



The European Federation of  
National Maintenance Societies

**THE SPECIFICATION FOR  
REQUIREMENTS OF A EUROPEAN  
MAINTENANCE TECHNICIAN SPECIALIST**

*These Requirements have been prepared by the EFNMS Working Group Training,  
and approved by the EFNMS Working Group Certification.*

*(These Requirements have been accepted by the EFNMS Council  
on the 20<sup>th</sup> of October 2001.)*

# The Specification for Requirements of a “European Maintenance Technician Specialist”

## Introduction

This document “The Specification for Requirements” specifies the *requirements* of competencies and responsibilities for a European Technician Maintenance Specialist.

The requirements have been set out under “General Competencies” and “Responsibilities and Competencies”; task related headings. These have sub-readings in each syllabus area with the level of required knowledge specified.

Three levels of required knowledge are:

- 1 **Very good knowledge**, to be able to handle special tasks.
- 2 **Good knowledge**, to be able to handle normal tasks.
- 3 **Understanding**, to be able to participated in making the right decisions.

In each syllabus the overall approach is to ensure that maintenance tasks are:

- (a) carried out safely and in a safe manner,
- (b) carried out in a correct manner first time, and
- (c) carried out on time and cost effectively.

The EFNMS document “Regulations to achieve the EFNMS Certificate as a European Maintenance Technician Specialist” specifies the *regulations* concerned with the assessment of candidates seeking the award of EFNMS Certificate as a European Maintenance Technician Specialist.

## The Requirements

### 1. General Competencies and Responsibilities

SYLLABUS	FINAL ATTAINMENT LEVEL	LEVEL OF REQUIRED KNOWLEDGE
<p>1.0 <b>Corporate/Company Environment</b></p> <p>1.0.1 Corporate/company situation</p> <p>1.0.2 Corporate/company organization</p> <p>1.0.3 Departmental organization</p> <p>1.0.4 Costs</p>	<p>Understands significance of social/economic impact of own organization/enterprise.</p>	<p>(not required as part of examination)</p>
<p>1.1 <b>Work Planning</b></p> <p>1.1.1 Planning</p> <ul style="list-style-type: none"> <li>- Maintenance request/Process sheet/Job ticket</li> <li>- Personnel planning</li> <li>- Equipment planning</li> <li>- Time sheet</li> </ul> <p>1.1.2 Control and reporting</p> <p><i>Detailed Specification</i></p> <ul style="list-style-type: none"> <li>• <i>Elements of a maintenance system</i> <ul style="list-style-type: none"> <li>- <i>Benefits</i></li> </ul> </li> <li>• <i>Production Scheduling/Maintenance</i> <ul style="list-style-type: none"> <li>- <i>First estimation activity scheduling</i></li> <li>- <i>Critical task identification</i></li> <li>- <i>Complexity of tasks, analysis and decision</i></li> <li>- <i>Skill requirements</i></li> </ul> </li> <li>• <i>Network Analysis</i> <ul style="list-style-type: none"> <li>- <i>Capacity of maintenance department, to task in hand</i></li> <li>- <i>Critical path</i></li> <li>- <i>Presentation of critical path</i></li> </ul> </li> <li>• <i>Control &amp; Reporting</i> <ul style="list-style-type: none"> <li>- <i>Procedures time to task Completion/Time Allocation</i></li> <li>- <i>Preparation of Report</i></li> <li>- <i>Data Trial to reduce errors in reporting and effects on planning</i></li> </ul> </li> <li>• <i>Work Requests/Orders</i> <ul style="list-style-type: none"> <li>- <i>Reporting back</i></li> <li>- <i>Matching Personnel/Skills to job, safety analysis</i></li> <li>- <i>Spares Requirements</i></li> </ul> </li> </ul>	<p>Does preparation and reporting on own maintenance tasks and on some team jobs.</p>	<p>1</p>

