

Validation of professional competence for the energy industry

ELECTRICITY DISTRIBUTION

- ✓ NETWORK PLANNER/DESIGNER
- ✓ FIELD PLANNER/PROJECT MANAGER
- ✓ DISTRIBUTION ELECTRICIAN
- ✓ NETWORK OPERATOR/NETWORK TECHNICIAN

Validation – your opportunity to show what you know!

Swedenergy welcomes you to carry out a validation of your knowledge and competence. If you do not have any documentation of your competence, this is a good opportunity for you to establish your level of knowledge by validation. You may need to learn more in certain areas in order to be able to do the work of, for example, a distribution electrician and obtain employment. We also put a great emphasis on knowledge of the Swedish language, since you have to be able to read and understand electrical safety regulations and warning signs posted for your safety and that of others.

WE CAN VALIDATE THE FOLLOWING PROFESSIONS

ELECTRICITY DISTRIBUTION

- Network planner/designer
- Field planner/project manager
- Distribution electrician
- Network operator/network technician

OPERATION OF HYDROPOWER PLANTS

- Power plant operator/systems operator

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In-depth competence survey

Self-evaluation

The form should be completed independently, after which the results are evaluated together with your adviser to be used for example in contact with a qualified assessor.

Evaluate your professional competence within the area in the left-hand column by indicating on the arrow to the right the level of competence you believe you have.

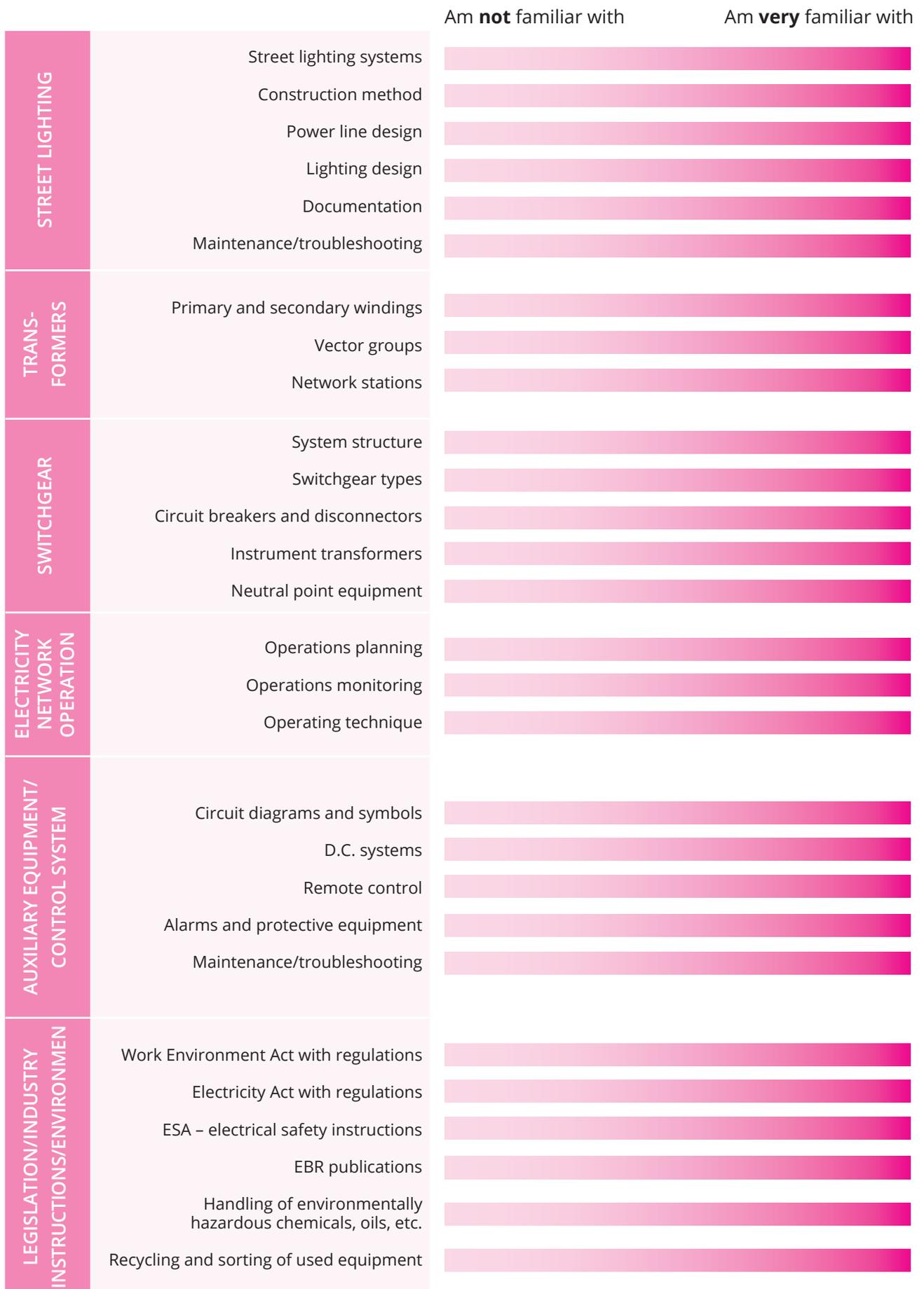
NETWORK PLANNER/DESIGNER FIELD PLANNER/PROJECT MANAGER		DISTRIBUTION ELECTRICIAN NETWORK OPERATOR/NETWORK TECHNICIAN
AREAS		
Underground cable networks	0,4 – 70 kV	Switchgear
Overhead cable networks	0,4 – 70 kV	Electricity network operation
Fiber optic cable networks		Control system/auxiliary equipment
Street lighting systems		Legislation/regulations/industry instructions/ environment
Transformers	0,4 – 130 kV	

