

# 2024 AUTOMOTIVE COLLISION REPAIR

## Program Standards

### CONTENT STANDARD 1.0: PROFESSIONAL ORGANIZATIONS AND LEADERSHIP

Performance Standard 1.1: Student Leadership in Career Technical Student Organizations (CTSO) and Professional Associations

- 1.1.1 Explore the role of professional organizations and/or associations in the Automotive Collision and Repair Industry.
- 1.1.2 Define the value, role, and opportunities provided through career technical student organizations.
- 1.1.3 Engage in career exploration and leadership development.

### CONTENT STANDARD 2.0: CAREERS

Performance Standard 2.1: Explore Careers

- 2.1.1 Describe the career opportunities and career paths in the transportation industry and the automotive collision repair industry.
- 2.1.2 Identify educational and credential requirements for career pathways in the industry.
- 2.1.3 Research new and emerging vehicle technologies and trends.

### CONTENT STANDARD 3.0: SAFETY PROCEDURES AND PROPER TOOLS

Performance Standard 3.1: General Lab Safety Rules and Procedures

- 3.1.1 Describe general lab/shop safety rules and procedures (i.e., safety test).
- 3.1.2 Identify general lab/shop safety hazards.
- 3.1.3 Describe the use and placement of floor jacks and jack stands.
- 3.1.4 Identify and use proper procedures for safe vehicle lift operation.
- 3.1.5 Describe proper ventilation procedures for working within the lab/shop area.
- 3.1.6 Describe marked safety areas.
- 3.1.7 Identify the location and the types of fire extinguishers and other fire safety equipment.
- 3.1.8 Describe the procedures for using fire extinguishers and other fire safety equipment.
- 3.1.9 Describe the location and use of eye wash stations.
- 3.1.10 Identify the location of the posted evacuation routes.
- 3.1.11 Comply with the required use of personal protective equipment (PPE) during lab/shop activities.
- 3.1.12 Wear appropriate clothing for lab/shop activities.
- 3.1.13 Secure hair and jewelry for lab/shop activities.
- 3.1.14 Describe safety aspects of supplemental restraint systems (SRS), Advanced Driver Assistance Systems (ADAS), hybrid vehicles, alternative fuel vehicles, electric vehicles, and high-voltage circuits.
- 3.1.15 Describe the location and purpose of safety data sheets (SDS).

Performance Standard 3.2: Tool Identification, Use, and Safety

- 3.2.1 Identify the correct tool for a specific application or repair.
- 3.2.2 Describe whether a tool or repair uses standard or metric designation.
- 3.2.3 Demonstrate safe handling and use of tools.
- 3.2.4 Describe the need for cleaning, storing, maintaining, and removing (i.e., lockout/tagout) tools and equipment.
- 3.2.5 Demonstrate use of precision measuring tools (e.g., tram gauges, mil thickness gauge) and when they should be used.

### CONTENT STANDARD 4.0: DAMAGE ANALYSIS, ESTIMATING, AND CUSTOMER SERVICE

#### Performance Standard 4.1: Vehicle Construction and Parts

- 4.1.1 Identify type of vehicle construction (i.e., unibody, body-on-frame).
- 4.1.2 Compare the different damage characteristics of unibody, and body-on-frame vehicles.
- 4.1.3 Identify impact energy absorbing components.
- 4.1.4 Identify damage to types of steel; determine reparability.
- 4.1.5 Identify damage to aluminum/magnesium components; determine reparability.
- 4.1.6 Identify damage to plastic/composite components; determine reparability.
- 4.1.7 Identify damage to vehicle glass components and repair or replacement procedures.
- 4.1.8 Identify damage to add-on accessories.