<p>1.2 <b>Team Working and Communications</b></p> <p>1.2.1 Authority and Responsibility</p> <p>1.2.2 Basic Management Techniques</p> <ul style="list-style-type: none"> <li>- Personnel Management</li> <li>- Reporting Techniques</li> <li>- Team organization techniques</li> </ul> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Team Working Basics</i> <ul style="list-style-type: none"> <li>- <i>Leadership</i></li> <li>- <i>Delegation</i></li> <li>- <i>Initiative</i></li> <li>- <i>Interpretation of Company plan</i></li> </ul> </li> <li>• <i>Communications</i> <ul style="list-style-type: none"> <li>- <i>Objectives</i></li> <li>- <i>Procedures</i></li> <li>- <i>Roles &amp; Responsibilities</i> <ul style="list-style-type: none"> <li>a) <i>in teams, facilitation</i></li> <li>b) <i>as individuals</i></li> </ul> </li> <li>- <i>Co-ordination &amp; Reporting</i> <ul style="list-style-type: none"> <li>a) <i>internally</i></li> <li>b) <i>externally</i></li> </ul> </li> </ul> </li> <li>• <i>Data Analysis Tools</i> <ul style="list-style-type: none"> <li>- <i>Pareto</i></li> <li>- <i>Brainstorming</i></li> <li>- <i>Fishbone Diagram</i></li> <li>- <i>Histograms</i></li> <li>- <i>Scatter Plot</i></li> </ul> </li> </ul>	<p>Reports orally and in writing within a team. Has social capability to communicate with people in and outside the team, such as in the production, with contractors, suppliers, etc.</p>	<p>1</p>
<p>1.3 <b>English Language</b></p> <ul style="list-style-type: none"> <li>- Technical English</li> </ul> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>- <i>Understanding of Instructions &amp; Terms</i></li> <li>- <i>From English to own Language</i></li> </ul>	<p>Is able to understand instructions in technical English.</p>	<p>3</p>

<p>1.4 <b>Information Technology</b></p> <p>1.4.1 Basics of EDP</p> <p>1.4.2 Processing/calculation techniques</p> <ul style="list-style-type: none"> <li>- Data base handling</li> <li>- Computation of tables</li> </ul> <p>1.4.3 The PC-Work station</p> <ul style="list-style-type: none"> <li>- Organization of the PC-Work station</li> <li>- Use of networks</li> </ul> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Basic Knowledge and practical use of</i> <ul style="list-style-type: none"> <li>- <i>Word Processing software</i></li> <li>- <i>Calculating software</i></li> <li>- <i>Database</i></li> <li>- <i>Input data for tasks</i></li> </ul> </li> <li>• <i>CMMS</i> <ul style="list-style-type: none"> <li>- <i>Practical use and Operation</i></li> <li>- <i>Input and Output of data</i></li> <li>- <i>Asset Register</i></li> <li>- <i>Coding</i></li> <li>- <i>Appreciation of useful data</i></li> </ul> </li> <li>• <i>Internat/Intranet</i> <ul style="list-style-type: none"> <li>- <i>Practical use of</i></li> </ul> </li> </ul>	<p>Uses the information system for entering and collecting data. Has the basic knowledge to use the system interactively.</p>	<p>2</p>
<p>1.5 <b>Training and Instructions</b></p> <p>1.5.1 Basics of the Learning Process</p> <p>1.5.2 Basics of Training Strategies</p> <p>1.5.3 Basics of Planning a Lecture</p> <p>1.5.4 Training facilities</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Information Transmission</i> <ul style="list-style-type: none"> <li>- <i>Communications Techniques</i></li> <li>- <i>Planning and performing/delivery</i></li> </ul> </li> <li>• <i>Introducing New Technologies</i> <ul style="list-style-type: none"> <li>- <i>Training strategy</i></li> <li>- <i>Delivery of training</i></li> </ul> </li> </ul>	<p>Has the basic knowledge needed for training and instructing team members. Is familiar with training facilities in and outside the organization.</p>	<p>2</p>
<p>1.6 <b>Quality Assurance (Systems)</b></p> <p>1.6.1 Scope and objectives of Quality Assurance</p> <ul style="list-style-type: none"> <li>- QA Standards, Terminology</li> <li>- Elements of QA systems</li> </ul> <p>1.6.2 Basics of Quality Assurance</p> <ul style="list-style-type: none"> <li>- Concepts, Definitions</li> </ul> <p>1.6.3 QA techniques and procedures</p>	<p>Has basic knowledge of the impact of maintenance on product quality. Is able to act as an active member of a quality team.</p>	<p>1</p>
<p>1.7 <b>Environment</b></p> <p>1.7.1 Scope and objectives of Environmental Management</p> <p>1.7.2 Influence on indoor and outdoor environment</p>	<p>Has basic knowledge of the impact of maintenance on indoor and outdoor environment. Is able to act as an active member of a quality team.</p>	<p>1</p>