Questionnaire 1

Mark your answer with a cross on the bar where it is suitable.



UNDERGROUND OR OVER- HEADCABLE NETWORKS	Underground cable networks	
	Overhead cable networks	
	Transformer stations	
	Power line design	
	Earthing technology	
	Documentation	
	Maintenance/troubleshooting	
FIBER OPTIC CABLE NETWORKS	Fiber optic cable networks	
	Communications via fiber optic cable	
	Construction method	
	Documentation	
	Maintenance/troubleshooting	





In-depth competence survey

Network planner/designer

WORK DUTIES

- ✓ Plan and design construction and modification of electricity distribution systems.
- ✓ Carry out network calculations and devise design rules.
- ✓ Consult with national and municipal authorities, consultants and contractors.
- ✓ Participate in the preparation of development agreements, easement contracts and utility right-of-way agreements.
- ✓ Evaluate different technical project solutions, prepare preliminary economic calculations and check them against the results at the end of the project.

COMPETENCE

Educational requirements: Engineer with university-level education in electric power engineering or Field planner/project manager with secondary education and post-secondary training in electric power engineering or the equivalent.

The profession requires: The network planner/designer's basic theoretical knowledge must be good enough that no on-the-job training is required. However, it must be borne in mind that the industry has many of its own standards, for example EBR's publications, that are not used in the schoolwork, so that some industry-specific on-the-job training is necessary.

Questionnaire 2

The form should be completed independently, after which the results are evaluated together with your adviser.



Check the alternative you think best describes your knowledge and experience.

PROFESSIONAL FIELD: NETWORK PLANNER/DESIGNER			
AREAS			
Underground and overhead cable networks	Switchgear		
Fiber optic cable networks	Auxiliary equipment/control system		
Street lighting systems	Legislation/regulations/industry instructions/environment		
Transformers			
Underground and overhead cable networks	Can do	Am familiar with	Have never done
Planning and design			
Network planning in computer-based NIS/GIS systems			
Power line design/disconnect condition			
Earthing technology			
Obtain permits and agreements			
Evaluate different technical solutions for projects			
Investigate new connections to the electricity network, for example industrial, residential, wind power, communication masts etc.			
Prepare economic calculations and check them against results			
Prepare agreements with consultants/contractors			
Documentation of electrical installations			
Fiber optic cable networks	Can do	Am familiar with	Have never done
Planning and design			
Network planning in computer-based NIS/GIS systems			
Obtain permits and agreements for fiber optic cable networks			
Evaluate different technical solutions for projects			
Planning of fiber optic cable networks with ducting and utility vaults			
Planning of fiber optic cable networks on overhead lines			
Prepare splicing plans			
Documentation of fiber optic cable networks			

