

CONTENT STANDARD 1.0: IDENTIFY AND UTILIZE SAFETY PROCEDURES AND PROPER TOOLS**Performance Standard 1.1: General Lab Safety Rules and Procedures**

- 1.1.1 Describe general shop safety rules and procedures (i.e., safety test).
- 1.1.2 Utilize safe procedures for handling of tools and equipment.
- 1.1.3 Identify and use proper placement of floor jacks and jack stands.
- 1.1.4 Identify and use proper procedures for safe vehicle lift operation.
- 1.1.5 Utilize proper ventilation procedures for working within the lab/shop area.
- 1.1.6 Identify marked safety areas.
- 1.1.7 Identify the location and the types of fire extinguishers and other fire safety equipment.
- 1.1.8 Demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment.
- 1.1.9 Identify the location and use of eye wash stations.
- 1.1.10 Identify the location of the posted evacuation routes.
- 1.1.11 Comply with the required use of PPE during lab/shop activities.
- 1.1.12 Identify and wear appropriate clothing for lab/shop activities.
- 1.1.13 Secure hair and jewelry for lab/shop activities.
- 1.1.14 Research safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
- 1.1.15 Research safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.)
- 1.1.16 Locate and interpret safety data sheets (SDS).

Performance Standard 1.2: Identify and Utilize Proper Tools

- 1.2.1 Identify tools and their usage in automotive applications.
- 1.2.2 Identify standard and metric designation.
- 1.2.3 Demonstrate safe handling and use of appropriate tools.
- 1.2.4 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
- 1.2.5 Demonstrate proper use of precision measuring tools (e.g., tram gauges, mil thickness gauge).

CONTENT STANDARD 2.0: INVESTIGATE INDUSTRY CAREERS**Performance Standard 2.1: Explore Careers**

- 2.1.1 Research the different career opportunities in the transportation career path.
- 2.1.2 Investigate new and emerging vehicle technologies and trends.

CONTENT STANDARD 3.0: DEMONSTRATE DAMAGE ANALYSIS, ESTIMATING, AND CUSTOMER SERVICE SKILLS**Performance Standard 3.1: Identify Vehicle Construction and Parts**

- 3.1.1 Identify type of vehicle construction (space frame, auto body, body-over-frame).
- 3.1.2 Recognize the different damage characteristics of space frame, uni-body, and body-over-frame vehicles.
- 3.1.3 Identify impact energy absorbing components.
- 3.1.4 Identify steel types; determine reparability.
- 3.1.5 Identify aluminum/magnesium components; determine reparability.
- 3.1.6 Identify plastic/composite components; determine reparability.
- 3.1.7 Identify vehicle glass components and repair/replacement procedures.
- 3.1.8 Identify add-on accessories.

Performance Standard 3.2: Perform Damage Analysis

- 3.2.1 Position the vehicle for inspection.
- 3.2.2 Prepare vehicle for inspection by providing access to damaged areas.
- 3.2.3 Analyze damage to determine appropriate methods for overall repairs.
- 3.2.4 Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.
- 3.2.5 Gather details of the incident/accident necessary to determine the full extent of vehicle damage.
- 3.2.6 Identify and record pre-existing damage.
- 3.2.7 Identify and record prior repairs.
- 3.2.8 Perform visual inspection of structural components and members.
- 3.2.9 Identify structural damage using measuring tools and equipment.
- 3.2.10 Perform visual inspection of non-structural components and members.
- 3.2.11 Determine parts, components, material type(s) and procedures necessary for a proper repair.
- 3.2.12 Identify type and condition of finish; determine if refinishing is required.
- 3.2.13 Identify suspension, electrical, and mechanical component physical damage.
- 3.2.14 Identify safety systems physical damage.
- 3.2.15 Identify interior component damage.
- 3.2.16 Identify damage to add-on accessories and modifications.
- 3.2.17 Identify single (one time) use components.

Performance Standard 3.3: Demonstrate Estimating Procedures

- 3.3.1 Determine and record customer/vehicle owner information.
- 3.3.2 Identify and record vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.
- 3.3.3 Identify and record vehicle options, including trim level, paint code, transmission, accessories, and modifications.
- 3.3.4 Identify safety systems; determine replacement items.
- 3.3.5 Apply appropriate estimating and parts nomenclature (terminology).