#### Performance Standard 4.2: Damage Analysis

- 4.2.1 Visually inspect vehicle to determine the extent of damage, (i.e., pre-repair scan).
- 4.2.2 Access original equipment manufacturer (OEM) repair procedures and recommended repair methods.
- 4.2.3 Identify one-time use components.
- 4.2.4 Determine the direction, point(s) of impact, and extent of direct, indirect, and inertia damage.
- 4.2.5 Gather details of the incident/accident necessary to determine the full extent of vehicle damage (i.e., interior, exterior, mechanical).
- 4.2.6 Document pre-existing damage to the vehicle and prior repairs.
- 4.2.7 Disassemble a vehicle for repair planning (i.e., blueprinting).
- 4.2.8 Identify structural damage, using measuring tools and equipment.
- 4.2.9 Perform visual inspection of structural and non-structural components.
- 4.2.10 Determine parts, components, material type(s), and procedures necessary for repair.

#### Performance Standard 4.3: Estimating Procedures

- 4.3.1 Document customer (i.e., vehicle owner) information.
- 4.3.2 Document vehicle identification number (VIN) information, including nation of origin, make, model, restraint system, body type, production date, engine type, and assembly plant.
- 4.3.3 Soap and water wash entire vehicle.
- 4.3.4 Complete a pre-repair inspection checklist.
- 4.3.5 Document vehicle options, including trim level, paint code, transmission, accessories, and modifications.
- 4.3.6 Identify safety systems, determining replacement items.
- 4.3.7 Apply estimating and parts nomenclature (i.e., terminology).
- 4.3.8 Describe the estimating sequence.
- 4.3.9 Apply estimating guide footnotes and headnotes as needed.
- 4.3.10 Estimate labor price for each operation prescribed (e.g., structural, non-structural, mechanical, refinish).
- 4.3.11 Select and price OEM, aftermarket, used, and remanufactured parts; verify availability, compatibility, and condition.
- 4.3.12 Calculate price and source of necessary sublet operations.
- 4.3.13 Calculate labor value, prices, charges, allowances, or fees for non-included operations and miscellaneous items.
- 4.3.14 Apply labor overlap deductions, included operations, and additions.
- 4.3.15 Determine additional material and charges (e.g., adhesives, corrosion protection, hardware).
- 4.3.16 Determine refinishing material and charges.
- 4.3.17 Estimate repair, using estimating guide procedure pages (i.e., P-pages).
- 4.3.18 Identify industry standard software used to create estimates.
- 4.3.19 Determine the cost effectiveness of the repair by assessing the approximate vehicle value and repair value.

**Performance Standard 4.4: Customer Relations and Sales Skills**

- 4.4.1 Greet the customer and determine needs, concerns, and expectations, remaining responsive and cooperative throughout the service.
- 4.4.2 Determine preferred customer communication methods.
- 4.4.3 Describe basic claims-handling procedures to the customer.
- 4.4.4 Describe warranty information to the customer.
- 4.4.5 Estimate the time that the vehicle will be out-of-service.
- 4.4.6 Describe estimate details to the customer.

**CONTENT STANDARD 5.0: NON-STRUCTURAL ANALYSIS AND DAMAGE REPAIR (BODY COMPONENTS)**

**Performance Standard 5.1: Outer Body Panel Repair, Replacement, and Adjustments**

- 5.1.1 Analyze damage, according to the damage report, to determine appropriate methods for overall repair.
- 5.1.2 Document a repair plan.
- 5.1.3 Inspect, remove, label, store, and reinstall exterior trim and moldings.
- 5.1.4 Inspect, remove, label, store, and reinstall interior trim and components.
- 5.1.5 Inspect, remove, label, store, and reinstall body panels and components that may interfere with or be damaged during repair.
- 5.1.6 Inspect, remove, label, store, and reinstall vehicle mechanical and electrical components that may interfere with or be damaged during repair.
- 5.1.7 Protect panels, glass, interior parts, and other vehicles adjacent to the repair area.
- 5.1.8 Prepare damaged area using water-based and solvent-based cleaners.
- 5.1.9 Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
- 5.1.10 Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
- 5.1.11 Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
- 5.1.12 Inspect restraint system mounting areas for damage; repair as needed.
- 5.1.13 Test and verify proper operation of seatbelt.
- 5.1.14 Clean, inspect, and prepare reusable fasteners.

