

**EFW Guideline for  
European/International Metal AM Supervisor**

**PERSONNEL WITH QUALIFICATION FOR METAL ADDITIVE  
MANUFACTURING**



**Minimum Requirements for the Qualification and  
Examination**



**EFW-AM-QUAL-012-20**

MINIMUM REQUIREMENTS FOR  
QUALIFICATION AND EXAMINATION

**European/International Metal Additive Manufacturing Supervisor  
(E/I MAM S)**

**Guideline - General information for the public and organizations that imple-  
ment this qualification**

**For more information regarding the Qualifications System, the EWF Management  
Team or the AM ANB should be contacted**  
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## **Preface**

The present document consists in European/International Metal AM Supervisor Guideline, developed by EWF.

This guideline, for the European education, training, examination and qualification of additive manufacturing personnel, has been prepared, evaluated and formulated by the EWF International Additive Manufacturing Qualification Council (IAMQC). Contains general information for the public and organisations that implement this qualification.

Copies of this document can be downloaded from EWF website: [www.ewf.be](http://www.ewf.be) or requested to EWF Additive Manufacturing Authorized Nominated Bodies (EWF AM ANBs) or EWF Management Team.

**MINIMUM REQUIREMENTS FOR THE EDUCATION, TRAINING, EXAMINATION AND QUALIFICATION OF PERSONNEL**

**Introduction**

This guideline covers the minimum requirements for education and training in terms of Learning Outcomes (Knowledge and Skills) and the recommended contact (teaching) hours to be devoted to achieving them.

Students successfully completing examinations will be expected to be capable of applying the achieved learning outcomes at a level consistent with the qualification diploma level. The modular course contents are given in the following structure (overview):

| COMPETENCE UNITS                                | E/IO- Metal AM Supervisor  |                     |
|-------------------------------------------------|----------------------------|---------------------|
|                                                 | Recommended Contact Hours* | Expected Workload** |
| CU 00: Additive manufacturing Process Overview  | 7                          | 14                  |
| CU 01: DED-Arc Process                          | 14                         | 28                  |
| CU 08: DED-LB Process                           | 14                         | 28                  |
| CU 15: PBF-LB Process                           | 14                         | 28                  |
| CU 46: Quality Assurance for Metal AM Processes | 14                         | 28                  |
| CU 47: HSE for Metal AM Processes               | 14                         | 28                  |
| CU 48: Powder Handling                          | 14                         | 28                  |
| <b>TOTAL</b>                                    | <b>91</b>                  | <b>182</b>          |

\* Recommended Contact Hours are the minimum recommended teaching hours for the Standard Routes. A contact hour shall contain at least 50 minutes of direct teaching time.

\*\* Expected Workload is calculated in hours, corresponding to an estimation of the time students typically need to complete all learning activities required to achieve the defined learning outcomes in formal learning environments plus the necessary time for individual study.

Within EWF’s qualifications, there are two types of Competence Units:

**Cross-cutting Competence Unit** - A competence unit whose learning outcomes are not directly linked with one job function since the knowledge and skills achieved will be mobilized in several job functions and activities.

**Functional Competence Unit** - A competence unit whose learning outcomes are directly linked with at least one job function and in which the knowledge and skills achieved will be mobilized in specific job functions and related activities.

The expected learning outcomes are described in two ways: generic outcome descriptors organized in knowledge, skills, autonomy and responsibility; and in detail for each competence unit, organized in job functions and related activities, knowledge and skills corresponding to a specific proficiency level within EWF’s Systems Framework levels (see Appendix I). On each Competence Unit, objectives and scope are defined for a specific depth of knowledge and skills. Recommended contact hours are distributed between theoretical (A), assigned projects/exercises (B), practical workshop training (C), etc., as shown in the following example:

| <b>Qualification: Example 1</b> |                     |
|---------------------------------|---------------------|
| <b>CONTACT HOURS</b>            | <b>X= (SUM A:C)</b> |
| <b>Subject Contents</b>         | A + B + C           |

## **Professional Profile**

Metal AM Supervisors are the professionals with the specific knowledge, skills, autonomy and responsibility to supervise AM production on shop floor, being its main tasks to:

- Implement Quality Procedures
- Ensure Health & Safety Environment Procedures
- Record the essential information during the AM manufacturing process

## **General Access Conditions**

The defined access conditions approved by EWF Technical Working Groups Area of competence “Implementation and Authorisation” of the EWF are given in detail for all countries participating in the EWF system.

