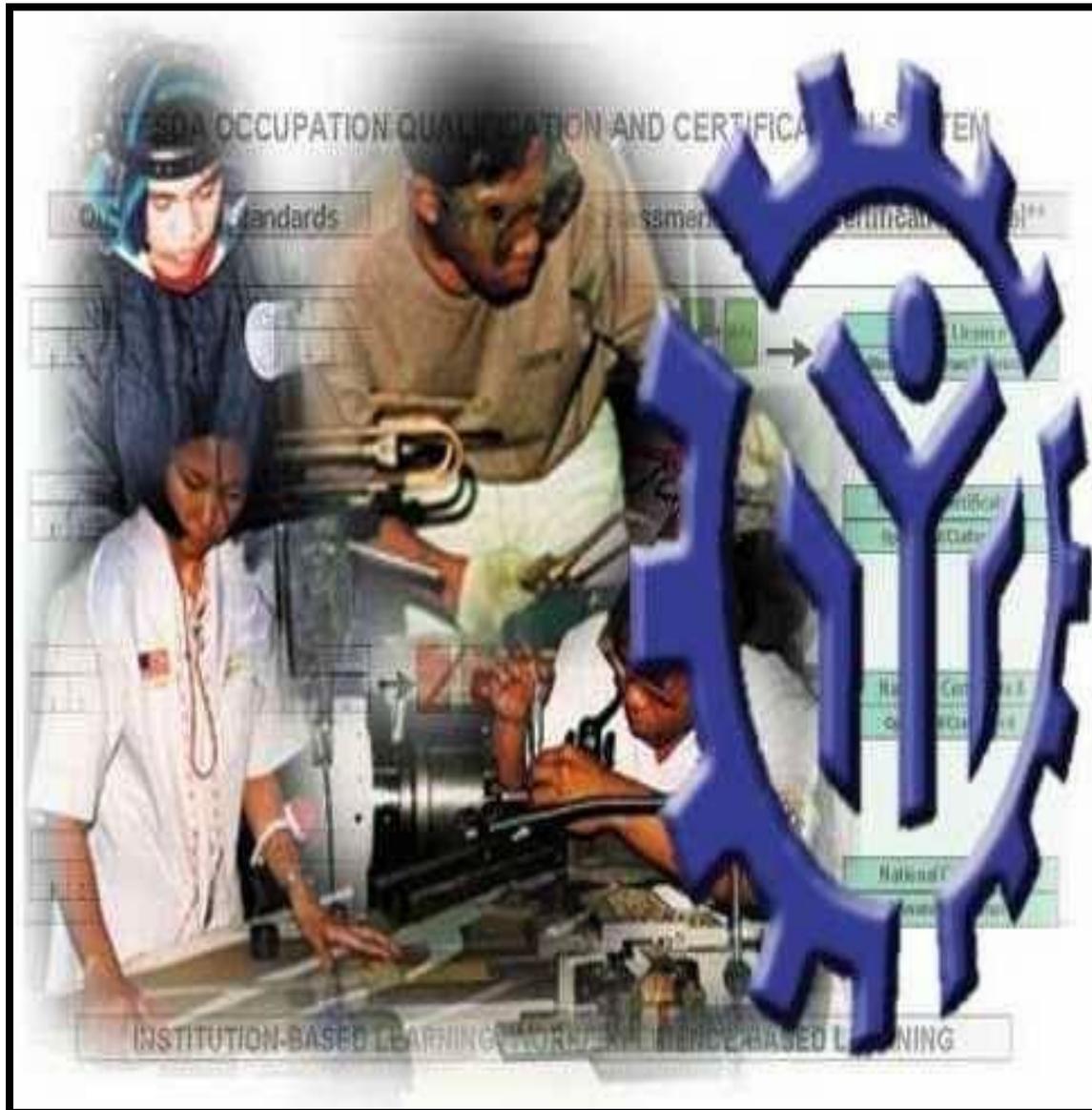


# TRAINING REGULATIONS

## PAINTING MACHINE OPERATION NC II



### AUTOMOTIVE MANUFACTURING SECTOR

#### TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY

East Service Road, South Superhighway, Taguig City, Metro Manila

*Technical Education and Skills Development Act of 1994  
(Republic Act No. 7796)*

**Section 22, “Establishment and Administration of the National Trade Skills Standards” of the RA 7796 known as the TESDA Act mandates TESDA to establish national occupational skill standards. The Authority shall develop and implement a certification and accreditation program in which private industry group and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.**

The Training Regulations (TR) serve as basis for the:

1. Competency assessment and certification;
2. Registration and delivery of training programs; and
3. Development of curriculum and assessment instruments.

Each TR has four sections:

- Section 1 Definition of Qualification - refers to the group of competencies that describes the different functions of the qualification.
- Section 2 Competency Standards - gives the specifications of competencies required for effective work performance.
- Section 3 Training Standards - contains information and requirements in designing training program for certain Qualification. It includes curriculum design, training delivery; trainee entry requirements; tools, equipment and materials; training facilities; trainer's qualification; and institutional assessment.
- Section 4 National Assessment and Certification Arrangements - describes the policies governing assessment and certification procedure

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**TRAINING REGULATIONS FOR  
PAINTING MACHINE OPERATION NC II**

**SECTION 1 PAINTING MACHINE OPERATION NC II QUALIFICATION**

The PAINTING MACHINE OPERATION NC II Qualification consists of competencies that a person must achieve to perform pre-treatment and cathodic electro-deposition process operations; perform gray primer (2<sup>nd</sup> primer) application procedures; and perform top coat application procedures in accordance with manufacturer's specification.

This Qualification is packaged from the competency map of the Automotive Industry (Manufacturing sub-sector) as shown in Annex A.

The Units of Competency comprising this Qualification include the following

<b>Code No.</b>	<b>BASIC COMPETENCIES</b>
500311105	Participate in Workplace Communication
500311106	Work in Team Environment
500311107	Practice Career Professionalism
500311108	Practice Occupational Health and Safety Procedures

<b>Code No.</b>	<b>COMMON COMPETENCIES</b>
ALT311202	Perform Mensuration and Calculation
ALT742201	Read, Interpret and Apply Engineering Drawings
ALT723202	Move and Position Vehicle
ALT723201	Apply Appropriate Sealant/Adhesive
ALT 723205	Perform Shop Maintenance

<b>CODE NO.</b>	<b>CORE COMPETENCIES</b>
ALT827316	Perform Pre-treatment and Cathodic Electro-deposition Process Operation
ALT827317	Perform Gray Primer (2 <sup>nd</sup> Primer) Application Procedures
ALT827318	Perform Top Coat Application Procedures

A person who has achieved this Qualification is competent to be:

- Automotive Painting Machine Operator**

## SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in PAINTING MACHINE OPERATION NC II.

### BASIC COMPETENCIES

**UNIT OF COMPETENCY :** PARTICIPATE IN WORKPLACE COMMUNICATION

**UNIT CODE :** 500311105

**UNIT DESCRIPTOR :** This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from <b>appropriate sources</b> 1.2 Effective questioning , active listening and speaking skills are used to gather and convey information 1.3 Appropriate <b>medium</b> is used to transfer information and ideas 1.4 Appropriate non- verbal communication is used 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed 1.6 Defined workplace procedures for the location and <b>storage</b> of information are used 1.7 Personal interaction is carried out clearly and concisely
2. Participate in workplace meetings and discussions	2.1 Team meetings are attended on time 2.2 Own opinions are clearly expressed and those of others are listened to without interruption 2.3 Meeting inputs are consistent with the meeting purpose and established <b>protocols</b> 2.4 <b>Workplace interactions</b> are conducted in a courteous manner 2.5 Questions about simple routine workplace procedures and matters concerning working conditions of employment are tasked and responded to 2.6 Meetings outcomes are interpreted and implemented
3. Complete relevant work related documents	3.1 Range of <b>forms</b> relating to conditions of employment are completed accurately and legibly 3.2 Workplace data are recorded on standard workplace forms and documents 3.3 Basic mathematical processes are used for routine calculations 3.4 Errors in recording information on forms/ documents are identified and properly acted upon 3.5 Reporting requirements to supervisor are completed according to organizational guidelines

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	1.1. Team members 1.2. Suppliers 1.3. Trade personnel 1.4. Local government 1.5. Industry bodies
2. Medium	2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information discussion 2.5. Follow-up or verbal instructions 2.6. Face to face communication
3. Storage	3.1. Manual filing system 3.2. Computer-based filing system
4. Forms	4.1. Personnel forms, telephone message forms, safety reports
5. Workplace interactions	5.1. Face-to-face interactions 5.2. Telephone conversation 5.3. Electronic and two-way radio communication 5.4. Written communication including electronic mail, memos, instruction and forms 5.5. Non-verbal communication including gestures, signals, signs and diagrams
6. Protocols	6.1. Observing meeting 6.2. Compliance with meeting decisions 6.3. Obeying meeting instructions

## EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ol style="list-style-type: none"> <li>1.1. Prepared written communication following standard format of the organization</li> <li>1.2. Accessed information using communication equipment</li> <li>1.3. Made use of relevant terms as an aid to transfer information effectively</li> <li>1.4. Conveyed information effectively adopting the formal or informal communication</li> </ol>
<p>2. Underpinning knowledge</p>	<ol style="list-style-type: none"> <li>2.1. Effective communication</li> <li>2.2. Different modes of communication</li> <li>2.3. Written communication</li> <li>2.4. Organizational policies</li> <li>2.5. Communication procedures and systems</li> <li>2.6. Technology relevant to the enterprise and the individual's work responsibilities</li> </ol>
<p>3. Underpinning skills</p>	<ol style="list-style-type: none"> <li>3.1. Follow simple spoken language</li> <li>3.2. Perform routine workplace duties following simple written notices</li> <li>3.3. Participate in workplace meetings and discussions</li> <li>3.4. Complete work related documents</li> <li>3.5. Estimate, calculate and record routine workplace measures</li> <li>3.6. Four fundamental operations (addition, subtraction, division and multiplication)</li> <li>3.7. Ability to relate to people of social range in the workplace</li> <li>3.8. Gather and provide information in response to workplace Requirements</li> </ol>
<p>4. Resource implications</p>	<p>The following resources <b>MUST</b> be provided:</p> <ol style="list-style-type: none"> <li>4.1. Fax machine</li> <li>4.2. Telephone</li> <li>4.3. Writing materials</li> <li>4.4. Internet</li> </ol>
<p>5. Method of assessment</p>	<p>Competency <b>MUST</b> be assessed through:</p> <ol style="list-style-type: none"> <li>5.1. Direct observation</li> <li>5.2. Oral interview and written test</li> </ol>
<p>6. Context of assessment</p>	<ol style="list-style-type: none"> <li>6.1. Competency may be assessed individually in the actual workplace or through accredited institution</li> </ol>

**UNIT OF COMPETENCY :** WORK IN TEAM ENVIRONMENT

**UNIT CODE :** 500311106

**UNIT DESCRIPTOR :** This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized terms</i> are elaborated in the Range of Variables
1. Describe team's role and scope	1.1. The <b><i>role and objective of the team</i></b> is identified from available <b><i>sources of information</i></b> 1.2. Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources
2. Identify own role and responsibility within the team	2.1. Individual role and responsibilities within the team environment are identified 2.2. Roles and responsibility of other team members are identified and recognized 2.3. Reporting relationships within team and external to team are identified
3. Work as a team member	3.1. Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives 3.2. Effective and appropriate contributions made to complement team activities and objectives, based on individual skills and competencies and <b><i>workplace context</i></b> 3.3. Observed protocols in reporting using standard operating procedures 3.4. Contribute to the development of team work plans based on an understanding of team's role and objectives and individual competencies of the members.

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgment maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

## EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1. Operated in a team to complete workplace activity</li> <li>1.2. Worked effectively with others</li> <li>1.3. Conveyed information in written or oral form</li> <li>1.4. Selected and used appropriate workplace language</li> <li>1.5. Followed designated work plan for the job</li> <li>1.6. Reported outcomes</li> </ul>
<p>2. Underpinning knowledge</p>	<ul style="list-style-type: none"> <li>2.1. Communication process</li> <li>2.2. Team structure</li> <li>2.3. Team roles</li> <li>2.4. Group planning and decision making</li> </ul>
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> <li>3.1. Communicate appropriately, consistent with the culture of the workplace</li> </ul>
<p>4. Resource implications</p>	<p>The following resources <b>MUST</b> be provided:</p> <ul style="list-style-type: none"> <li>4.1. Access to relevant workplace or appropriately simulated environment where assessment can take place</li> <li>4.2. Materials relevant to the proposed activity or tasks</li> </ul>
<p>5. Method of assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> <li>5.1. Observation of the individual member in relation to the work activities of the group</li> <li>5.2. Observation of simulation and or role play involving the participation of individual member to the attainment of organizational goal</li> <li>5.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork</li> </ul>
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> <li>6.1. Competency may be assessed in workplace or in a simulated workplace setting</li> <li>6.2. Assessment shall be observed while task are being undertaken whether individually or in group</li> </ul>

**UNIT OF COMPETENCY : PRACTICE CAREER PROFESSIONALISM**

**UNIT CODE : 500311107**

**UNIT DESCRIPTOR :** This unit covers the knowledge, skills and attitudes in promoting career growth and advancement.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized terms</i> are elaborated in the Range of Variables
1. Integrate personal objectives with organizational goals	1.1 Personal growth and work plans are pursued towards improving the qualifications set for the profession 1.2 Intra- and interpersonal relationships <del>is</del> are maintained in the course of managing oneself based on performance <b>evaluation</b> 1.3 Commitment to the organization and its goal is demonstrated in the performance of duties
2. Set and meet work priorities	2.1 Competing demands are prioritized to achieve personal, team and organizational goals and objectives. 2.2 <b>Resources</b> are utilized efficiently and effectively to manage work priorities and commitments 2.3 Practices along economic use and maintenance of equipment and facilities are followed as per established procedures
3. Maintain professional growth and development	3.1 <b>Trainings and career opportunities</b> are identified and availed of based on job requirements 3.2 <b>Recognitions</b> are -sought/received and demonstrated as proof of career advancement 3.3 <b>Licenses and/or certifications</b> relevant to job and career are obtained and renewed

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Evaluation	1.1 Performance appraisal 1.2 Psychological profile 1.3 Aptitude tests
2. Resources	2.1 Human 2.2 Financial 2.3 Technology 2.3.1 Hardware 2.3.2 Software
3. Trainings and career opportunities	3.1 Participation in training programs 3.1.1 Technical 3.1.2 Supervisory 3.1.3 Managerial 3.1.4 Continuing education 3.2 Serving as resource persons in conferences and workshops
4. Recognitions	4.1 Recommendations 4.2 Citations 4.3 Certificate of appreciations 4.4 Commendations 4.5 Awards 4.6 Tangible and intangible rewards
5. Licenses and/or certifications	5.1 National certificates 5.2 Certificate of competency 5.3 Support level licenses 5.4 Professional licenses

## EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Attained job targets within key result areas (KRAs)</li> <li>1.2 Maintained intra and interpersonal relationship in the course of managing oneself based on performance evaluation</li> <li>1.3 Completed trainings and career opportunities which are based on the requirements of the industries</li> <li>1.4 Acquired and maintained licenses and/or certifications according to the requirement of the qualification</li> </ul>
<p>2. Underpinning knowledge</p>	<ul style="list-style-type: none"> <li>2.1 Work values and ethics (Code of Conduct, Code of Ethics, etc.)</li> <li>2.2 Company policies</li> <li>2.3 Company-operations, procedures and standards</li> <li>2.4 Fundamental rights at work including gender sensitivity</li> <li>2.5 Personal hygiene practices</li> </ul>
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> <li>3.1 Appropriate practice of personal hygiene</li> <li>3.2 Intra- and Interpersonal skills</li> <li>3.3 Communication skills</li> </ul>
<p>4. Resource implications</p>	<p>The following resources <b>MUST</b> be provided:</p> <ul style="list-style-type: none"> <li>4.1 Workplace or assessment location</li> <li>4.2 Case studies/scenarios</li> </ul>
<p>5. Method of assessment</p>	<p>Competency may be assessed through:</p> <ul style="list-style-type: none"> <li>5.1 Portfolio Assessment</li> <li>5.2 Interview</li> <li>5.3 Simulation/Role-plays</li> <li>5.4 Observation</li> <li>5.5 Third Party Reports</li> <li>5.6 Exams and Tests</li> </ul>
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> <li>6.1 Competency may be assessed in the work place or in a simulated work place setting</li> </ul>

**UNIT OF COMPETENCY : PRACTICE OCCUPATIONAL HEALTH AND SAFETY PROCEDURES**

**UNIT CODE : 500311108**

**UNIT DESCRIPTOR :** This unit covers the outcomes required to comply with regulatory and organizational requirements for occupational health and safety.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized terms</i> are elaborated in the Range of Variables
1. Identify hazards and risks	1.1 <b>Safety regulations</b> and workplace safety and hazard control practices and procedures are clarified and explained based on organization procedures 1.2 <b>Hazards/risks</b> in the workplace and their corresponding indicators are identified to minimize or eliminate risk to co-workers, workplace and environment in accordance with organization procedures 1.3 <b>Contingency measures</b> during workplace accidents, fire and other emergencies are recognized and established in accordance with organization procedures
2. Evaluate hazards and risks	2.1 Terms of maximum tolerable limits which when exceeded will result in harm or damage are identified based on threshold limit values (TLV) 2.2 Effects of the hazards are determined 2.3 OHS issues and/or concerns and identified safety hazards are reported to designated personnel in accordance with workplace requirements and relevant workplace OHS legislation
3. Control hazards and risks	3.1 Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace are consistently followed 3.2 Procedures for dealing with workplace accidents, fire and emergencies are followed in accordance with organization OHS policies 3.3 <b>Personal protective equipment (PPE)</b> is correctly used in accordance with organization OHS procedures and practices 3.4 Appropriate assistance is provided in the event of a workplace emergency in accordance with established organization protocol
4. Maintain OHS awareness	4.1 <b>Emergency-related drills and trainings</b> are participated in as per established organization guidelines and procedures 4.2 <b>OHS personal records</b> are completed and updated in accordance with workplace requirements