**Performance Standard 5.2: Metal Finishing and Body Filling Techniques**

- 5.2.1 Identify substrate, determining the best repair method.
- 5.2.2 Repair surface irregularities on a damaged body panel.
- 5.2.3 Demonstrate hammer-and-dolly techniques and shrinking techniques.
- 5.2.4 Demonstrate glue tab pulling techniques.
- 5.2.5 Prepare surface per OEM specifications.
- 5.2.6 Identify various types of body fillers.
- 5.2.7 Prepare and apply body filler.
- 5.2.8 Rough sand body filler to contour and finish sand.

**Performance Standard 5.3: Moveable Glass and Hardware Components**

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

**Performance Standard 5.4: Metal Welding and Cutting Techniques**

- 5.4.1 Identify weldable and non-weldable substrates used in vehicle construction.
- 5.4.2 Weld and cut high-strength steel and other steels (e.g., plasma).
- 5.4.3 Determine the correct GMAW (MIG) welder type, electrode/wire type, diameter, and gas to be used in a specific welding situation.
- 5.4.4 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 that will be welded.

- 5.4.5 Store, handle, and install high-pressure gas cylinders.
- 5.4.6 Determine work clamp (ground) location and attach.
- 5.4.7 Perform welds in the flat, horizontal, vertical, and overhead positions, using the proper angle of the gun to the joint and direction of gun travel per weld type.
- 5.4.8 Protect adjacent panels, glass, and vehicle interior from welding and cutting operations.
- 5.4.9 Protect computers and other electronic control modules during welding procedures.
- 5.4.10 Clean and prepare the metal that will be welded, assure good metal fit-up, apply weld-through primer if recommended, clamp or tack as required.
- 5.4.11 Determine the best joint type (e.g., butt weld with backing, lap) for various welds.
- 5.4.12 Determine the type of weld (e.g., continuous, stitch weld, plug) for each specific welding operation.
- 5.4.13 Perform the following welds: continuous, plug, butt weld with and without backing, and fillet.
- 5.4.14 Perform visual and destructive tests on each weld type.
- 5.4.15 Identify the causes of various welding defects, making necessary adjustments.
- 5.4.16 Identify cause of contact tip burn-back and failure of wire to feed, making necessary adjustments.
- 5.4.17 Identify different methods of attaching non-structural components (e.g., squeeze-type resistant spot welds [STRSW], riveting/rivet bonding, adhesive, silicon bronze).

#### Performance Standards 5.5: Plastic and Adhesives

- 5.5.1 Identify the types of plastics; determine repairability and procedures.
- 5.5.2 Clean and prepare the surface of plastic parts.
- 5.5.3 Demonstrate one-sided, two-sided, and tab repair, using adhesive and nitrogen welding.
- 5.5.4 Repair rigid, semi-rigid, or flexible plastic panels.
- 5.5.5 Remove or repair damaged areas from rigid exterior composite panels.
- 5.5.6 Demonstrate the proper cleanup procedures for specific adhesives.

### CONTENT STANDARD 6.0: STRUCTURAL ANALYSIS

#### Performance Standards 6.1: Inspection and Repair Techniques

- 6.1.1 Describe diagnostic techniques for structural damage.
- 6.1.2 Describe how vehicles are attached to anchoring devices and subsequent restoration of anchoring locations.
- 6.1.3 Describe the extent of the direct and indirect damage and the direction of impact.
- 6.1.4 Document the methods and sequence of structural repair.
- 6.1.5 Identify crush/collapse zones.
- 6.1.6 Identify steering and suspension collision damage.

### CONTENT STANDARD 7.0: PAINTING AND REFINISHING TECHNIQUES

#### Performance Standards 7.1: Safety Precautions

- 7.1.1 Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
- 7.1.2 Identify safety and personal health hazards according to the Occupational Safety and Health Administration (OSHA) guidelines and the "Right to Know Law."
- 7.1.3 Inspect spray environment and equipment to ensure compliance with federal, state, and local regulations, and for safety and cleanliness hazards.
- 7.1.4 Describe the procedures for safely using a National Institute for Occupational Safety and Health (NIOSH) approved air purifying respirator.
- 7.1.5 Describe procedures for safely using a NIOSH approved supplied air (i.e., fresh air make-up) respirator system.
- 7.1.6 Perform maintenance on respirators in accordance with OSHA regulation and applicable state and local regulations.
- 7.1.7 Select and use appropriate PPE in the painting and refinishing environment.