- 3.3.6 Determine and apply appropriate estimating sequence.
- 3.3.7 Utilize estimating guide procedure pages.
- 3.3.8 Apply estimating guide footnotes and headnotes as needed.
- 3.3.9 Estimate labor value for operations requiring judgment.
- 3.3.10 Select appropriate labor value for each operation (structural, non-structural, mechanical, and refinish).
- 3.3.11 Select and price OEM parts; verify availability, compatibility, and condition.
- 3.3.12 Select and price alternative/optional OEM parts; verify availability, compatibility and condition.
- 3.3.13 Select and price aftermarket parts; verify availability, compatibility, and condition.
- 3.3.14 Select and price recyclable/used parts; verify availability, compatibility and condition.
- 3.3.15 Select and price remanufactured, rebuilt, and reconditioned parts; verify availability, compatibility and condition.
- 3.3.16 Determine price and source of necessary sublet operations.
- 3.3.17 Determine labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items.
- 3.3.18 Recognize and apply overlap deductions, included operations, and additions.
- 3.3.19 Determine additional material and charges.
- 3.3.20 Determine refinishing material and charges.
- 3.3.21 Apply math skills to establish charges and totals.
- 3.3.22 Interpret computer-assisted and manually written estimates; verify the information is current.
- 3.3.23 Identify procedural differences between computer-assisted systems and manually written estimates.
- 3.3.24 Identify procedures to restore corrosion protection; establish labor values, and material charges.
- 3.3.25 Determine the cost effectiveness of the repair and determine the approximate vehicle retail, and repair value.
- 3.3.26 Recognize the differences in estimation procedures when using different information provider systems.
- 3.3.27 Verify accuracy of estimate compared to the actual repair and replacement operations.
- 3.3.28 Demonstrate ability to access OEM repair information.

Performance Standard 3.4: Demonstrate Customer Relations and Sales Skills

- 3.4.1 Acknowledge and/or greet customer/client.
- 3.4.2 Listen to customer/client; collect information and identify customers/client's concerns, needs and expectations.
- 3.4.3 Establish cooperative attitude with customer/client.
- 3.4.4 Identify yourself to customer/client; offer assistance.
- 3.4.5 Resolve customer/client conflicts.
- 3.4.6 Identify customer/client preferred communication method; follow up to keep customer/client informed about parts and the repair process.
- 3.4.7 Recognize basic claims handling procedures; explain to customer/client.

- 3.4.8 Project positive attitude and professional appearance.
- 3.4.9 Provide and review warranty information.
- 3.4.10 Estimate and explain duration of out-of-service time.
- 3.4.11 Apply negotiation skills to obtain a mutual agreement.
- 3.4.12 Interpret and explain manual or computer-assisted estimate to customer/client.

CONTENT STANDARD 4.0: PERFORM NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR (BODY COMPONENTS)

Performance Standard 4.1: Demonstrate Inspection and Preparation Techniques

- 4.1.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
- 4.1.2 Inspect, remove, label, store, and reinstall exterior trim and moldings.
- 4.1.3 Inspect, remove, label, store, and reinstall interior trim and components.
- 4.1.4 Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
- 4.1.5 Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
- 4.1.6 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
- 4.1.7 Soap and water wash entire vehicle; complete pre-repair inspection checklist.
- 4.1.8 Prepare damaged area using water-based and solvent-based cleaners.
- 4.1.9 Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
- 4.1.10 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
- 4.1.11 Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
- 4.1.12 Inspect restraint system mounting areas for damage; repair as needed.
- 4.1.13 Verify proper operation of seatbelt.

Performance Standard 4.2: Perform Outer Body Panel Repair, Replacement, and Adjustments

- 4.2.1 Review damage report and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
- 4.2.2 Inspect, remove, label, store, and reinstall exterior trim and moldings.
- 4.2.3 Inspect, remove, label, store, and reinstall interior trim and components.
- 4.2.4 Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
- 4.2.5 Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
- 4.2.6 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
- 4.2.7 Soap and water wash entire vehicle; complete pre-repair inspection checklist.
- 4.2.8 Prepare damaged area using water-based and solvent-based cleaners.

- 4.2.9 Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
- 4.2.10 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
- 4.2.11 Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
- 4.2.12 Inspect restraint system mounting areas for damage; repair as needed.
- 4.2.13 Verify proper operation of seatbelt.
- 4.2.14 Identify one-time use fasteners.
- 4.2.15 Clean, inspect, and prepare reusable fasteners.

Performance Standard 4.3: Apply Metal Finishing and Body Filling Techniques

- 4.3.1 Remove paint from the damaged area of a body panel.
- 4.3.2 Locate and repair surface irregularities on a damaged body panel.
- 4.3.3 Demonstrate hammer and dolly techniques.
- 4.3.4 Heat shrink stretched panel areas to proper contour.
- 4.3.5 Cold shrink stretched panel areas to proper contour.
- 4.3.6 Prepare and apply body filler.
- 4.3.7 Identify different types of body fillers.
- 4.3.8 Rough sand body filler to contour; finish sand.