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Safety regulations	May include but are not limited to: <ol style="list-style-type: none"> <li>1.1 Clean air act</li> <li>1.2 Building code</li> <li>1.3 National electrical and fire safety codes</li> <li>1.4 Waste management statutes and rules</li> <li>1.5 Philippine occupational safety and health standards</li> <li>1.6 DOLE regulations on safety legal requirements</li> <li>1.7 ECC regulations</li> </ol>
2. Hazards / Risks	May include but are not limited to: <ol style="list-style-type: none"> <li>2.1 Physical hazards – impact, illumination, pressure, noise, vibration, temperature, radiation</li> <li>2.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects</li> <li>2.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors</li> <li>2.4 Ergonomics               <ul style="list-style-type: none"> <li>• Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles</li> <li>• Physiological factors – monotony, personal relationship, work out cycle</li> </ul> </li> </ol>
3. Contingency measures	May include but are not limited to: <ol style="list-style-type: none"> <li>3.1 Evacuation</li> <li>3.2 Isolation</li> <li>3.3 Decontamination</li> <li>3.4 (Calling designed) emergency personnel</li> </ol>
4. PPE	May include but are not limited to: <ol style="list-style-type: none"> <li>4.1 Mask</li> <li>4.2 Gloves</li> <li>4.3 Goggles</li> <li>4.4 Hair Net/cap/bonnet</li> <li>4.5 Face mask/shield</li> <li>4.6 Ear muffs</li> <li>4.7 Apron/Gown/coverall/jump suit</li> <li>4.8 Anti-static suits</li> </ol>

5. Emergency-related drills and training	5.1 Fire drill 5.2 Earthquake drill 5.3 Basic life support/cardio pulmonary resuscitation (CPR) 5.4 First aid 5.5 Spillage control 5.6 Decontamination of chemical and toxic 5.7 Disaster preparedness/management
6. OHS personal records	6.1 Medical/health records 6.2 Incident reports 6.3 Accident reports 6.4 OHS-related training completed

## EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Explained clearly established workplace safety and hazard control practices and procedures</li> <li>1.2 Identified hazards/risks in the workplace and its corresponding indicators in accordance with company procedures</li> <li>1.3 Recognized contingency measures during workplace accidents, fire and other emergencies</li> <li>1.4 Identified terms of maximum tolerable limits based on threshold limit value (TLV)</li> <li>1.5 Followed Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace</li> <li>1.6 Used Personal Protective Equipment (PPE) in accordance with company OHS procedures and practices</li> <li>1.7 Completed and updated OHS personal records in accordance with workplace requirements</li> </ul>
<p>2. Underpinning knowledge</p>	<ul style="list-style-type: none"> <li>.1.1. OHS procedures and practices and regulations</li> <li>.1.2. PPE types and uses</li> <li>.1.3. Personal hygiene practices</li> <li>.1.4. Hazards/risks identification and control</li> <li>.1.5. Threshold limit value (TLV)</li> <li>.1.6. OHS indicators</li> <li>.1.7. Organization safety and health protocol</li> <li>.1.8. Safety consciousness</li> <li>.1.9. Health consciousness</li> </ul>
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> <li>3.1 Practice of personal hygiene</li> <li>.2. Hazards/risks identification and control skills</li> <li>.3. Interpersonal skills</li> <li>3.4 Communication skills</li> </ul>
<p>4. Resource implications</p>	<p>The following resources <b>MUST</b> be provided:</p> <ul style="list-style-type: none"> <li>4.1 Workplace or assessment location</li> <li>4.2 OHS personal records</li> <li>4.3 PPE</li> <li>4.4 Health records</li> </ul>
<p>5. Method of assessment</p>	<p>Competency <b>MUST</b> be assessed through:</p> <ul style="list-style-type: none"> <li>5.1 Portfolio Assessment</li> <li>5.2 Interview</li> <li>5.3 Case Study/Situation</li> </ul>
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> <li>6.1 Competency may be assessed in the work place or in a simulated work place setting</li> </ul>

**COMMON COMPETENCIES  
(AUTOMOTIVE MANUFACTURING – ASSEMBLY)**

**UNIT OF COMPETENCY : PERFORM MENSURATION AND CALCULATION**

**UNIT CODE : ALT311202**

**UNIT DESCRIPTOR :** This unit covers the knowledge, skills and attitudes in measuring and calculating using tools and measuring instrument. It also covers caring for and handling of measuring instrument.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized terms</i> are elaborated in the Range of Variables
1. Select measuring instruments	1.1 Object or component to be measured is identified 1.2 Correct specifications are obtained from relevant source 1.3 Appropriate <b>measuring instrument</b> is selected according to job requirements
2. Carry out measurements and calculation	2.1 Measuring tools are selected in line with job requirements 2.2 Accurate measurements are obtained to job 2.3 <b>Calculation</b> needed to complete work tasks are performed using the four fundamental operation of addition (+), subtraction (-), multiplication (x) and division (/). 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks. 2.5 Numerical computation is self-checked and corrected for accuracy 2.6 Instruments are read to the limit of accuracy of the tool.
3. Maintain measuring instruments	3.1 Measuring instruments are kept free from corrosion 3.2 Measuring instruments are not dropped to avoid damage 3.3 Measuring instruments are cleaned before and after using.

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Measuring instruments	Measuring instruments includes: <ul style="list-style-type: none"> <li>1.1 Multitester</li> <li>1.2 Micrometer (In-out, depth)</li> <li>1.3 Vernier caliper (Out, inside)</li> <li>1.4 Dial gauge with Mag. Std.</li> <li>1.5 Plastigauge</li> <li>1.6 Straight edge</li> <li>1.7 Thickness gauge</li> <li>1.8 Torque gauge</li> <li>1.9 Small hole gauge</li> <li>1.10 Telescopic gauge</li> <li>1.11 Try square</li> <li>1.12 Protractor</li> <li>1.13 Combination gauge</li> <li>1.14 Steel rule</li> </ul>
2. Calculation	Includes calculation of the following: <ul style="list-style-type: none"> <li>2.1 Volume</li> <li>2.2 Area</li> <li>2.3 Displacement</li> <li>2.4 Inside diameter</li> <li>2.5 Circumference</li> <li>2.6 Length</li> <li>2.7 Thickness</li> <li>2.8 Outside diameter</li> <li>2.9 Taper</li> <li>2.10 Out of roundness</li> <li>2.11 Oil clearance</li> <li>2.12 End play/thrust clearance</li> </ul>

## EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Selected measuring instruments 1.2. Carried-out measurements and calculations. 1.3. Maintained measuring instruments
2. Underpinning knowledge	2.1 Types of measuring instruments and its uses 2.2 Safe handling procedures in using measuring instruments 2.3 Four fundamental operation of mathematics 2.2 Formula for volume, area, perimeter and other geometric figures
3. Underpinning skills	3.1 Caring and handling measuring instruments 3.2 Calibrating and using measuring instruments 3.3 Performing calculation by Addition, Subtraction, Multiplication and Division 3.4 Visualizing objects and shapes 3.5 Interpreting formula for volume, area, perimeter and other geometric figures
4. Resource implications	The following resources <b>MUST</b> be provided: 4.1 Workplace location 4.2 Measuring instrument appropriate to servicing processes 4.3 Instructional materials relevant to the propose activity
5. Method of assessment	Competency may be assessed through: 5.1 Observation with questioning 5.2 Written or oral examination 5.3 Interview 5.4 Demonstration with questioning
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be conducted in a workplace or simulated environment

**UNIT OF COMPETENCY:**     **READ, INTERPRET AND APPLY ENGINEERING DRAWINGS**

**UNIT CODE**                 **:**     **ALT742201**

**UNIT DESCRIPTOR**         **:**     This unit deals with identifying, interpreting and applying automotive mechanical assembly engineering manuals / specifications in accordance with requirements of the job.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	<i>Italicized</i> terms are elaborated in the Range of Variables
1. Identify and access engineering manuals / specifications	1.1 Appropriate <b>manuals</b> are identified and accessed as per job requirements. 1.2 Version and date of manual is checked to ensure correct specification and procedure are identified.
2. Interpret manuals	2.1 Relevant sections, chapters of manuals/specifications are located in relations to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance to industry practices
3. Apply information in manual	3.1 Manual is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer specification 3.3 Manual data is applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications
4. Store manuals	4.1 Manual or specification are stored appropriately to ensure prevention of damage, ready access and updating of information when required in accordance with company requirements

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Manuals	Kinds of manuals: 1.1 Manufacturer's specification manual 1.2 Vehicle assembly manual 1.3 Vehicle quality standard manual 1.4 Vehicle specification manual

## EVIDENCE GUIDE

1.Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified and accessed manual/specification 1.2 Interpreted manuals 1.3 Applied information in manuals 1.4 Stored manuals
12 Underpinning knowledge	2.1 Types of manuals used in automotive industry 2.2 Identification of symbols used in the manuals 3.1 Identification of units of measurements 3.2 Unit conversion
13 Underpinning skills	3.1.Reading and comprehension skills required to identify and interpret automotive manuals and specifications 3.2.Accessing information and data
14 Resource Implications	The following resources <b>MUST</b> be provided: 4.1. All manuals/catalogues relative to Automotive 4.2. Work order 4.3. Actual vehicle or simulator
15 Method of assessment	Competency <b>MUST</b> be assessed through: 5.1.Observation with questioning 5.2.Interview
16 Context of assessment	6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 6.2 Assessment may be conducted in the workplace or a simulated environment.