The access conditions to European/International Supervisor Qualification admission are the following:

- National compulsory school diploma
- Basic knowledge and skills related with Quality Assurance and HSE
- At least 1 year of experience in Quality and Safety supervision in manufacturing activities is recommended.

**Section I: Theoretical and Practical Education – Qualification Descriptors and Learning Outcomes**

**I.1. Qualification Outcome Descriptors**

| QUALIFICATION              | EFW LEVEL   | KNOWLEDGE                                                                                                                             | SKILLS                                                                                                                                                                                                                                                                                                                                        | AUTONOMY AND RESPONSIBILITY                                                                                                                                                                                                                       |
|----------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E/ I O Metal AM Supervisor | INDEPENDENT | Factual and broad concepts in the field of Metal additive manufacturing processes, quality health and safety assurance in shop floor. | Fundamental cognitive and practical skills on simple and specific of Metal additive manufacturing problems required to: <ul style="list-style-type: none"> <li>develop proper solutions related with quality, health and safety in shop floor</li> <li>application of procedures and tools related with quality, health and safety</li> </ul> | Self-manage of professional activities and simple standard applications of Metal AM manufacturing in predictable contexts but subject to change. Take responsibility for supervising routine Metal AM production, machines and related personnel. |

**I.2. Mandatory Competence Units Learning Outcomes**

Each of the following Competence Units has its Guideline with the Minimum Requirements for the Competence Unit and Examination, containing all the detailed knowledge to be covered and implementation and examination rules and procedures.

**Competence Unit 00: Additive Manufacturing Processes Overview**

| CU 00: Additive Manufacturing Processes Overview | RECOMMENDED CONTACT HOURS |
|--------------------------------------------------|---------------------------|
| <b>SUBJECT TITLE</b>                             |                           |
| Directed energy deposition                       | 1                         |
| Powder bed fusion                                | 1                         |
| Vat photopolymerization                          | 1                         |
| Material jetting                                 | 1                         |
| Binder jetting                                   | 1                         |
| Material extrusion                               | 1                         |
| Sheet lamination                                 | 1                         |
| <b>Total</b>                                     | <b>7</b>                  |
| <b>WORKLOAD</b>                                  | <b>14</b>                 |

| Learning Outcomes – CU 00: Additive Manufacturing Processes Overview |                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                                                     | Factual and broad knowledge of theory, principles and applicability of: <ul style="list-style-type: none"> <li>Directed energy deposition</li> <li>Powder bed fusion</li> <li>Vat photopolymerization</li> <li>Material jetting</li> <li>Binder jetting</li> <li>Material extrusion</li> <li>Sheet lamination</li> </ul> |
| <b>SKILLS</b>                                                        | Distinguish parts produced by different AM processes<br>Recognise the advantages and limitations of AM processes from a manufacturing process chain point of view<br>Identify the applicability of different AM processes, according to the characteristics of each process                                              |

**Competence Unit 01: DED-Arc Process**

| <b>CU01: DED-Arc Process</b>                            |  | <b>RECOMMENDED CONTACT HOURS</b> |
|---------------------------------------------------------|--|----------------------------------|
| <b>SUBJECT TITLE</b>                                    |  |                                  |
| DED-Arc System (Hardware & Software)                    |  | 5                                |
| DED-Arc Physical Principles, Processes and Parameters   |  | 5                                |
| DED-Arc Build platform, feedstock and other consumables |  | 3                                |
| Post processing operations                              |  | 1                                |
| <b>Total</b>                                            |  | <b>14</b>                        |
| <b>WORKLOAD</b>                                         |  | <b>28</b>                        |

| <b>Learning Outcomes – CU01: DED-Arc Process</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                                 | Factual and broad of: <ul style="list-style-type: none"> <li>- DED-Arc systems</li> <li>- Arc physics</li> <li>- Processable materials with DED-Arc</li> <li>- Processing atmosphere requirements with DED-Arc</li> <li>- Sensors and process controls with DED-Arc</li> </ul>                                                                                                                                                                                                                                                                                                                       |
| <b>SKILLS</b>                                    | Describe the DED–Arc systems, including the components and their functions<br>Distinguish different types of feedstock<br>Associate the interaction of the process heat source with the feedstock<br>Recognise the DED–Arc parameters and the influence of their adjustment on the as built part (e.g. deformation)<br>Recognise the characteristics of the DED–Arc build platform, feedstock and other consumables<br>Identify the problems associated with inadequate preparation and set-up of the build platform, handling and storage of feedstock and application of the gases used in DED–Arc |