Performance Standard 4.4: Inspect Moveable Glass and Hardware Components

- 4.4.1 Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.
- 4.4.2 Inspect, adjust, repair, remove, reinstall or replace weather-stripping.
- 4.4.3 Cycle electrical components as needed.

Performance Standard 4.5: Perform Metal Welding and Cutting Techniques

- 4.5.1 Identify weldable and non-weldable substrates used in vehicle construction.
- 4.5.2 Weld and cut high-strength steel and other steels (plasma, oxy fuel).
- 4.5.3 Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.
- 4.5.4 Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
- 4.5.5 Store, handle, and install high-pressure gas cylinders.
- 4.5.6 Determine work clamp (ground) location and attach.
- 4.5.7 Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.
- 4.5.8 Protect adjacent panels, glass, vehicle interior, etc. from welding and cutting operations.
- 4.5.9 Protect computers and other electronic control modules during welding procedures.
- 4.5.10 Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if recommended, clamp or tack as required.
- 4.5.11 Determine the joint type (butt weld with backing, lap, etc.) for weld being made.

- 4.5.12 Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation.
- 4.5.13 Perform the following welds: continuous, plug, butt weld with and without backing, fillet, etc.
- 4.5.14 Perform visual and destructive tests on each weld type.
- 4.5.15 Identify the causes of various welding defects; make necessary adjustments.
- 4.5.16 Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.
- 4.5.17 Identify different methods of attaching non-structural components squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.

Performance Standards 4.6: Utilize Plastic and Adhesives

- 4.6.1 Identify the types of plastics; determine reparability.
- 4.6.2 Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.
- 4.6.3 Demonstrate one-sided, two-sided, and tab repair.
- 4.6.4 Repair rigid, semi-rigid, or flexible plastic panels.
- 4.6.5 Remove or repair damaged areas from rigid exterior composite panels.
- 4.6.6 Replace bonded rigid exterior composite body panels; straighten or align panel supports.
- 4.6.7 Demonstrate the proper cleanup procedures for specific adhesives.

CONTENT PERFORMANCE 5.0: PERFORM STRUCTURAL ANALYSIS AND DAMAGE REPAIR

Performance Standards 5.1: Demonstrate Inspection and Repair Techniques

- 5.1.1 Measure and diagnose structural damage using a tram gauge.
- 5.1.2 Attach vehicle to anchoring devices.
- 5.1.3 Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
- 5.1.4 Analyze and identify crush/collapse zones.
- 5.1.5 Restore mounting and anchoring locations.
- 5.1.6 Check for water leaks, dust leaks, and wind noise.
- 5.1.7 Perform visual inspection and measuring checks to identify steering and suspension collision damage.
- 5.1.8 Reinstall wheels and torque lug nuts.

CONTENT STANDARDS 6.0: DEMONSTRATE PAINTING AND REFINISHING TECHNIQUES

Performance Standards 6.1: Apply Safety Precautions

- 6.1.1 Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
- 6.1.2 Identify safety and personal health hazards according to OSHA guidelines and the "Right to Know Law".
- 6.1.3 Inspect spray environment and equipment to ensure compliance with federal, state and local regulations, and for safety and cleanliness hazards.
- 6.1.4 Select and use a NIOSH approved air purifying respirator. Inspect condition and ensure fit and

operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.

6.1.5 Select and use a NIOSH approved supplied air (Fresh Air Make-up) respirator system. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.

6.1.6 Select and use appropriate PPE.

Performance standards 6.2: Utilize Surface Preparation Techniques

- 6.2.1 Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation.
- 6.2.2 Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants.
- 6.2.3 Inspect and identify type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system.
- 6.2.4 Strip paint to bare substrate (paint removal).
- 6.2.5 Dry or wet sand areas to be refinished.
- 6.2.6 Featheredge areas to be refinished.
- 6.2.7 Apply suitable metal treatment or primer in accordance with total product systems.
- 6.2.8 Mask and protect other areas that will not be refinished.
- 6.2.9 Mix primer, primer-surface or primer-sealer.
- 6.2.10 Identify a complimentary color or shade of undercoat to improve coverage.
- 6.2.11 Apply primer onto surface of repaired area.
- 6.2.12 Apply two-component finishing filler to minor surface imperfections.
- 6.2.13 Block sand area to which primer-surface has been applied.
- 6.2.14 Dry sand area to which finishing filler has been applied.
- 6.2.15 Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
- 6.2.16 Clean area to be refinished using a final cleaning solution.
- 6.2.17 Remove, with a tack rag, any dust or lint particles from the area to be refinished.
- 6.2.18 Apply suitable sealer to the area being refinished.
- 6.2.19 Scuff sand to remove nibs or imperfections from a sealer.
- 6.2.20 Apply stone chip resistant coating.
- 6.2.21 Restore caulking and seam sealers to repaired areas.
- 6.2.22 Prepare adjacent panels for blending.
- 6.2.23 Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials needed, preparation, and refinishing procedures.
- 6.2.24 Identify metal parts to be refinished; determine the materials needed, preparation, and refinishing procedures.