**UNIT OF COMPETENCY : MOVE AND POSITION VEHICLE**

**UNIT CODE : ALT723202**

**UNIT DESCRIPTOR :** This unit covers the knowledge, skills and attitude needed to move and position vehicle in a workshop before and after servicing.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized terms</i> are elaborated in the Range of Variables
1. Prepare vehicle for driving	1.1 <b>Check-up procedures</b> is performed based on vehicle manufacturer standard
2. Move and position vehicle	2.1 Select vehicle to be moved or re-position. 2.2 Drive the vehicle to appropriate location 2.3 Park vehicle following <b>parking safety techniques</b> and procedure
3. Check the vehicle	3.1 <b>Vehicle</b> position is checked as per required 3.2 Vehicle is checked for external damages

## RANGE OF VARIABLE

VARIABLE	RANGE
1. Check-up procedure	Check-up procedures include the following: 1.1 Oil level 1.2 Brake fluid 1.3 Clutch fluid 1.4 Coolant level 1.5 Battery (electrolyte) 1.6 Tire pressure 1.7 Position of driving gear 1.8 Lighting and warning devices
2. Vehicles	2.1 Vehicles with automatic transmission 2.2 Vehicles with manual transmission
3. Parking safety techniques	3.1 Engaging of park brake 3.2 Vehicle parking position 3.3 Front wheel position

## EVIDENCE GUIDE

1. Critical aspects of competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Prepared vehicle for driving.</li> <li>1.2 Moved and positioned vehicle</li> <li>1.3 Checked the vehicle.</li> </ul>
2. Underpinning knowledge and attitudes	<ul style="list-style-type: none"> <li>2.1 Driver's code of conduct</li> <li>2.2 Workshop signs and symbols</li> <li>2.3 Driving skills</li> <li>2.4 Vehicle accessories for safe driving and parking</li> </ul>
3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1 Ability to handle vehicle/maneuver vehicle the easiest way</li> <li>3.2 Immediate response to accident</li> <li>3.3 Preparing vehicle for driving</li> <li>3.4 Parking downhill, uphill, parallel</li> <li>3.5 Shifting gears</li> <li>3.6 Maneuvering</li> </ul>
4. Resource implications	<p>The following resources <b>MUST</b> be provided:</p> <ul style="list-style-type: none"> <li>4.1 Driving range/area</li> <li>4.2 Appropriate vehicle for driving</li> <li>4.3 Vehicle accessories</li> </ul>
5. Method of assessment	<p>Competency <b>MUST</b> be assessed through:</p> <ul style="list-style-type: none"> <li>5.1 Observation with questioning</li> <li>5.2 Written or oral examination</li> </ul>
6. Context of assessment	<ul style="list-style-type: none"> <li>6.1 Assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines</li> <li>6.2 Assessment of practical skills must be done in a workplace or simulated environment.</li> </ul>

**UNIT OF COMPETENCY :**      **APPLY APPROPRIATE SEALANT/ADHESIVE**

**UNIT CODE :**                      **ALT723201**

**UNIT DESCRIPTOR :**            This competency unit covers the selection and application of sealant/adhesives.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized</i> terms are elaborated in the Range of Variables
1. Identify appropriate sealant / adhesive	1.1 <b>Sealant/adhesive</b> is selected in line with job requirements and manufacturer's specification 1.2 <b>Sealant/adhesive checking</b> is performed to ensure that product is fit for use.
2. Prepare surface for sealant / adhesive application	2.1 Surface materials are identified as per construction 2.2 Surface is cleaned and free of moisture, dust and other foreign matters to ensure maximum adhesion or seal.
3. Apply Sealant / adhesive evenly	3.1 Sealant/adhesive is applied evenly on the surface in line with manufacturer's specification 3.2 Excess sealant/adhesive is removed by sanding or scrapping 3.3 <b>Tools and equipment</b> used to apply sealant/adhesive are appropriate to job requirements 3.6 <b>Safety</b> are observed and PPE are worn in accordance with industry SOP 3.7 <b>Hazards</b> associated with the use of sealant and adhesives are identified.
4. Store / Dispose of sealant / adhesive	4.1 Sealant/adhesive are stored as per prescribed procedure 4.2 Waste are disposed as per workshop SOP

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Sealant/Adhesive	Sealant/adhesive includes: 1.1 Form in Place Gasket (FIPG) 1.2 Ribbon Sealer 1.3 Hametite 1.4 Silicon Body sealer 1.5 Prestite for Auto and Auto Aircon
2. Adhesive/Sealant checking	Adhesive/Sealant checking includes: 2.1 Expiry date 2.2 Free of contamination 2.3 Cap/Covers 2.4 Tightly closed 2.5 Concentration
3. Tools and equipment	Tools and equipment include: 3.1 Putty knife 3.2 Scraper 3.3 Compressor 3.4 Steel brush 3.5 Paint brush 3.6 Rubber hammer 3.7 Hand tools Personal protective equipment include: 3.8 Gloves 3.9 Apron 3.10 Safety shoes 3.11 Goggles 3.12 Gas mask
4. Safety	Safety includes: 4.1 Ventilation 4.2 Handling of Flammable/Irritating substances 4.3 Use of Personal Protective Equipment
5. Hazards	Hazard includes: 5.1 Fumes 5.2 Skin irritation 5.3 Burns

## EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Identified appropriate sealant/adhesive 1.2 Prepared surface for sealant/adhesive 1.3 Applied sealant/adhesive 1.4 Stored unused or dispose of used sealant/adhesive
2. Underpinning knowledge and attitude	2.1 OH & S regulations 2.2 Safe handling of sealant/adhesive 2.3 Industry code of practice 2.3 Procedures in sealant/adhesive application 2.4 Procedures in interpreting manuals
3. Underpinning skills	3.1 Handling sealant/adhesive 3.2 Applying sealant/adhesive 3.3. Sanding the surface 3.4 Use of tools, equipment 3.5 Mixing of body filler and epoxy base and hardener
4. Resource implications	The following resources <b>MUST</b> be provided: 4.1 Materials relevant to the activity 4.2 Appropriate tools and equipment 4.3 Real or simulated workplace
5. Method of assessment	Competency <b>MUST</b> be assessed through 5.1 Observation with questioning 5.2 Interview related to: <ul style="list-style-type: none"> <li>• Safe and correct use of tools and equipment</li> <li>• Application of adhesive/sealant</li> </ul>
6. Context of assessment	6.1 Competency elements must be assessed in a safe working environment 6.2 Assessment may be done in a workplace or simulated environment

**UNIT OF COMPETENCY :**    **PERFORM SHOP MAINTENANCE**

**UNIT CODE**                                :    **ALT723205**

**UNIT DESCRIPTOR**                    :    This unit deals with inspecting and cleaning of work area including tools, equipment and facilities. Storage and checking of tools/equipment and disposal of used materials are also incorporated in this competency

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized</i> terms are elaborated in the Range of Variables
1. Inspect/clean tools and work area	.1.1 Cleaning solvent used as per workshop/tools <b><i>cleaning requirement</i></b>  1.2 <b><i>Work area</i></b> is checked and cleaned  1.3 Wet surface/spot in work area is wiped and dried
2. Store/arrange tools and shop equipment	1.5 Tools/equipment are checked and stored in their respective shelves/location  2.2 Corresponding labels are posted and visible  2.3 Tools are safely secured and logged in the records
3. Dispose wastes/used lubricants	3.1 Containers for used lubricants are visibly labeled  3.2 Wastes/used lubricants are disposed as per workshop SOP
4. Report damaged tools/equipment	4.1 Complete inventory of tools/equipment is maintained  4.2 Damaged tools/equipment/facilities are identified and repair recommendation is given  4.3 Reports prepared has no error/discrepancy