**Competence Unit 08: DED-LB Process**

| CU 08: DED-LB Process                           |  | RECOMMENDED CONTACT HOURS |
|-------------------------------------------------|--|---------------------------|
| SUBJECT TITLE                                   |  |                           |
| DED-LB System (Hardware & Software)             |  | 5                         |
| DED-LB Physical Principles                      |  | 2                         |
| DED-LB Parameters                               |  | 3                         |
| Build platform, feedstock and other consumables |  | 3                         |
| Post processing operations                      |  | 1                         |
| <b>Total</b>                                    |  | <b>14</b>                 |
| <b>WORKLOAD</b>                                 |  | <b>28</b>                 |

| Learning Outcomes – CU08: DED-LB Process |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                         | Factual and broad of: <ul style="list-style-type: none"> <li>– DED-LB systems</li> <li>– Laser Characteristics</li> <li>– Build platform</li> <li>– Powder/wire</li> <li>– Gases</li> <li>– Processable materials with DED-LB</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>SKILLS</b>                            | Describe the DED-LB systems, including the components and their functions<br>Distinguish different types of feedstock<br>Associate the interaction of the process heat source with the feedstock<br>Recognise the DED-LB parameters and the influence of their adjustment on the as built part (e.g. deformation)<br>Recognise the characteristics of the DED-LB build platform, feedstock and other consumables<br>Identify the problems associated with inadequate preparation and set-up of the build platform, handling and storage of feedstock and application of the gases used in DED-LB<br>Recognise the basic principles of 3D CAD systems and machine control software |

**Competence Unit 15: PBF-LB Process**

| <b>CU 15: PBF-LB Process</b>          |  | <b>RECOMMENDED CONTACT HOURS</b> |
|---------------------------------------|--|----------------------------------|
| <b>SUBJECT TITLE</b>                  |  |                                  |
| PBF-LB Process Principles             |  | 2                                |
| PBF-LB System – Hardware and Software |  | 4                                |
| PBF-LB Parameters                     |  | 3                                |
| PBF-LB Feedstock                      |  | 2                                |
| PBF-LB Consumables                    |  | 2                                |
| Post Processing                       |  | 1                                |
| <b>Total</b>                          |  | <b>14</b>                        |
| <b>WORKLOAD</b>                       |  | <b>28</b>                        |

| <b>Learning Outcomes – CU15: PBF-LB Process</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                                | Factual and broad knowledge of: <ul style="list-style-type: none"> <li>– PBF-LB systems</li> <li>– Laser characteristics</li> <li>– Build platform</li> <li>– Powder</li> <li>– Gases</li> <li>– Processable materials with PBF-LB</li> </ul>                                                                                                                                                                                                                                                                                    |
| <b>SKILLS</b>                                   | Describe the PBF-LB systems, including the components and their functions<br>Recognise the characteristics of the PBF-LB build platform, feedstock and other consumables<br>Recognise the PBF-LB parameters and the influence of their adjustment on the as built part<br>Recognise the interaction of the process heat source with the feedstock<br>Identify the problems associated with inadequate preparation and setup of the build platform, handling and storage of feedstock and application of the gases used in PBF-LB |

**Competence Unit 46: Quality Assurance for Metal AM Processes**

| <b>CU 46: Quality Assurance for Metal AM Processes</b> |  | <b>RECOMMENDED CONTACT HOURS</b> |
|--------------------------------------------------------|--|----------------------------------|
| SUBJECT TITLE                                          |  |                                  |
| Quality Assurance and Quality Control                  |  | 5.5                              |
| QA for different energy source machine                 |  | 3.5                              |
| Wire vs Powder Parts QA                                |  | 3.5                              |
| Communication workflows                                |  | 1.5                              |
| <b>Total</b>                                           |  | <b>14</b>                        |
| <b>WORKLOAD</b>                                        |  | <b>28</b>                        |