<p><u>Detailed Specification for 1.6 Quality Assurance and 1.7 Environment</u></p> <ul style="list-style-type: none"> <li>• <i>Requirements of QA/Environment System</i> <ul style="list-style-type: none"> <li>- <i>Applications to maintenance in quality and environmental control</i></li> <li>- <i>Requirement for maintenance</i></li> </ul> </li> <li>• <i>Membership of QA/Environment Team</i> <ul style="list-style-type: none"> <li>- <i>Co-operating with other team members</i></li> <li>- <i>Basic knowledge on product quality</i></li> <li>- <i>Need for verification of documentation</i></li> </ul> </li> <li>• <i>Quality of Maintenance</i> <ul style="list-style-type: none"> <li>- <i>QA standards in maintenance</i></li> <li>- <i>Cross checking and standards of work</i></li> </ul> </li> <li>• <i>Environment</i> <ul style="list-style-type: none"> <li>- <i>Safety of the individual</i></li> <li>- <i>Safety of the workforce</i></li> <li>- <i>Safety of the community/environment</i></li> </ul> </li> </ul>		
<p>1.8     <b>Automation</b></p> <p>1.8.1   Basics of Process Control</p> <p>1.8.2   Basics of machine automation</p> <p>1.8.3   Common system design</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Automation Systems</i> <ul style="list-style-type: none"> <li>- <i>Process on individual machine</i></li> <li>- <i>How system works (input, output &amp; sensors)</i></li> <li>- <i>How system is presented</i></li> <li>- <i>Use of P.C., schematics, diagrams</i></li> </ul> </li> <li>• <i>Interlocks and Safety</i> <ul style="list-style-type: none"> <li>- <i>Safety implications with stored energy, large forces</i></li> <li>- <i>Fail safe design</i></li> </ul> </li> <li>• <i>Reasons for Automatic Systems</i> <ul style="list-style-type: none"> <li>- <i>Safety and Environment</i></li> <li>- <i>Automation to Reduce Repetitive work</i></li> </ul> </li> </ul>	<p>Should have general knowledge of systems at present.</p>	<p>2</p>

## 2. Task Related Competencies

SYLLABUS	FINAL ATTAINMENT LEVEL	LEVEL OF REQUIRED KNOWLEDGE
<p>2.1 <b>Maintenance Objectives and Policies</b></p> <p>2.1.1 Corporate Maintenance Engineering</p> <ul style="list-style-type: none"> <li>- Objectives, Tasks, Significance</li> <li>- Policies on maintenance</li> <li>- Investment considerations. LCC/DOM</li> </ul> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Connection between company objectives and maintenance objectives</i> <ul style="list-style-type: none"> <li>- <i>Relationship between team and individual objectives</i></li> <li>- <i>Policies to achieve these objectives</i></li> <li>- <i>Economics</i></li> <li>- <i>Targets</i></li> </ul> </li> <li>• <i>Understanding of strategies in maintenance</i> <ul style="list-style-type: none"> <li>- <i>Strategies with regard to PM, BMA, RCM, TPM</i></li> <li>- <i>Reasons for Strategy</i></li> </ul> </li> <li>• <i>Maintenance Policies</i> <ul style="list-style-type: none"> <li>- <i>General rules of operation of policies</i></li> <li>- <i>Policies on breakdown times, contractors OEMs, employee skills</i></li> </ul> </li> <li>• <i>Financial Policies</i> <ul style="list-style-type: none"> <li>- <i>Budget arrangements</i></li> <li>- <i>Difference between capital expenditure and maintenance</i></li> </ul> </li> </ul>	<p>Understands the importance of maintenance objectives and policies. Understands the economic impact of maintenance and the importance of operation and capital costs within the framework of life-cycles costs - LCC.</p>	<p>3</p>
<p>2.2 <b>Maintenance Concepts</b></p> <p>2.2.1 The maintenance system</p> <p>2.2.2 The Wear and Tear Process</p> <p>2.2.3 Preventive and Corrective Maintenance Choices</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Ideas and targets of maintenance systems</i> <ul style="list-style-type: none"> <li>- <i>Types of systems</i></li> <li>- <i>Balance between preventive and corrective maintenance</i></li> <li>- <i>Choice of appropriate system</i></li> <li>- <i>Economic and environmental considerations</i></li> </ul> </li> </ul>	<p>Knows the principles of the preventive, corrective and opportunity based maintenance incl. condition monitoring.</p>	<p>1</p>

The Specification for Requirements of a European Maintenance Technician Specialist