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Cleaning requirement	1.1 Cleaning solvent 1.2 Inventory of supplies, tools, equipment, facilities 1.3 List of mechanics/technicians 1.4 Rags 1.5 Broom 1.6 Map 1.7 Pail 1.8 Used oil container 1.9 Oiler 1.10 Dust/waste bin
2. Work Area	Work areas include: 2.1 Workshop areas for assembly of automotive vehicle and/or outdoor power equipment 2.2 Open workshop and enclosed, ventilated office area 2.3 Other variables may include workshop with: <ul style="list-style-type: none"> <li>• Mess hall</li> <li>• Wash room</li> <li>• Comfort room</li> </ul>

## EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: <ul style="list-style-type: none"> <li>1.1 Cleaned workshop tools/facilities</li> <li>1.2 Maintained equipment, tools and facilities</li> <li>1.3 Disposed wastes and used lubricants/fluid as per required procedure</li> </ul>
2. Underpinning knowledge and attitudes	<ul style="list-style-type: none"> <li>2.1 5S or TQM</li> <li>2.2 Service procedures</li> <li>2.3 Relevant technical information</li> <li>2.4 Safe handling of Equipment and tools</li> <li>2.5 Vehicle safety requirements</li> <li>2.6 Workshop policies</li> <li>2.7 Personal safety procedures</li> <li>2.8 Fire Extinguishers and prevention</li> <li>2.9 Storage/Disposal of Hazardous/flammable materials</li> <li>2.10 Positive Work Values (Perseverance, Honesty, Patience, Attention to Details)</li> </ul>
3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1 Handling/Storing of tools/equipment/supplies and material</li> <li>3.2 Cleaning grease/lubricants</li> <li>3.3 Disposing of wastes and fluid</li> <li>3.4 Preparing inventory of s/m and tools and equipment</li> <li>3.5 Monitoring of s/m and tools/equipment</li> </ul>
4. Resource implications	The following resources <b>MUST</b> be provided: <ul style="list-style-type: none"> <li>4.1 Workplace: Real or simulated work area</li> <li>4.2 Appropriate Tools &amp; equipment</li> <li>4.3 Materials relevant to the activity</li> </ul>
5. Method of assessment	Competency <b>MUST</b> be assessed through: <ul style="list-style-type: none"> <li>5.1 Written/Oral Questioning</li> <li>5.2 Demonstration</li> <li>5.3 Assessment of underpinning knowledge and practical skills may be combined.</li> </ul>
6. Context of assessment	<ul style="list-style-type: none"> <li>6.1 Competency must be assessed on the job or simulated environment.</li> <li>6.2 The assessment of practical skills must take place after a period of supervised practice and repetitive experience.</li> </ul>

## CORE COMPETENCIES

**UNIT OF COMPETENCY:** PERFORM PRE-TREATMENT AND CATHODIC ELECTRO-DEPOSITION PROCESS (CEDP) OPERATION

**UNIT CODE** : ALT827316

**UNIT DESCRIPTOR** : This unit identifies the knowledge, skills and attitudes required to perform pre-treatment and CEDP operation.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables
1. Prepare body shell for pre-treatment operation	1.1 <b>Tools</b> and <b>materials</b> are selected based on the requirements of the job. 1.2 <b>Body shell</b> is prepared for pre-treatment operation in accordance with company procedures 1.3 <b>Body shell</b> is inspected to ensure that it's 100% free from <b>defect and damage</b> .
2. Perform pre-treatment operation	2.1 Degreasing operation is performed in accordance with company standard operating procedures. 2.2 Phosphating operation is performed in accordance company standard operating procedure. 2.3 Excess phosphate is rinsed off in accordance with company standard operating procedure
3. Perform cathodic electro-deposition process (CEDP)	3.1 Cathodic electro-deposition process is performed in accordance company standard operating procedures 3.2 Painted main body shell is oven-baked in accordance company standard operating procedures. 3.3 Paint coat is checked to ensure compliance with company paint appearance and thickness requirements

**RANGE OF VARIABLES**

<b>VARIABLE</b>	<b>RANGE</b>
1. Tools	Tools and equipment for CEDP process include: 1.1 Pre-treatment dipping process equipment 1.2 Cathodic electro-deposition process equipment 1.3 Boiler and pump 1.4 Baking oven 1.5 Measuring instruments
2. Materials	2.1 EDP paint 2.2 Degreasing chemical 2.3 Phosphating chemical 2.4 D.I. water and raw water 2.5 Metal conditioner 2.6 Solvent naptha
3. Body shell	Vehicle body shell model 1.1 Passenger vehicle 1.2 Commercial vehicle 1.3 Light trucks
4. Damage	4.1 Metal scratches 4.2 Dents and excess metal 4.3 Rust formation 4.4 Air pocket

## EVIDENCE GUIDE

<p>1. Critical aspect of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Prepared shell body surface for pre-treatment operation</li> <li>1.2 Performed degreasing and phosphate application procedures</li> <li>1.3 Performed CEDP and met the standard paint coating appearance, paint thickness and hardness</li> </ul>
<p>2. Underpinning knowledge and attitude</p>	<ul style="list-style-type: none"> <li>2.1 Standard procedure of surface preparation</li> <li>2.2 Standard operation procedure of pre-treatment operation</li> <li>2.3 Chemical and material preparation</li> <li>2.4 Basic mathematics</li> <li>2.5 Standard operation procedure of CEDP</li> <li>2.6 Basic Chemistry</li> <li>2.7 Measuring instruments</li> <li>2.8 Equipment control data relevant to the operation</li> <li>2.9 Safety procedures</li> <li>2.10 Preventive maintenance of all equipment related to the operation</li> <li>2.11 Plan and organize work activities</li> <li>2.12 Honest and diligent worker</li> </ul>
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> <li>3.1 Operating the pre-treatment equipment</li> <li>3.3 Operating baking oven equipment</li> <li>3.4 Operating the CEDP equipment</li> <li>3.5 Preparation of chemicals</li> <li>3.6 Checking of chemical concentration and DI water conductivity</li> <li>3.7 Interpreting equipment control relevant to the operation</li> <li>3.8 Using measuring instruments</li> <li>3.9 Cleaning and maintaining equipment relevant to the operation</li> </ul>

<p>4. Resources implications</p>	<p>The following resources <b>MUST</b> be provided:</p> <ul style="list-style-type: none"> <li>4.1 Adequate working area to perform the tasks</li> <li>4.2 Pre-treatment equipment (hot water tank, degreasing tank, raw water and DI rinse tanks, surface conditioning tank, etc)</li> <li>4.3 Cathodic electro-deposition process equipment (paint tank, UF tank, etc.)</li> <li>4.4 Baking oven</li> <li>4.5 Materials relevant to the activity</li> <li>4.6 Measuring instruments</li> <li>4.7 Operating manuals and other relevant reference</li> <li>4.8 Personal protective equipment</li> </ul>
<p>5. Method of assessment</p>	<p>Competency <b>MUST</b> be assessed or measured through:</p> <ul style="list-style-type: none"> <li>5.1 Written examination</li> <li>5.2 Actual observation with questioning</li> </ul>
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> <li>6.1 Competency must be assessed in the workplace or in simulated work environment</li> <li>6.2 Competency assessment can be conducted while the activity is being performed.</li> </ul>

**UNIT OF COMPETENCY: PERFORM GRAY PRIMER (2<sup>nd</sup> Primer) APPLICATION PROCEDURES**

**UNIT CODE : ALT827317**

**UNIT DESCRIPTION :** This unit covers the knowledge, skills and attitudes required in the application of gray primer to ED body shell.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized</i> terms are elaborated in the Range of Variables
1. Perform under-body coating to the ED body shell.	1.1 Hand/air <b>tools</b> are selected based on the job requirement 1.2 Underbody is prepared for undercoating in accordance with company standard operating procedures 1.3 <b>Undercoating</b> is applied in accordance with company standard operating procedures 1.4 <b>Vehicle</b> is cleaned after undercoating application in accordance with company standard operating procedures. 1.5 ED body shell is checked for damage and other paint defects in accordance with company standard operating procedures 1.6 Corrective measures are undertaken to correct damage and other paint defects.
2. Install floor silencer	2.1 Floor silencer is selected in accordance with company standard operating procedures 2.2 Floor silencer is installed in accordance with company standard operating procedures
3. Apply drip and floor sealant	3.1 Surface is prepared for sealant application in accordance with company standard operating procedures 3.2 Sealant is applied based on the quality control guidelines and standards 3.3 Body shell is cleaned and excess sealants are removed in accordance with quality control guidelines and standards
4. Apply gray primer	4.1 Shell body is inspected for excess sealants and other paint defects in accordance with company standard operating procedures 4.2 Body shell is cleaned and prepared for <b>gray primer application</b> in accordance with company standard operating procedures. 4.3 Gray primer is mixed in accordance with standard ratio of paint and solvent 4.4 Gray primer is applied based on quality control standards of coating and spray patterns 4.5 Gray primer coat is checked for <b>damage and/or paint defects</b> and corrective measures are undertaken in accordance with company standard operating procedures
5. Bake the painted gray body shell	5.1 Baking oven equipment are checked and prepared in accordance with standard operating procedures 5.2 Body shell is baked as per company standard baking procedure 5.3 Baking temperature and baking time are monitored to ensure that the painted <i>body</i> surfaces are cured to the required hardness stated in the quality control standard 5.4 Baked gray primer <i>body</i> surfaces are inspected to ensure that they meet the required thickness and appearance as per quality control standard 5.5 Safety practices are Implemented in the workplace