Street lighting systems	Can do	Am familiar with	Have never done
Planning and design			
Obtain permits and agreements for street lighting system			
Evaluate different technical solutions for projects			
Power line design/disconnect condition			
Lighting design			
Documentation of street lighting systems			
Transformers	Can do	Am familiar with	Have never done
Design of transformers			
Choice of voltages and vector group			
Loss evaluations			
Transformers with on-load tap changers			
Switchgears	Can do	Am familiar with	Have never done
Planning and design of outdoor and indoor substations			
Design of circuit breakers, disconnectors and busbar systems			
System with isolated neutral point			
Calculation of capacitive earth fault current			
Planning and calculation of protective equipment for switchgear			
Circuit diagrams and symbols			
Legislation/industry instructions/environment	Can do	Am familiar with	Have never done
Relevant requirements in Work Environment Act with regulations			
Relevant requirements in Electricity Act with regulations			
Work in accordance with ESA electrical safety instructions			
Work requiring authorisation			
Risk analyses in connection with different work methods			
Plan jobs in accordance with EBR's publications and instructions			
Purchasing according to Public Procurement Act			
Handling of environmentally hazardous chemicals, oils, etc.			
Sorting and recycling of used equipment			

Type the numbers in the circles under the picture



Switchgear



Surge arrester



Circuit breaker



Voltage transformer



Current transformer



Cable termination

Pole mounted transformer station



Transformer



Surge arrester



High-voltage cable



High-voltage fuse



Station cubicle



Expansion vessel



Cable termination

Type the numbers in the circles next to the picture



Competence assessment and requirements for certificate

Network planner/designer

Work duties

- Plan and design construction and modification of electricity distribution systems.
- Carry out network calculations and devise design rules.
- Consult with national and municipal authorities, consultants and contractors.
- Participate in the preparation of development agreements, easement contracts and utility right-of-way agreements.
- Evaluate different technical project solutions, prepare preliminary economic calculations and check them against the results at the end of the project.



Network planner/designer

The network planner/designer shall have good basic knowledge and skills in the following areas:

- EBR
- Work methodology
- Production technology
- Occupational health and safety and environmental requirements
- Regulations and standards
- Computer-IT
- Business administration

A network planner/designer shall be able to carry out all necessary calculations for an electricity network and shall possess a thorough knowledge of the heavy current regulations and the electricity industry's common instructions; hence, a network planner/designer should also possess the following knowledge and competence.

- Design of urban networks
- Calculation
- Design of rural networks
- Negotiation techniques
- Calculation of disconnect condition
- Procurement
- Heavy current regulations
- Fiber optic technology
- Electrical safety instructions
- Environmental and occupational health and safety legislation

In-service training

By "in-service training" is meant competence enhancement training aimed at imparting cutting-edge professional skills. The company's organisation and business determine what in-service training is required. Examples of in-service training are:

- Maintenance strategy
- Business administration
- Street lighting technology
- Contracting law
- IT – computer technology
- Loss evaluation
- Presentation techniques

Training plan

Swedenergy offers tailored trainings for network planner/designers. The aim is to impart the professional skills and knowledge needed by today's network planners/designers. The trainings offered can also meet companies' needs for competenceenhancing in-service training and the continued training required to maintain a high level of competence in the profession.



In-depth competence survey

Field planner/project manager

WORK DUTIES

- ✓ Carry out land studies, valuation and negotiation, plus write agreements/contracts.
- ✓ Carry out electrical studies, field measurements and soil investigations, determine a suitable system design and do setting-out on the work site.
- ✓ Prepare a material specification, job map and other documents needed for the execution of the work.
- ✓ Plan, manage, delegate and coordinate the work in a project.
- ✓ Take charge of planning so that the work is carried out with the greatest possible cost effectiveness.
- ✓ Consult with others in the project so that efficient material control is obtained.
- ✓ Carry out cost calculations and cost follow-up and update network documentation and customer documentation.

COMPETENCE

Educational requirements:

Secondary education, electricity programme or equivalent.
Persons without secondary education but with long experience as EBR electricians need supplementary training in mathematics and electricity.

The profession requires:

At least two years of work experience in the profession. The work experience should be focused on the profession, be comprehensive and include both theory and practice, and cover the entire field of electricity distribution. At least one year of parallel work with an experienced Field planner/project manager is also required.
Theoretical knowledge according to Swedenergy's training plan for EBR-field planner/project manager or EBR Graduate field planner/project manager.