Performance Standards 6.3: Perform Spray Gun and Related Equipment Operations

- 6.3.1 Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).

- 6.3.2 Select spray gun and setup (fluid needle, nozzle, and cap) for product being applied.
- 6.3.3 Test and adjust spray gun using fluid, air, and pattern control valves.
- 6.3.4 Demonstrate an understanding of the operation of spray equipment.

Performance Standards 6.4: Utilize Paint Mixing, Matching, and Application

- 6.4.1 Identify color code by manufacturer's vehicle information label.
- 6.4.2 Shake, stir, reduce, catalyze/activate, and strain refinish materials.
- 6.4.3 Apply finish using appropriate spray techniques (gun arc, angle, distance, travel speed, and spray pattern overlap) for the finish being applied.
- 6.4.4 Demonstrate a let-down panel; check for color match.
- 6.4.5 Apply single stage topcoat.
- 6.4.6 Apply basecoat/clear coat for panel blending and panel refinishing.
- 6.4.7 Apply basecoat/clear coat for overall refinishing.
- 6.4.8 Remove nibs or imperfections from basecoat.
- 6.4.9 Refinish rigid or semi-rigid plastic parts.
- 6.4.10 Refinish flexible plastic parts.
- 6.4.11 Demonstrate knowledge of multi-stage coats for panel blending and overall refinishing.
- 6.4.12 Identify and mix paint using a formula.
- 6.4.13 Identify poor hiding colors; determine necessary action.
- 6.4.14 Tint color using formula to achieve a bendable match.
- 6.4.15 Identify alternative color formula to achieve a bendable match.
- 6.4.16 Identify the materials equipment, and preparation differences between solvent and waterborne technologies.

Performance Standards 6.5: Identify Paint Defects—Causes and Cures

- 6.5.1 Identify blistering (raising of the paint surface, air entrapment); determine the cause(s) and correct the condition.
- 6.5.2 Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition.
- 6.5.3 Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s) and correct the condition.
- 6.5.4 Identify lifting; determine the cause(s) and correct the condition.
- 6.5.5 Identify clouding (mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.
- 6.5.6 Identify orange peel; determine the cause(s) and correct the condition.
- 6.5.7 Identify overspray; determine the cause(s) and correct the condition.
- 6.5.8 Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition.
- 6.5.9 Identify sags and runs in paint surface; determine the cause(s) and correct the condition.
- 6.5.10 Identify sanding marks or sand scratch swelling; determine the cause(s) and correct the

condition.

- 6.5.11 Identify contour mapping/edge mapping while finish is drying; determine the cause(s) and correct the condition.
- 6.5.12 Identify color difference (off-shade); determine the cause(s) and correct the condition.
- 6.5.13 Identify tape tracking; determine the cause(s) and correct the condition.
- 6.5.14 Identify low gloss condition; determine the cause(s) and correct the condition.
- 6.5.15 Identify poor adhesion; determine the cause(s) and correct the condition.
- 6.5.16 Identify paint cracking (shrinking, splitting, crow's feet or line-checking, micro-checking, etc.); determine the cause(s) and correct the condition.
- 6.5.17 Identify corrosion; determine the cause(s) and correct the condition.
- 6.5.18 Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition.
- 6.5.19 Identify water spotting; determine the cause(s) and correct the condition.
- 6.5.20 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
- 6.5.21 Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition.
- 6.5.22 Identify die-back conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.
- 6.5.23 Identify chalking (oxidation); determine the cause(s) and correct the condition.
- 6.5.24 Identify bleed-through (staining); determine the cause(s) and correct the condition.
- 6.5.25 Identify pin-holing; determine the cause(s) and correct the condition.
- 6.5.26 Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.
- 6.5.27 Identify pigment flotation (color change through film build); determine the cause(s) and correct the condition.

Performance Standards 6.6: Perform Detail Procedures

- 6.6.1 Apply decals, transfers, tapes, pinstripes (painted and taped), etc.
- 6.6.2 Sand, buff and polish fresh or existing finish to remove defects as required.
- 6.6.3 Clean interior, exterior, and glass.
- 6.6.4 Clean body openings (door jambs and edges, etc.)
- 6.6.5 Remove overspray.
- 6.6.6 Perform vehicle clean-up; complete quality control using a checklist.