| CU                                                      | EQF/ EWF LEVEL         | JOB FUNCTION                                             | JOB REQUIRED ACTIVITIES                                                                                                                                    | RECOMMENDED CONTACT HOURS | WORKLOAD  |
|---------------------------------------------------------|------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------|
| <b>CU 46 – Quality Assurance for Metal AM Processes</b> | <b>4 / INDEPENDENT</b> | Supervise Quality Assurance Procedures on the Shop Floor | Ensuring the implementation of QA/QC procedures and instructions (e.g. feedstock storage and handling);                                                    | <b>14</b>                 | <b>28</b> |
|                                                         |                        |                                                          | Monitoring the compliance of the AM production process and the AM parts with the relevant documents (e.g. standards, product specifications, legislation); |                           |           |
|                                                         |                        |                                                          | Implementing preventive actions to avoid defects;                                                                                                          |                           |           |
|                                                         |                        |                                                          | Implementing corrective actions to eliminate defects;                                                                                                      |                           |           |
|                                                         |                        |                                                          | Providing guidance to AM operators in the day-to-day activities;                                                                                           |                           |           |
|                                                         |                        |                                                          | Assigning tasks to AM operators based on job requirements.                                                                                                 |                           |           |

| <b>LEARNING OUTCOMES – CU 46 - Quality Assurance for Metal AM Processes</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                                                            | Factual and broad knowledge of theory and applicability of: <ul style="list-style-type: none"> <li>- Quality Assurance (QA) principles</li> <li>- Metal AM Systems QA</li> <li>- Quality Control (QC) in the manufacturing chain</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>SKILLS</b>                                                               | Prepare the daily work and tasks distribution based on production plans<br>Compare DED-Arc, DED-LB and PBF-LB processes QA/QC procedures identifying each process' QA/QC specific requirements.<br>Name the most common standards used for Metal AM production, Metal AM operator's qualification, Metal AM procedures approval and Metal AM systems qualification.<br>Provide technical inputs to improve QA/QC procedures and instructions related to handling and storage of feedstock, AM systems and part production.<br>Verify if parts' production on the shop floor complies with Quality Control procedures and Additive Manufacturing Procedure Specification (APS). |

**Competence Unit 47: HSE for Metal AM Processes**

| CU 47: HSE for Metal AM Processes    | RECOMMENDED CONTACT HOURS |
|--------------------------------------|---------------------------|
| SUBJECT TITLE                        |                           |
| HSE in facilities                    | 5                         |
| HSE for different energy sources     | 4.5                       |
| HSE for different types of feedstock | 4.5                       |
| <b>Total</b>                         | <b>14</b>                 |
| <b>WORKLOAD</b>                      | <b>28</b>                 |

| CU                                                            | EQF/ EWF LEVEL             | JOB FUNCTION                    | JOB REQUIRED ACTIVITIES                                                                                           | RECOMMENDED CONTACT HOURS | WORKLOAD  |
|---------------------------------------------------------------|----------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------|-----------|
| <b>CU 47<br/>HSE for<br/>Metal<br/>AM<br/>Pro-<br/>cesses</b> | <b>4 /<br/>INDEPENDENT</b> | Supervise HSE on the Shop Floor | Ensuring compliance with HSE requirements and instructions featuring Metal AM processes and systems;              | <b>14</b>                 | <b>28</b> |
|                                                               |                            |                                 | Providing support to management and operational teams in all aspects of safety, health, and environmental issues; |                           |           |
|                                                               |                            |                                 | Implementing corrective actions to avoid hazardous risks.                                                         |                           |           |

| <b>LEARNING OUTCOMES – CU 47 HSE for Metal AM Processes</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                                            | <p>Factual and broad knowledge of theory and applicability of:</p> <ul style="list-style-type: none"> <li>- HSE requirements and instructions featuring Metal AM processes manufacturing</li> <li>- Infrastructures/Facility Requirements featuring Metal AM processes manufacturing</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>SKILLS</b>                                               | <p>Identify HSE training requirements for personnel operating at the shop floor.</p> <p>Describe the HSE hazards occurring on shop floor naming the different specifications applicable to the main metal AM systems.</p> <p>Describe HSE procedures for handling and storage of metal AM feedstock naming the differences between wire and powder materials' procedures.</p> <p>Describe metal AM HSE applicable legislation and standards ensuring that personnel follows all the applicable HSE regulations on the shop floor.</p> <p>Verify if safety metal AM work procedures are properly followed monitoring personnel operations at the shop floor.</p> <p>Interpret Risk Assessment plans applying appropriate prevention and protection measures for reducing incidents at the shop floor.</p> <p>Produce incident/accident reports describing all the relevant factors related with the event.</p> |