Questionnaire 3

The form should be completed independently, after which the results are evaluated together with your adviser.



Check the alternative you think best describes your knowledge and experience.

PROFESSIONAL FIELD: FIELD PLANNER/PROJECT MANAGER			
AREAS			
Underground and overhead cable networks Fiber optic cable networks Street lighting systems Transformers	Switchgear Auxiliary equipment/control system Legislation/regulations/industry instructions/environment		
Underground and overhead cable networks	Can do	Am familiar with	Have never done
Preparation in computer-based preparation system			
Evaluate inspection records and propose measures			
Power line design/disconnect condition			
Levelling and pole placement in line work			
Cable-laying in the ground or on poles			
Earthing technology			
Obtain permits and agreements			
Evaluate different technical solutions for projects			
Design, specify materials and stipulate building and working methods for the chosen technical solution			
Performing measuring-in and setting-out on the work site			
Prepare economic calculations and check them against results			
Formulate requirements specifications and evaluate tenders from suppliers			
Plan, manage, delegate and coordinate the work in a project			
Testing before commissioning of line network			
Documentation of electrical installations			
Fiber optic cable networks	Can do	Am familiar with	Have never done
Preparation in computer-based preparation system			
Obtain permits and agreements for fiber optic cable			
Evaluate different technical solutions for projects			
Design, specify materials and stipulate building and working methods for the chosen technical solution			
Fiber optic cable networks with ducting and utility vaults			
Fiber optic cable networks on overhead lines			
Prepare splicing plans			
Documentation of fiber optic cable networks			

Street lighting systems	Can do	Am familiar with	Have never done
Planning and design			
Obtain permits and agreements for street lighting system			
Design, specify materials and stipulate building and working methods for the chosen technical solution			
Power line design/disconnect condition			
Lighting design			
Documentation of street lighting systems			
Transformers	Can do	Am familiar with	Have never done
Design of transformers			
Choice of voltages and vector group			
Loss evaluations			
Switchgear	Can do	Am familiar with	Have never done
System with isolated neutral point			
Calculation of capacitive earth fault current			
Circuit diagrams and symbols			
Legislation/industry instructions/environment	Can do	Am familiar with	Have never done
Relevant requirements in Work Environment Act with regulations			
Relevant requirements in Electricity Act with regulations			
Work in accordance with ESA electrical safety instructions			
Work requiring authorisation			
Risk analyses in connection with different work methods			
Plan jobs in accordance with EBR's publications and instructions			
Purchases according to Public Procurement Act			
Handling of environmentally hazardous chemicals, oils, etc.			
Sorting and recycling of used equipment			

Type the numbers in the circles under the picture



Switchgear



Surge arrester



Circuit breaker



Voltage transformer



Current transformer



Cable termination



Type the numbers in the circles next to the picture

Pole mounted transformer station



Transformer



Surge arrester



High-voltage cable



High-voltage fuse



Station cubicle



Expansion vessel



Cable termination

Competence assessment and requirements for certificate Field planner/project manager

Work duties:

- Carry out land studies, valuation and negotiation and write agreements/contracts.
- Carry out electrical studies, field measurements and soil investigations, determine a suitable system design and carry out setting-out on the work site.
- Prepare a material specification, job map and other documents needed for the execution of the work.
- Plan, manage, delegate and coordinate the work in a project.
- Take charge of planning so that the work is carried out with the greatest possible cost effectiveness.
- Consult with others in the project so that efficient material control is obtained.
- Carry out cost calculations and cost follow-up and update network documentation and customer documentation.