<p>2.3 <b>Restoration Techniques</b></p> <p>2.3.1 Basis of Technology          - Mechanical Technology/mechanical equipment          - Electrical Technology/electrical equipment          - PLC's and PC's applications          - Hydraulics and Pneumatics          - Building</p> <p>2.3.2 Repair techniques</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• Identification of Restoration needs             <ul style="list-style-type: none"> <li>- Repair Techniques</li> </ul> </li> <li>• Skills and knowledge for repair             <ul style="list-style-type: none"> <li>- Width of appropriate technologies</li> </ul> </li> </ul>	<p>Knows the principle and is able to apply them in practice.</p>	<p>1</p>
<p>2.4 <b>Maintenance Terminology</b></p> <p>2.4.1 Terminology          2.4.2 Standards/CEN</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• The standards appropriate to maintenance             <ul style="list-style-type: none"> <li>- General standard terms and definitions</li> </ul> </li> </ul>	<p>Knows and understands maintenance terminology and standards, understands them and is able to use them actively.</p>	<p>1</p>
<p>2.5 <b>Contracts</b></p> <p>2.5.1 Basics of Contractual Law          2.5.2 The CEN Maintenance Contract Guidelines          2.5.3 Practical applications</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• The EFNMS/CEN Maintenance Contract Guideline             <ul style="list-style-type: none"> <li>- Know how to apply guidelines</li> </ul> </li> </ul>	<p>Knows the requirements and scope to which a contractor should comply. Is able to instruct and supervise contractors on maintenance jobs.</p>	<p>2</p>
<p>2.6 <b>Laws and Regulations</b></p> <p>2.6.1 Basics of Labour Law          2.6.2 Law and regulations on Health Care &amp; Safety          2.6.3 Laws and regulations on environmental protection          2.6.4 Safety practice          - First aid training          - Preventive health protection and safety measures</p> <p>2.6.5 Equipment Safety Systems</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• Equipment Safety Systems             <ul style="list-style-type: none"> <li>- CE Markings</li> <li>- Requirements to achieve CE Markings</li> </ul> </li> <li>• Safety Regulations             <ul style="list-style-type: none"> <li>- Need to know requirements for qualified first aid</li> <li>- Award First Aid requirements</li> </ul> </li> <li>• Legal implication of maintenance modifications on CE markings             <ul style="list-style-type: none"> <li>- Liabilities</li> </ul> </li> </ul>	<p>Knows all relevant laws and regulations concerning job safety, fire protection and environment.</p>	<p>2</p>



SYLLABUS	FINAL ATTAINMENT LEVEL	LEVEL OF REQUIRED KNOWLEDGE
<p>2.7 <b>Condition Monitoring</b></p> <p>2.7.1 Significance of CM in maintenance practice</p> <p>2.7.2 CM techniques</p> <ul style="list-style-type: none"> <li>- Areas of application</li> <li>- Results</li> <li>- Base Lines</li> </ul> <p>2.7.3 Measuring Techniques</p> <ul style="list-style-type: none"> <li>- Calibration of measuring tools and instruments</li> <li>- Disturbance, interference and noise</li> </ul> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Objective of Condition Monitoring</i> <ul style="list-style-type: none"> <li>- <i>Common CM Techniques</i></li> <li>- <i>Applications to specific tasks</i></li> <li>- <i>Measurements and problems associated with analysis of readings</i></li> <li>- <i>Calibrations</i></li> </ul> </li> <li>• <i>Cost Awareness of newer techniques v older hands-on techniques</i></li> </ul>	<p>Knows the most common condition monitoring methods and devices and is familiar with their use in practice.</p>	<p>2</p>
<p>2.8 <b>Fault Finding Techniques</b></p> <p>2.8.1 Root Cause Analysis</p> <ul style="list-style-type: none"> <li>- Analysis of functions</li> <li>- Analysis of design</li> </ul> <p>2.8.2 Fault Finding Techniques</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Purpose of Fault Finding Techniques (F.F.T.)</i> <ul style="list-style-type: none"> <li>- <i>Different methods as trial and error method, root cause analysis</i></li> <li>- <i>Practical use of at least one method</i></li> <li>- <i>Usefulness of history in CMMS records in F.F.T.</i></li> </ul> </li> </ul>	<p>Knows at least one method for systematic fault finding and is familiar with its use and practice.</p>	<p>1</p>
<p>2.9 <b>Improvement Techniques</b></p> <p>2.9.1 Concept, definitions, scope</p> <ul style="list-style-type: none"> <li>- Small Scale Activities</li> </ul> <p>2.9.2 Workshop practice</p> <ul style="list-style-type: none"> <li>- Determination of weak points</li> <li>- Elimination of weak points</li> </ul> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Objectives and benefits of continuous small improvements</i> <ul style="list-style-type: none"> <li>- <i>How to apply improvement</i></li> <li>- <i>Use of experience and data</i></li> <li>- <i>Use for redesign</i></li> </ul> </li> <li>• <i>Plan and carry out check actions</i> <ul style="list-style-type: none"> <li>- <i>Measurements before and after improvements</i></li> </ul> </li> </ul>	<p>Has basic knowledge of improvement techniques and under direction is familiar with their use and practice.</p>	<p>2</p>

