<table>
<thead>
<tr>
<th>TSC Category</th>
<th>Engineering and Maintenance</th>
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<tbody>
<tr>
<td>TSC</td>
<td>Equipment and Systems Repair</td>
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<tr>
<td>TSC Description</td>
<td>Execute equipment and systems repair procedures to correct faults and restore functionalities</td>
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<thead>
<tr>
<th>TSC Proficiency Description</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
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<tr>
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<td>BPM-ENM-2005-1.1</td>
<td>BPM-ENM-3005-1.1</td>
<td>BPM-ENM-4005-1.1</td>
<td>BPM-ENM-5005-1.1</td>
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<tr>
<td>Identify the causes of minor faults with equipment and systems and make necessary repairs</td>
<td>Implement repair procedures to ensure correct operation of biopharmaceuticals manufacturing equipment and systems</td>
<td>Develop solutions to restore and sustain optimal functionality of biopharmaceuticals manufacturing equipment and systems</td>
<td>Provide technical expertise to guide the development of solutions to repair, restore and optimise equipment and systems functionality</td>
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**Knowledge**

- Types of mechanical, structural and electrical malfunctions and defects
- Methods of repairing mechanical, structural and electrical malfunctions and defects
- Types of tools required for repair works
- Safety isolation procedures for equipment and systems
- Cleaning and preparation processes
- Hazards and safety precautions associated with repair works
- Repair procedures
- Resources required for repairs
- Methods of analysing equipment manuals, system diagrams and structural plans
- Techniques for targeting and determining malfunctions and defects
- Methods of determining follow-up measures to ensure repair works are successful
- Manufacturing processes and workflows
- Root-cause analysis and other techniques for determining the causes of major malfunctions and defects
- Impact of equipment and system faults on other parts of the manufacturing processes
- Methods of determining follow-up measures to ensure repair works are successful
- Manufacturing processes and workflows
- Impact of repair activities on wider operations and processes in the facility
- Interdependencies among processes in a biopharmaceutical manufacturing facility
- Best practices in equipment and system repairs

**Abilities**

- Identify mechanical, electrical or structural faults with equipment or system components
- Dismantle equipment according to standard operating procedures and safety protocols
- Remove defective parts, using appropriate tools
- Inspect damaged machine parts and mark defective areas
- Estimate time and costs needed for repair activities
- Oversee the resolution of minor equipment and system component failures, and provide guidance and input where required
- Conduct more complex repair work of non-standard equipment or system components
- Identify the root causes of complicated equipment and system failures and malfunctions
- Guide repair procedures and provide information on standard protocols
- Measure the impact of major repair works on manufacturing processes
- Develop interim solutions to replace faulty equipment if there
- Evaluate root cause analysis of major equipment and system failures
- Assess viability of recommended activities and steps to repair and restore equipment and systems
- Review equipment breakdown trends and analyses
- Design modifications to minimise or eliminate
| • Conduct minor repairs on system components  
  • Adhere to relevant Health, Safety and Environment risk control measures when conducting repair works  
  • Record repair steps and results in accordance with organisational procedures | • Monitor success of repair work  
  • Maintain repair logs for future analysis  
  • Ensure repair work is conducted in compliance with Health, Safety and Environment policies, procedures and regulations | are no alternative solutions  
  • Analyse patterns in equipment breakdowns to identify potential design or process modifications  
  • Develop risk control measures to mitigate possible issues in executing repair works  
  • Outline procedures for monitoring successes of repair works  
  • Oversee documentation procedures in relation to equipment and systems repair works  
  • Outline standard quality and safety procedures to adhere to during repair works | • machine or system malfunctions  
  • Provide expert technical guidance for repairing and restoring equipment and systems to optimal performance |