EBR-field planner/project manager

A trained EBR-field planner/project manager possesses good knowledge and skills in the following technical areas:

- Documentation
- Co-construction/co-location
- EBR designs
- EBR-business administration
- Environment and occupational health and safety
- Heavy current regulations, electrical safety instructions and standards
- EBR Preparation
- Production development engineering
- Documentation of electrical installations
- Electrical design
- Personnel management
- Dealing with customers

EBR Graduate field planner /project manager

In addition to the qualifications possessed by an EBR field planner/project manager, a graduate EBR field planner/project manager has in-depth knowledge and skills in the following technical areas:

- Field measurement
- Computer tools for preparation
- Mechanical design
- EBR levelling and pole placement
- EBR land valuation and grant of land tenure

- Mechanical design
- Dealing and negotiating with customers

In-service training

By “in-service training” is meant competence enhancement training aimed at imparting cutting-edge professional skills. The company’s organisation and business determine what in-service training is required. Examples of in-service training are:

- Maintenance philosophy/technology
- Preparation of maintenance in forest corridor
- Inspection courses, e.g. corrosion inspection
- Negotiation techniques
- Presentation techniques
- Street lighting technology
- Geotechnical engineering
- Fiber optic technology

Training plan

Swedenergy offers tailored trainings for field planners/project managers. The aim is to impart the professional skills and knowledge needed by today’s field planners/project managers. The trainings can lead to qualification as EBR-field planner/project manager or EBR Graduate field planner/project manager, or meet companies’ needs for in-service training and the continued training required to maintain a high level of competence in the profession.



In-depth competence survey

Distribution electrician

WORK DUTIES

- ✓ Independently carry out all work on electrical networks including construction and modifications, care and maintenance, and repairs and service.
- ✓ In some cases carry out work on street lighting systems and fiber optic cable networks.

COMPETENCE

Educational requirements:

Secondary education, electricity programme or equivalent.

Yrket kräver:

At least three years of work experience in the profession. The work experience should be focused on the profession, be comprehensive and include both theory and practice, and cover the entire field of electricity distribution.

Theoretical knowledge according to Swedenergy's training plan for EBR electrician and EBR Graduate distribution electrician

Questionnaire 4

The form should be completed independently, after which the results are evaluated together with your adviser.



Check the alternative you think best describes your knowledge and experience.

PROFESSIONAL FIELD: DISTRIBUTION ELECTRICIAN			
AREAS			
Underground and overhead cable networks	Switchgear		
Fiber optic cable networks	Auxiliary equipment/control system		
Street lighting systems	Legislation/regulations/industry instructions/environment		
Transformers			
Underground and overhead cable networks	Can do	Am familiar with	Have never done
Cable-laying in the ground or on poles			
Splicing/termination of underground cable			
Power line design/disconnect condition			
Earthing technology and earth electrode testing			
Work with overhead line with insulated or bare conductors			
Line work according to EBR's methods and instructions			
Live-line work			
Climbing on a wooden pole with pole climbers			
Rescue of worker from pole			
Driving of snowmobiles and ATVs			
Co-construction/location with other companies that use transmission lines			
Work with chain saws and clearing saws			
Work from an aerial platform/skylift			
Hot work			
Testing before commissioning of line network			
Inspection of line network			
Modernisation and renovation of cable cabinet			
Sheath test on underground cable			
Troubleshooting on line network			
Connection and operation of standby power system			
Fiber optic cable networks	Can do	Am familiar with	Have never done
Work with fiber optic cable networks with ducting and utility vaults			
Work with fiber optic cable networks carried on overhead lines			
Making splices and branches with welding equipment			
Termination of fiber optic cable			
Function measurement of fiber optic cable			
Troubleshooting of fiber optic cable			

Street lighting systems	Can do	Am familiar with	Have never done
Work with lighting system with wooden poles			
Work with lighting system designed with cable and metal poles			
Changing lamps with a skylift			
Power line design/disconnect condition			
Troubleshooting			
Transformers	Can do	Am familiar with	Have never done
Connection of distribution transformers			
Regulation of off-load tap changers			
Connection of instrument and voltage transformers			
Inspection and maintenance of distribution transformers			
Switchgear	Can do	Am familiar with	Have never done
Installation of switchgear equipment			
Operating in switchgear			
Work with neutral point equipment			
Inspection of external protection at outdoor substations			
Auxiliary equipment/control system	Can do	Am familiar with	Have never done
Reading of circuit diagrams			
Troubleshooting direct current			
Testing of signal systems			
Care and maintenance of batteries			
Inspection rounds and periodic maintenance			
Validering			
Legislation/industry instructions/environment	Can do	Am familiar with	Have never done
Relevant requirements in Work Environment Act with regulations			
Relevant requirements in Electricity Act with regulations			
Work in accordance with ESA electrical safety instructions			
Act as electrical work supervisor for electrical work			
Work requiring authorisation as electrical contractor			
Risk analyses in connection with different work methods			
Execute jobs in accordance with EBR's publications and instructions			
Handling of chemicals, oils, etc.			
Sorting and recycling of used equipment			