<p>2.10. <b>Documentation</b></p> <p>2.10.1 Basics of Engineering Drawings          - Mechanical design          - Wiring and piping diagrams          - Electrical and electronic diagrams</p> <p>2.10.2 Organization and use          - Filing          - Retrieving          - Marking up</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Purpose of Documentation in Maintenance</i> <ul style="list-style-type: none"> <li>- <i>Literacy in maintenance documentation</i></li> <li>- <i>Standard practice/symbols</i></li> </ul> </li> <li>• <i>Purpose of Documentation Systems</i> <ul style="list-style-type: none"> <li>- <i>Administration</i></li> <li>- <i>Procedures for change</i></li> <li>- <i>Links to engineering departments</i></li> </ul> </li> </ul>	<p>Understands all documentation (instructions, drawings, etc.) related to the maintenance job and can, if necessary, propose improvements and handle non-conformance.</p>	<p>2</p>
<p>2.11 <b>Spare Part Management</b></p> <p>2.11.1 Administration of spare parts          - Planning and organization of storing facilities          - Cost accounting</p> <p>2.11.2 Documentation</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Purpose of Spare Parts Management</i> <ul style="list-style-type: none"> <li>- <i>Administration Techniques</i></li> <li>- <i>Economic Aspects</i></li> <li>- <i>Documentation Aspects</i></li> <li>- <i>Parts change</i></li> <li>- <i>Quality of spare parts</i></li> </ul> </li> <li>• <i>Links to Planned Maintenance</i> <ul style="list-style-type: none"> <li>- <i>Reference to use of alternative parts</i></li> <li>- <i>Cost saving, machine warranty and safety implications</i></li> </ul> </li> </ul>	<p>Has basic knowledge of the storing of spare parts. Knows the practical routine of storing and retrieval of spare parts.</p>	<p>1</p>

SYLLABUS	FINAL ATTAINMENT LEVEL	LEVEL OF REQUIRED KNOWLEDGE
<p>2.12 <b>Materials Technology</b></p> <p>2.12.1 Materials Technology</p> <ul style="list-style-type: none"> <li>- Metals</li> <li>- Synthetic materials</li> <li>- Ceramics</li> <li>- Glass</li> <li>- Building materials</li> <li>- Others</li> </ul> <p>2.12.2 Wear and Tear Mechanisms</p> <ul style="list-style-type: none"> <li>- Corrosion</li> <li>- Fatigue</li> <li>- Stress</li> <li>- Friction</li> <li>- Others</li> </ul> <p>2.12.3 Protective Methods</p> <ul style="list-style-type: none"> <li>- Coating techniques</li> <li>- Tribology/lubrication</li> </ul> <p>2.12.4 Non-destructive Testing methods</p> <p><u>Detailed Specification</u></p> <ul style="list-style-type: none"> <li>• <i>Basic Knowledge of Materials in Families</i> <ul style="list-style-type: none"> <li>- <i>Main characteristics and properties</i></li> </ul> </li> <li>• <i>Wear and Tear Mechanisms</i> <ul style="list-style-type: none"> <li>- <i>Main forms of wear and tear</i></li> <li>- <i>Avoidance of wear</i></li> </ul> </li> <li>• <i>Protection Methods</i> <ul style="list-style-type: none"> <li>- <i>Applications of coating techniques and tribology/lubrication to Maintenance</i></li> </ul> </li> <li>• <i>Non-destructive Testing</i> <ul style="list-style-type: none"> <li>- <i>Main techniques and applications</i></li> </ul> </li> </ul>	<p>Has basic knowledge of material technology and application, material deterioration and protective methods.</p>	<p>2</p>