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools	Tools and equipment includes but not limited to: 1.1 Sealer Gun 1.1.1. Floor Sealer Gun 1.1.2. Drip Sealer Gun 1.2 Sealer pump and underbody coating pump 1.3 High pressure spray gun and pressure tank 1.4 Baking oven and hot air blower 1.5 Spray booth with balance air velocity
2. Undercoating	2.1 Asphalt 2.2 PVC
3. Vehicle	1.1 Passenger car 1.2 Commercial vehicles and light trucks
4. Gray primer application	Gray primer application must consider the following: 4.1 Paint viscosity 4.2 Paint Pressure 4.3 Paint Injection Volume 4.4 Spray Pattern is performed based on the standard operating procedure 4.5 Number of coats is based on the company's standards
5. Damages and/or paint defects	5.1 Under baking/over baking of paint 5.2 Scratches, dirt, and dents 5.3 Orange peel appearance of Gray Primer 5.4 Uneven paint thickness 5.5 Poor application of floor and drip sealer 5.6 Improper installation of floor silencer and other materials needed in the operation

## EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Performed under body coating to ED shell</li> <li>1.2 Installed floor silencer</li> <li>1.3 Applied drip and floor sealant</li> <li>1.4 Applied gray primer</li> <li>1.5 Baked the painted gray body shell</li> </ul>
<p>2. Underpinning knowledge and attitude</p>	<ul style="list-style-type: none"> <li>2.1 Types and properties of sealants, undercoat and primer</li> <li>2.2 Procedures in the application of sealants, undercoat and primer</li> <li>2.3 Standard operating procedure of the company</li> <li>2.4 Equipment control standard</li> <li>2.5 Maintenance and cleaning procedure of equipment related to the operation</li> <li>2.6 Safety standard</li> <li>2.7 Communication and interpretation of operational information</li> <li>2.8 Honest and industrious worker</li> <li>2.9 Plan and organize work activities</li> </ul>
<p>3. Underpinning skills</p>	<ul style="list-style-type: none"> <li>3.1 Operating the floor sealer and drip sealer gun</li> <li>3.2 Operating body lifter and underbody spray gun</li> <li>3.3 Cleaning and maintaining tools equipment used in gray primer application</li> <li>3.4 Operating baking oven</li> <li>3.5 Rectifying paint defects of ED Primer or 1<sup>st</sup> Primer</li> </ul>
<p>4. Resource implications</p>	<p>The following resources <b>MUST</b> be provided:</p> <ul style="list-style-type: none"> <li>4.1 Adequate working area needed in the operation</li> <li>4.2 Tools and equipment (sealer gun, high pressure spray gun, pressure tank, lifter, and pump, etc.)</li> <li>4.3 Vehicle protection equipment</li> <li>4.4 Baking oven and spray booth with balanced air velocity</li> <li>4.5 Paint and other materials relevant to the operation</li> <li>4.6 Standard operation manuals</li> <li>4.7 Personal protective equipment</li> </ul>
<p>5. Method of assessment</p>	<p>Competency <b>MUST</b> be assessed through:</p> <ul style="list-style-type: none"> <li>5.1 Written and oral examination</li> <li>5.2 Actual observation with questioning</li> </ul>
<p>6. Context of assessment</p>	<ul style="list-style-type: none"> <li>6.1 Competency assessment is conducted while the activities are being performed</li> <li>6.2 Assessment may be conducted at work or in simulated workplace environment</li> </ul>

**UNIT OF COMPETENCY: PERFORM TOP COAT APPLICATION PROCEDURES****UNIT CODE : ALT827318****UNIT DESCRIPTOR :** This unit covers the knowledge, skills and attitudes required to apply top coating (final coating) to vehicle body shell.

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> <i>Italicized</i> terms are elaborated in the Range of Variables
1. Perform wet sanding of gray primer body shell	1.1 Gray primer body shell is inspected and defects to be rectified are labeled as per company standard operating procedures. 1.2 <b>Vehicle</b> is prepared for wet sanding as per company standard operating procedures 1.3 Wet sanding is performed using pneumatic polisher as per company standard operating procedures. 1.4 Vehicle is rinsed and dried as per company standard operating procedures.
2. Apply top coat	2.1 <b>Tools and equipment</b> are prepared in accordance with job requirements 2.2 Gray body shell cleaned and prepared for top coat application based on company standard operation procedure 2.3 Paint is selected and/or mixed based on job requirements and company standard operation procedure 2.4 Top coat is applied based on the standard number of coating and spray pattern technique provided by the company 2.5 Applied top coat is checked for compliance with requirements
3. Bake the top coated body shell	3.1 Top coated body shell is baked to the required hardness and in accordance with company standard operating procedures 3.2 Top coated body shells are inspected to ensure that they meet the required appearance and thickness as per quality control standard
4. Perform top coat rectification procedures	4.1 <b>Painting defects</b> are identified and marked to ensure the correct method of repair 4.2 Painting defects are rectified and baked based on the required standard of the company 4.3 Repainted surfaces are polished and cleaned to ensure that they show no signs of defects and that they meet the quality standard for paint rectification

## RANGE OF VARIABLES

VARIABLE	RANGE
1. Vehicle	1.1 Passenger car 1.2 Commercial vehicle and light trucks
2. Tools and equipment	2.1 Spray booth with balance air velocity (air handling unit) 2.2 Baking oven and hot air blower 2.3 Pressure tank with agitator and heavy duty spray gun 2.4 Automatic conveyor 2.5 Pneumatic polisher
3. Defects and damages	3.1 Solvent popping of paint 3.2 Mottling and orange peel appearance 3.3 Dirt, sag, and scratch 3.4 Under/ over bake of paint 3.5 Poor gloss and low paint thickness

## EVIDENCE GUIDE

<p>1. Critical aspect of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 Performed wet sanding gray primer body shells</li> <li>1.2 Applied top coat</li> <li>1.3 Baked top coated body shells</li> <li>1.4 Rectified top coat defects</li> </ul>
<p>2. Underpinning knowledge and attitude</p>	<ul style="list-style-type: none"> <li>2.1 Surface preparation procedures</li> <li>2.2 Paint types and their application procedures</li> <li>2.3 Standard operating procedure and standard quality control of the company</li> <li>2.4 Equipment control and operating standard</li> <li>2.5 Painting defects and procedures in rectifying defects</li> <li>2.6 Plan and organize work activities</li> <li>2.5 Communicate and interpret operational information</li> <li>2.6 Safety standard</li> <li>2.7 Industrious and diligent worker</li> </ul>
<p>3. Underpinning skill</p>	<ul style="list-style-type: none"> <li>3.1 Operating the pneumatic sanding polisher</li> <li>3.2 Operating the baking oven, dry-off, and the automatic oven conveyor</li> <li>3.3 Performing the spray patterns technique</li> <li>3.4 Maintaining and cleaning surface preparation and painting tools and equipment</li> <li>3.5 Designing counter measures to solve minor paint defects</li> </ul>
<p>4. Resource implications</p>	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> <li>4.1 Adequate working area needed in the operation</li> <li>4.2 Tools and equipment (pneumatic sanding polisher, baking oven, drying oven, spray booth with balanced air velocity, pressure tank, heavy duty spray gun, infra-red portable oven, etc.)</li> <li>4.3 Vehicle protection equipment</li> <li>4.4 Materials relevant to the activity (materials, solvent, TAC rag, varnish, and different grits of sand paper)</li> <li>4.5 Standard operation manuals</li> <li>4.7 Personal protective equipment</li> </ul>
<p>5. Method of Assessment</p>	<ul style="list-style-type: none"> <li>5.1 Actual observation with questioning</li> <li>5.2 Written examination</li> </ul>
<p>6. Context of Assessment</p>	<ul style="list-style-type: none"> <li>6.1 Competency must be assessed in the workplace or in simulated work environment</li> <li>6.2 Competency assessment can be conducted while the activity is being performed.</li> </ul>

## SECTION 3 TRAINING STANDARDS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for PAINTING MACHINE OPERATION NC II

### 3.1 CURRICULUM DESIGN

Course Title: **PAINTING MACHINE OPERATION NC II**

NC Level **NC II**

Nominal Training Duration: **18 Hours** (Basic Competencies)  
**20 Hours** (Common Competencies)  
**140 Hours** (Core Competencies)

Course Description:

This course is designed to enhance the knowledge, skills and attitudes of an individual in the field of automotive manufacturing in accordance with industry standards. It covers competencies to perform cathodic electro-deposition process operations; perform gray primer (2<sup>nd</sup> primer) application procedures; and perform top coat application procedures in accordance with manufacturer's specification.