Type the numbers in the circles under the picture



Switchgear



Surge arrester



Circuit breaker



Voltage transformer



Current transformer



Cable termination



Type the numbers in the circles next to the picture

Pole mounted transformer station



Transformer



Surge arrester



High-voltage cable



High-voltage fuse



Station cubicle



Expansion vessel



Cable termination

Competence assessment and requirements for certificate

Distribution electrician

Work duties

- Independently carry out all work on electrical network including construction and modifications, care and maintenance, and repairs and service.
- In some cases carry out work on street lighting systems and fiber optic cable networks fiber optic cable networks.



EBR-electrician

A trained EBR-electrician possesses good knowledge and skills within the following areas:

1. Electricity legislation, regulations and electrical safety instructions

2. Underground cable technology

- Cable technology
- Cable instructions/troubleshooting
- Network stations
- Earth electrode testing

3. Overhead line technology

- Low-voltage lines
- High-voltage lines
- Mechanics
- Earth electrode testing
- Co-construction/co-location

4. Installation, basic knowledge

- Direct measurement
- Power transformer
- Service connection
- Visual inspection

5. EBR knowledge

- EBR as a system
- EBR cost catalogue
- EBR construction method
- EBR in field work
- Outline of preparation document

EBR Graduate distribution electrician

An EBR Graduate distribution electrician has in-depth competence in the following technical areas.

The training is composed of different training blocks and must include the following:

- EBR Basic Course
- Underground cable technology
- Overhead line technology
- Heavy current regulations
- Testing before commissioning
- Inspection of electricity distribution systems

In-service training

By “in-service training” is meant competence enhancement training aimed at imparting cutting-edge professional skills. The company’s organisation and business determine what in-service training is required. Examples of in-service training are:

- Overhead line inspection from the air
- Wood decay inspection
- EBR Preparation
- Live-line work in low-voltage network
- Live-line work in high-voltage network
- IT/computer studies
- Quality and environment

Training plan

Swedenergy offers tailored trainings for electricians. The aim is to impart the professional skills and knowledge needed by today’s distribution electricians. The trainings can lead to qualification as an EBR-electrician or EBR Graduate distribution electrician, or meet companies’ needs for in-service training and the continued training required to maintain a high level of competence in the profession.



In-depth competence survey

Network operator/network technician

WORK DUTIES

- ✓ Handling of operational matters, interruption planning and strategies.
- ✓ Prepare operations order or operating instructions and notify customer of interruption in service.
- ✓ Monitoring of the electrical network, handling of operational disturbances, restoration of interrupted service, optimising the network and monitoring power quality in the network.
- ✓ Collaborate in issuing operations instructions, operation and maintenance of relay equipment, control system, remote control, communications equipment, etc.

COMPETENCE

Educational requirements: Secondary education, electricity programme or equivalent.

The profession requires: At least three years of work experience in the profession. The work experience should be focused on the profession, be comprehensive and include both theory and practice, and cover the entire field of electricity distribution.
Theoretical knowledge according to the training plan for network operator/network technician within electricity distribution.

Questionnaire 5

The form should be completed independently, after which the results are evaluated together with your adviser.



Check the alternative you think best describes your knowledge and experience.

PROFESSIONAL FIELD: NETWORK OPERATOR/NETWORK TECHNICIAN			
AREAS			
Underground and overhead cable networks	Electricity network operation		
Fiber optic cable networks	Auxiliary equipment/control system		
Transformers	Legislation/regulations/industry instructions/environment		
Switchgear			
Underground and overhead cable networks	Can do	Am familiar with	Have never done
Operation of cable network			
Operation of overhead cable network			
Power line design/disconnect condition			
Earthing technology			
Prepare procedures for inspection and periodic maintenance			
Prepare procedures for earth electrode testing			
Fiber optic cable networks	Can do	Am familiar with	Have never done
Fiber optic cable networks			
Prepare procedures for inspection and maintenance			
Transformers	Can do	Am familiar with	Have never done
Design of transformers			
Choice of voltages and vector group			
Loss evaluations in transformer operation			
Operation of transformers with on-load tap changers			
Parallel operation of transformers			
Monitoring and condition check of large transformers			
Switchgear	Can do	Am familiar with	Have never done
System structure			
Switchgear types			
Remote operating in switchgear			
System with isolated neutral point			
Calculation of capacitive earth fault current			
Testing of external protection of outdoor substations			