**Competence Unit 48: Powder Handling**

| CU 48: Powder Handling                             | RECOMMENDED CONTACT HOURS |
|----------------------------------------------------|---------------------------|
| SUBJECT TITLE                                      |                           |
| Overview of Powder Manufacturing Processes         | 3                         |
| Chemical Composition and Physical Properties       | 4                         |
| Particle Size Distribution                         | 2                         |
| Powder storage, handling, ageing and documentation | 3                         |
| Powder reusability                                 | 1                         |
| HSE procedures                                     | 1                         |
| <b>Total</b>                                       | <b>14</b>                 |
| <b>WORKLOAD</b>                                    | <b>28</b>                 |

| CU             | EQF/ EWF LEVEL         | JOB FUNCTIONS               | JOB REQUIRED ACTIVITIES                                                                                                                                                                                                         | RECOMMENDED CONTACT HOURS | WORKLOAD |
|----------------|------------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------|
| Power Handling | <b>4 / INDEPENDENT</b> | Manage powders for Metal AM | Implementing procedures for powder delivery and storage<br>Preparing and analysing powder according to technical documentation<br>Performing powder reconditioning (e.g. sieving) after build cycle<br>Following HSE procedures | 14                        | 28       |

| Learning Outcomes – CU 48: Powder Handling |                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>KNOWLEDGE</b>                           | Factual and broad of:<br><br><ul style="list-style-type: none"> <li>– Powder handling, storage and reconditioning</li> </ul>                                                                                                                                                                       |
| <b>SKILLS</b>                              | Complete technical documentation related to powders for metal AM<br>Characterise powders according to instructions from the engineer<br>Ensure powder conditioning according to the AM Procedure Specification<br>Control the reusability of powders<br>Handle powders according to HSE procedures |

**Appendix I: EWF Systems Framework**

| FIELD OF ACTIVITY                                    |  | EQF LEVEL | EFW LEVEL   | KNOWLEDGE                                                                                                                                                                                   | SKILLS                                                                                                                                                                                                                                                          | AUTONOMY AND RESPONSIBILITY                                                                                                                                                                                                                                                                 | EFW QUALIFICATION SYSTEM |
|------------------------------------------------------|--|-----------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| INSPECTORS<br>COORDINATORS/MANAGERS<br><br>OPERATORS |  | 7         | EXPERT      | Highly specialised and forefront knowledge including original thinking, research and critical assessment of theory, principles and applicability of metal additive manufacturing processes. | Highly specialised problem- solving skills including critical and original evaluation, allowing to define or develop the best technical and economical solutions, when applying metal additive manufacturing processes, in complex and unpredictable conditions | Manage and transform the metal additive manufacturing processes in a highly complex context.<br>Fully responsible for the definition and revision of personnel's tasks.                                                                                                                     | AM                       |
|                                                      |  | 6         | ADVANCED    | Advanced knowledge and critical understanding of the theory, principles and applicability of metal additive manufacturing processes.                                                        | Advanced problem-solving skills including critical evaluation, allowing to choose the proper technical and economical solutions, when applying metal additive manufacturing processes, in complex and unpredictable conditions                                  | Manage the applications of metal additive manufacturing processes in a highly complex context.<br>Act autonomously in decision making and definition in the definition of the metal additive manufacturing personnel's tasks.                                                               |                          |
|                                                      |  | 5         | SPECIALIZED | Specialised, factual and theoretical of theory, principles and applicability of metal additive manufacturing processes                                                                      | Specialised range of cognitive and practical skills, allowing to develop solutions or choose the appropriate methods, when applying metal additive manufacturing processes in common/regular problems.                                                          | Manage and supervise common or standard metal additive manufacturing processes, in an unpredictable context.<br>Take responsibility in standard work and supervise the metal additive manufacturing personnel's tasks.                                                                      |                          |
|                                                      |  | 4         | INDEPENDENT | Factual and broad concepts in the field of metal additive manufacturing processes.                                                                                                          | Fundamental cognitive and practical skills required to develop proper solutions and application of procedures and tools on simple and specific metal additive manufacturing problems.                                                                           | Self-manage of professional activities and simple standard applications of metal additive manufacturing processes in predictable contexts but subject to change.<br>Supervise routine tasks and similar function workers, as well as take responsibility for decision making in basic work. |                          |

**General reference descriptors transversal to all qualifications. Each Qualification has its own specific descriptors in terms of Knowledge, skills, autonomy and responsibility.**