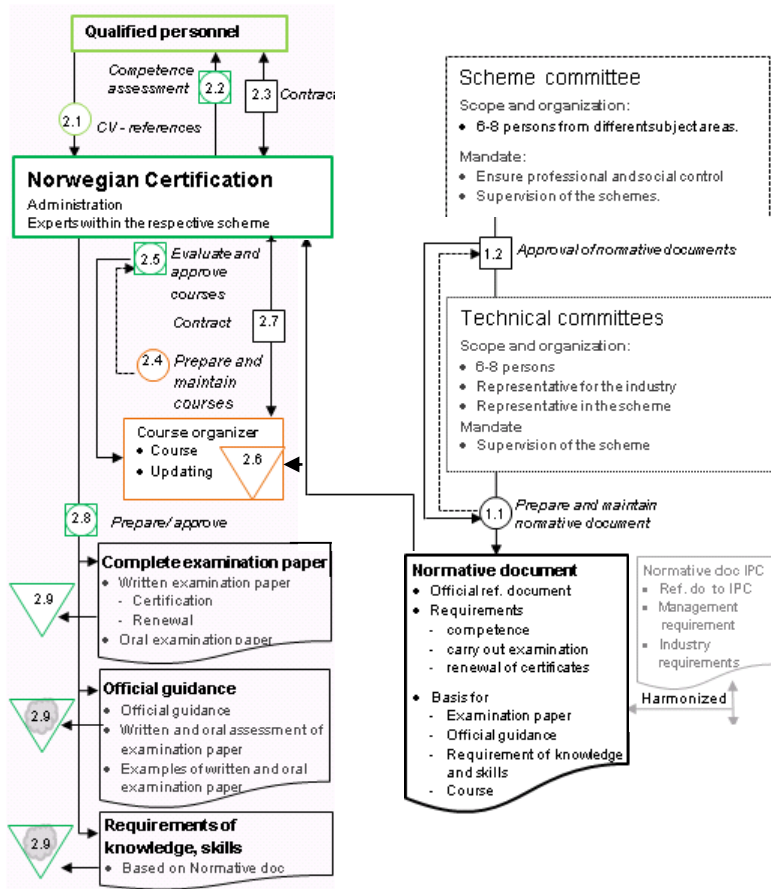


The process

3 Use of scheme

2 Implementation

1 Establishment and maintenance





The process