Electricity network operation	Can do	Am familiar with	Have never done
Handle operational information and execute operating manoeuvres in computer-based operations system			
Determine strategies for optimal network operation			
Monitor the electricity network and handle routine operational matters			
Interruption planning			
Prepare operations order or operating instructions			
Collaborate in issuing operations instructions			
Deal with operational disturbances			
Monitor power quality in the network			
Testing and calibration of protection relays			
Operation and maintenance of communications system			
Studies of voltage quality, magnetic fields, causes of interruptions, etc.			
Auxiliary equipment/control system	Can do	Am familiar with	Have never done
Reading of circuit diagrams			
Troubleshooting direct current			
Testing of signal systems			
Operation and maintenance of batteries			
Inspection rounds and periodic maintenance			
Legislation/industry instructions/environment	Can do	Am familiar with	Have never done
Relevant requirements in Work Environment Act with regulations			
Relevant requirements in Electricity Act with regulations			
Work in accordance with ESA electrical safety instructions			
Work requiring authorisation as electrical contractor			
Risk analyses in connection with different work methods			
Execute jobs in accordance with EBR's publications and instructions			
Handling of environmentally hazardous chemicals, oils, creosote-treated poles, etc.			
Sorting and recycling of used equipment			

Type the numbers in the circles under the picture



Switchgear



Surge arrester



Circuit breaker



Voltage transformer



Current transformer



Cable termination



Type the numbers in the circles next to the picture

Pole mounted transformer station



Transformer



Surge arrester



High-voltage cable



High-voltage fuse



Station cubicle



Expansion vessel



Cable termination

Competence assessment and requirements for certificate

Network operator/network technician

Work duties

- Handling of operational matters, interruption planning and strategies
- Prepare operations order or operating instructions and notify customer of interruption in service
- Monitoring of the electrical network, handling of operational disturbances, restoration of interrupted service, optimising the network and monitoring power quality in the network
- Collaborate in issuing operations instructions, operation and maintenance of relay equipment, control system, remote control, communications equipment, etc.



Network operator/network technician

A trained network operator/network technician possesses good knowledge and skills within the following areas:

1. Legislation

- Electricity legislation and regulations
- Electrical safety instructions - ESA
- Inspection and routine service of electrical installation
- Operational disturbance and structure of operations

2. Care of electricity network

- Operations and maintenance planning
- Operations monitoring
- Network technology

3. Underground cable technology

- Cable technology
- Network stations
- Testing before commissioning
- Cable instructions/troubleshooting
- Earth electrode testing

4. Overhead line technology

- Low-voltage lines
- High-voltage lines
- Earth electrode testing
- Co-construction/co-location
- Testing before commissioning

5. Electrical knowledge

- Relay technology
- Current and voltage transformers
- Earth fault currents

6. EBR knowledge

- EBR as a system
- Cost catalogue
- Structural engineering
- Inspection of electrical installations

In-service training

By “in-service training” is meant competence enhancement training aimed at imparting cutting-edge professional skills. The company's organisation and business determine what in-service training is required. Examples of in-service training are:

- Inspection, basic course
- Overhead line inspection from the air
- IT/computer studies
- Emergency preparedness for major disturbances
- Quality and environment

Training plan

Swedenergy offers tailored trainings for network operators/network technicians. The aim is to impart the professional skills and knowledge needed by today's network operators/network technicians or to meet companies' needs for in-service training and the continued training required to maintain a high level of competence in the profession.

Energiföretagen Sverige

SE-101 53 Stockholm, Sweden
Visiting address: Olof Palmes gata 29
Phone: +46 8 677 25 00 Fax: +46 8 677 25 06
E-mail: info@svenskenergi.se
Website: www.svenskenergi.se

Swedish National Agency for Higher Vocational Education

P.O.Box 145
SE-721 05 Västerås, Sweden
Phone: +46 10 209 01 00
E-mail: info@valideringsinfo.se
Website: www.valideringsinfo.se