To obtain this, all units prescribed for this qualification must be achieved.

### BASIC COMPETENCIES (18 Hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Participate in workplace communication	1.1 Obtain and convey workplace information 1.2 Complete relevant work related documents 1.3 Participate in workplace meeting and discussion	<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Interaction</li> <li>• Lecture</li> <li>• Reportorial</li> </ul>	<ul style="list-style-type: none"> <li>• Written test</li> <li>• Practical/ performance test</li> <li>• Interview</li> </ul>
2. Work in a team environment	2.1 Describe and identify team role and responsibility in a team. 2.2 Describe work as a team member.	<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Case studies</li> <li>• Simulation</li> </ul>	<ul style="list-style-type: none"> <li>• Written test</li> <li>• Observation</li> <li>• Simulation</li> <li>• Role playing</li> </ul>
3. Practice career professionalism	3.1 Integrate personal objectives with organizational goals 3.2 Set and meet work problems 3.3 Maintain professional growth and development	<ul style="list-style-type: none"> <li>• Interactive lecture</li> <li>• Structure activity</li> <li>• Simulation</li> <li>• Demonstration</li> <li>• Self-paced instruction</li> </ul>	<ul style="list-style-type: none"> <li>• Role play</li> <li>• Interview</li> <li>• Written examination</li> </ul>
4. Practice occupational health and safety	4.1 Evaluate hazards and risks 4.2 Control hazards and risks 4.3 Maintain occupational health and safety awareness	<ul style="list-style-type: none"> <li>• Interactive lecture</li> <li>• Simulation</li> <li>• Symposium</li> <li>• Group dynamics</li> <li>• Film viewing</li> </ul>	<ul style="list-style-type: none"> <li>• Situational analysis</li> <li>• Interview</li> <li>• Practical examination</li> <li>• Written exam</li> <li>• Portfolio assessment</li> </ul>

## COMMON COMPETENCIES (20 Hours)

Unit of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Perform mensuration and calculation	1.1 Select measuring instruments 1.2 Carry out measurements and calculation 1.3 Maintain measuring instruments	<ul style="list-style-type: none"> <li>• Lecture/ Demonstration</li> <li>• Practical exercises</li> <li>• Simulation</li> </ul>	<ul style="list-style-type: none"> <li>• Written test</li> <li>• Oral questioning</li> <li>• Direct observation</li> </ul>
2. Read, interpret and apply engineering manuals/specifications	2.1 Identify/access engineering manuals / specification 2.2 Interpret manual 2.3 Apply information in manual 2.4 Store manuals	<ul style="list-style-type: none"> <li>• Lecture/ Demonstration</li> <li>• Dual training</li> </ul>	<ul style="list-style-type: none"> <li>• Direct observation</li> <li>• Interview</li> </ul>
3. Move and position vehicle	3.1 Prepare vehicle for driving 3.2 Move and position vehicle 3.3 Check the vehicle	<ul style="list-style-type: none"> <li>• Lecture/ Demonstration</li> <li>• Practical exercises</li> <li>• Simulation</li> </ul>	<ul style="list-style-type: none"> <li>• Written test</li> <li>• Oral questioning</li> <li>• Direct observation</li> </ul>
4. Apply appropriate sealant/adhesive	4.1 Identify appropriate sealant/ adhesive 4.2 Prepare surface for sealant / adhesive application 4.3 Store unused and dispose used sealant/adhesive	<ul style="list-style-type: none"> <li>• Lecture/ Demonstration</li> <li>• Dual training</li> <li>• Distance learning</li> </ul>	<ul style="list-style-type: none"> <li>• Written test</li> <li>• Oral questioning</li> <li>• Direct observation</li> <li>• Interview</li> <li>• Project method</li> </ul>
5. Perform shop maintenance	5.1 Inspect/clean tools and work area 5.2 Store/arrange tools and shop equipment 5.3 Dispose waste/used lubricants 5.4 Report damaged tools/equipment	<ul style="list-style-type: none"> <li>• Lecture/ Demonstration</li> <li>• Dual training</li> <li>• Self-paced (modular)</li> </ul>	<ul style="list-style-type: none"> <li>• Written test</li> <li>• Direct observation</li> <li>• Interview</li> <li>• Practical exercises</li> </ul>

## CORE COMPETENCIES (140Hours)

Units of Competency	Learning Outcomes	Methodology	Assessment Approach
1. Perform pre-treatment and Cathodic Electro-deposition process operation	1.1 Prepare surface for operation of pre-treatment and CEDP 1.2 Pre-Treatment Operation 1.3 CEDP Operation	• Actual Training	• Observation • Written examination
2. Perform Gray Primer (2 <sup>nd</sup> Primer) application procedures	2.1 Perform Under body coating (asphalt or PVC) to the ED body shell 2.2 Apply Drip sealer and Floor Sealer 2.3 Install Floor Silencer 2.4 Perform Gray Primer Application 2.5 Bake Gray Primer Body Surface	• Actual Training	• Observation • Written examination
3. Perform Top coat application procedures	3.1 Perform wet sanding operation of the gray primer body surface 3.2 Perform top coat application 3.3 Baking top coated body surface 3.4 Perform Top coat paint rectification	• Actual Training	• Observation • Written examination

### 3.2 TRAINING DELIVERY

The delivery of training should adhere to the design of the curriculum. Delivery should be guided by the 10 basic principles of competency-based TVET.

- The training is based on curriculum developed from the competency standards;
- Learning is modular in its structure;
- Training delivery is learner-centered and should accommodate individualized and self-paced learning strategies;
- Training is based on work that must be performed;
- Training materials are directly related to the competency standards and the curriculum modules;
- Assessment is based in the collection of evidence of the performance of work to the industry required standard;
- Training is based on and off-the-job components;
- Allows for recognition of prior learning (RPL) or current competencies;
- Training allows for multiple entry and exit; and
- Approved training programs are nationally accredited.

The competency-based TVET system recognizes various types of delivery modes, both on and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities may be adopted when designing training programs:

- The dualized mode of training delivery is preferred and recommended. Thus programs would contain both in-school and in-industry training or fieldwork components. Details can be referred to the Dual Training System (DTS) Implementing Rules and Regulations.
- Modular/self-paced learning is a competency-based training modality wherein the trainee is allowed to progress at his own pace. The trainer facilitates the training delivery
- Peer teaching/mentoring is a training modality wherein fast learners are given the opportunity to assist the slow learners.
- Supervised industry training or on-the-job training is an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations.
- Distance learning is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, or audio, video or computer technologies.
- Project-Based Instruction is an authentic instructional model or strategy in which students plan, implement and evaluate projects that have real world applications.

### 3.3 TRAINEE ENTRY REQUIREMENTS

Trainees or students should possess the following requirements:

- can communicate both oral and written;
- physically and mentally fit; and
- with good moral character

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

### 3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS PAINTING MACHINE OPERATION NC II

Recommended list of tools, equipment and materials for the training of 15 trainees for Painting Machine Operation NC II

TOOLS		EQUIPMENT		MATERIALS	
QTY		QTY		QTY	
2 units	Wire brush	2 units	Oil free compressor boiler	20 L.	TSA Paint (Baking type)
4 units	Pneumatic Sanding Pousher	1 unit	Boiler	20 L.	Base coat paint
2 units	Vibrator Sander	2 units	Air Handling equipment	20 L.	Clear coat
6 units	Heavy duty spray gun	3 units	Vehicle (Bare metal)	20 L.	Polyester gray primer
5 units	Spray gun with cup	1 set	Pre-treatment equipment	40 L.	TSA paint reducer
6 pcs.	Sanding rubber block	3 units	Baking oven	40 L.	Base coat reducer
2 units	Sealer gun	1 set	Electro Deposition Process Equipment	40 L.	Clear reducer

1 unit	Undercoat spray gun	3 units	Oven (baking)	20 L.	Solvent Naptha
2 unit	Impact gun	1 unit	Infra-red Dry-off oven	20 L.	Acrylic Thinner (air dry)
4 unit	Paint pousher	1 unit	Body lifter	20 L.	Sealer material
2 unit	Ford cup #4	5 units	Pressure tank	1 drum	Undercoat material
15 pcs.	Rubber Glove	10 units	Mixing tank	1 sack	Fine cleaner (Degreasing chemical)
				1 sack	PALBOND(Phosphating chemical)
				3 L.	Paint (for rectification)
				10 pcs.	Fender packing
				20 L.	Kerosene
				1 Gal.	TAC rag varnish
				3 sets	Floor silencer material
				2 L.	Polishing compound
				30 pcs.	Sandpaper (assorted grit) Grit # 1200 Grit # 600 Grit # 400 Grit # 360 Grit # 280 Grit # 180
				2 kls.	White rag (de hilo)

### 3.5 TRAINING FACILITIES PAINTING MACHINE OPERATION NC II

Based on a class size of 15 students/trainees

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
• Building (permanent)	26.00 x 28.00	728.00	728.00
• Trainee Working Space	3.50 x 3.50 per student/trainee	12.25 per student	306.00
• Lecture Room	9.00 x 10.00	90.00	90.00
• Learning Resource Center	5.00 x 8.00	40.00	40.00
• Facilities/ Equipment/ Circulation Area	-	-	291.75

### 3.6 TRAINER'S QUALIFICATIONS FOR AUTOMOTIVE SECTOR MANUFACTURING SUB-SECTOR

#### PAINTING MACHINE OPERATION NC II TRAINER QUALIFICATION (TQ II)

- Must be a holder of Painting Machine Operation NC II
- Must have undergone training on Training Methodology II (TM II)
- Must be computer literate
- Must be physically and mentally fit
- \*Must have at least 2 years job/industry experience
- Must be a civil service eligible (for government position or appropriate professional license issued by the Professional Regulatory Commission)

\* Optional. Only when required by the hiring institution.  
Reference: TESDA Board Resolution No. 2004 03

### 3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

## **SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS**

4.1. To attain the National Qualification of PAINTING MACHINE OPERATION NC II, the candidate must demonstrate competence in all the units listed in Section 1. Successful candidates shall be awarded a National Certificate signed by the TESDA Director General.

4.2 The qualification of Painting Machine Operation NC II may be attained through:

4.2.1 Accumulation of Certificates of Competency (COCs) in all the following areas:

4.2.1.1 Perform pre-treatment and Cathodic electro-deposition process procedures

4.2.1.2 Perform gray primer (2<sup>nd</sup> primer) application procedures

4.2.1.3 Perform top coat application procedures

4.3 Assessment shall focus on the core units of competency. The basic and common units shall be integrated or assessed concurrently with the core units.

4.4 The following are qualified to apply for assessment and certification:

1.1.1 Graduates of formal, non-formal and informal including enterprise-based training programs.

1.1.2 Experienced workers (wage employed or self-employed)

4.5 The guidelines on assessment and certification are discussed in detail in the Procedures Manual on Assessment and Certification and Guidelines on the Implementation of the Philippine TVET Qualification and Certification System (PTQCS).

**COMPETENCY MAP- AUTOMOTIVE SECTOR  
MANUFACTURING SUB SECTOR  
(ASSEMBLY)**

**PAINTING MACHINE OPERATION NC II**

<b>CORE COMPETENCIES</b>	Install/Fit out Electrical Parts to Engine Assembly	Install/Fit out Electronic Units to Body Interior Components	Install/Fit out Electrical Parts & Electronic Units to Dash Board Instrument Panel	Install/Fit out Electrical Parts to Exterior and Engine Compartment	Install/Fit out Audio and Video Systems	Perform Headlight Focus Aiming Operation	
	Assemble Mechanical Assemblies Using Jigs/ Fixtures	Mount/ Install Brake Fuel System	Mount/ Install Suspension Drive System	Mount/ Install Power Drive System	Install/Fit Trim Parts/Components	Perform Final Engine Run	Perform Wheel Alignment Operation
	Perform pre-treatment and Cathodic Electro-deposition process procedures	Perform Gray Primer (2 <sup>nd</sup> Primer) application procedures	Perform Top coat application procedures				
	Perform welding and brazing application	Perform tinsmith operation					

<b>COMMON COMPETENCIES</b>	Perform Mensuration and Calculation	Read, Interpret and Apply Engineering Drawings	Move and Position Vehicle	Apply Appropriate Sealant/Adhesives	Perform Shop Maintenance
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<b>BASIC COMPETENCIES</b>	Receive and respond workplace communication	Work with Other	Demonstrate work values	Practice basic housekeeping procedures	Lead in workplace communication	Develop and practice negotiation skills	Use relevant technologies	Solve workplace problems related to work activities
	Participate in workplace communication	Work in team environment	Practice career professionalism	Practice occupational health and safety procedures	Lead small Team	Use mathematical concepts and techniques	Develop team and individual	Apply problem solving techniques in the workplace
	Plan and organize work	Utilize specialist communication skills						

Legend:

PAINTING MACHINE OPERATION NC II

## DEFINITION OF TERMS

- 1. Air velocity**            **Air velocity** is the speed of air inside the painting spray booth.
- 2. Asphalt undercoat**   **Asphalt undercoat** is the use of seal consisting of a coating of a tar or rubber like material on the underbody of a motor vehicle to retard corrosion.
- 3. Baking oven**            The **baking oven** is the equipment used to dry paint in order to attain the standard paint hardness.
- 4. Cathodic electro-deposition process**    The **CEDP** or **Cathodic Electro-Deposition Process** is the process of immersing the unit into the ED tank of paint to highly prevent corrosion. It is also done to attain the superior paint coating up to the hidden/innermost portions of the unit.
- 5. De-ionized water**        **De-ionized water** is [water](#) that lacks [ions](#), such as [cations](#) from [sodium](#), [calcium](#), [iron](#), [copper](#) and [anions](#) such as [chloride](#) and [bromide](#). This means it has been purified from all other ions except  $H_3O^+$  and  $OH^-$ , but it may still contain other non-ionic types of impurities such as organic compounds. This type of water is produced using an [ion exchange](#) process. De-ionized water is similar to [distilled water](#), in that it is useful for [scientific experiments](#) where the presence of impurities may be undesirable.
- 6. Degreasing**            **Degreasing** is the process of removing grease or oil and other foreign matter on the body surface.
- 7. Filter cloth**            A **filter cloth** is the material used to eliminate foreign matter such as dirt on the paint material.
- 8. Floor silencer**        The **floor silencer** is a material used to reduce sound, noise, and underbody vibration of the unit.
- 9. Ford cup # 4**            The **Ford Cup # 4** is an instrument used to measure the paint viscosity.
- 10. Lacquer thinner**        **Lacquer thinner** is used to dilute, dissolve and clean up lacquer products. Typically too caustic for oil paints, lacquer thinner is often used for removing inks on metal, and adhesive residue from a variety of surfaces. Lacquer thinner is very strong and rapidly deteriorates many surfaces and fabrics. Always test in a small inconspicuous area before applying too liberally on a large surface.
- 11. Naptha solvent**        **Naptha Solvent** is Any of several highly volatile, flammable liquid mixtures of hydrocarbons distilled from petroleum, coal tar, and natural gas and used as fuel, as solvents, and in making various chemicals.
- 12. Painting**            **Painting** is the process, art, or occupation of coating surfaces with paint for a utilitarian or artistic effect.

- 13. Paint reducer**      **Paint reducer** is used in paint mixing to attain the required viscosity.
- 14. Paint viscosity**      **Paint Viscosity** is the condition or property of paint to be viscous; the resistance of paint to shear forces (and hence to flow).
- 15. Phosphate application**      **Phosphate application** is done to make phosphate serve as the base for coating and make it an integral part of metal. It also provides adhesion and coating flexibility. It also increases the resistance to corrosion.
- 16. Pneumatic polisher**      A **pneumatic polisher** is an instrument activated by air pressure. It is the hand tool used in wet sanding operation of the gray primer.
- 17. Polishing compound**      The **polishing compound** is the material used to smoothen the paint applied to increase the glossy appearance of the top coat paint.
- 18. Pressure tank**      A **pressure tank** is a closed cylindrical steel container designed to store water under pressure. It is an equipment supplied with air pressure that is designed to contain paint used in painting application.
- 19. Primer paint**      **Primer Paint** is the first or preliminary coat of paint or size applied to a surface.
- 20. Sealer**      A **sealer** seals, as an undercoat of paint or varnish used to size a surface. It is also a kind of sealing material that is used to form a hard coating on a porous surface (as a coat of paint or varnish used to size a surface).
- 21. Spray booth**      **Spray Booth** means a power-ventilated structure that encloses or accommodates a spraying operation so that spray vapour and residue can be controlled and exhausted.
- 22. Spray gun**      The **spray gun** is a an applicator resembling a gun for applying liquid substances (as paint) in the form of a spray
- 23. Thermocouple**      A **thermocouple** is a thermoelectric device used to measure temperatures accurately, especially one consisting of two dissimilar metals joined so that a potential difference generated between the points of contact is a measure of the temperature difference between the points.
- 24. Wet sanding**      **Wet sanding** is a painting process wherein the gray primer is sanded with a pneumatic polisher and water.

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