#### Performance Standard 7.2: Surface Preparation Techniques

- 7.2.1 Inspect, remove, store, and replace exterior trim and components necessary for surface preparation.
- 7.2.2 Wash with soap and water the entire vehicle, using appropriate cleaner to remove contaminants.
- 7.2.3 Identify type of finish, surface condition, and film thickness.
- 7.2.4 Develop a plan for refinishing, using a total product system.
- 7.2.5 Strip paint to bare substrate (i.e., paint removal).
- 7.2.6 Dry sand or wet sand areas to be refinished.
- 7.2.7 Featheredge areas to be refinished.
- 7.2.8 Apply suitable metal treatment or primer in accordance with total product systems.
- 7.2.9 Mask and protect other areas that will not be refinished.
- 7.2.10 Identify types of primers and appropriate application (e.g., UV, urethane, epoxy).
- 7.2.11 Mix primer-surfacer or primer-sealer.
- 7.2.12 Identify a complementary color or shade of undercoat to improve coverage.
- 7.2.13 Apply primer to surface of repaired area.
- 7.2.14 Apply two-component finishing filler to minor surface imperfections.
- 7.2.15 Block sand area to which primer-surface has been applied.
- 7.2.16 Dry sand area to which finishing filler has been applied.
- 7.2.17 Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
- 7.2.18 Clean area to be refinished, using a final cleaning solution.
- 7.2.19 Remove, with a tack rag, any dust or lint particles from the area to be refinished.
- 7.2.20 Apply suitable sealer to the area being refinished.
- 7.2.21 Scuff sand to remove nibs or imperfections from a sealer.
- 7.2.22 Apply stone chip-resistant coating.
- 7.2.23 Restore caulking and seam sealers to repaired areas.
- 7.2.24 Prepare adjacent panels for blending.
- 7.2.25 Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished, determining the materials needed, preparation, and refinishing procedures.
- 7.2.26 Identify metal parts to be refinished, determining the materials needed, preparation, and refinishing procedures.

#### Performance Standards 7.3: Spray Gun and Related Equipment Operations

- 7.3.1 Inspect, clean, and determine the condition of spray guns and related equipment (e.g., air hoses, regulators, air lines, air source) in the spray environment.
- 7.3.2 Select spray gun and setup (e.g., fluid needle, nozzle, cap) for applied product.
- 7.3.3 Test and adjust spray gun, using fluid, air, and pattern control valves.
- 7.3.4 Demonstrate the operation of spray equipment.

#### Performance Standards 7.4: Paint Mixing, Matching, and Application

- 7.4.1 Identify color code by manufacturer's vehicle information label.
- 7.4.2 Shake, stir, reduce, catalyze/activate, and strain refinish materials.
- 7.4.3 Apply finish, using appropriate spray techniques (e.g., gun arc, angle, distance, travel speed, spray pattern overlap) for the applied finish.
- 7.4.4 Create sprayout panel and check for color match.
- 7.4.5 Apply single-stage topcoat.
- 7.4.6 Apply basecoat/clear coat for panel blending and panel refinishing.
- 7.4.7 Apply basecoat/clear coat for overall refinishing.
- 7.4.8 Remove nibs or imperfections from basecoat.
- 7.4.9 Refinish flexible plastic parts.
- 7.4.10 Demonstrate knowledge of multi-stage coats for panel blending and overall refinishing.
- 7.4.11 Create letdown panel for multi-stage finishes.
- 7.4.12 Mix paint, using a formula.
- 7.4.13 Identify poor hiding colors, determining necessary action.

- 7.4.14 Identify alternative color formula to achieve a blended match (e.g., color chips, spectrophotometers).
- 7.4.15 Identify the materials equipment and the preparation differences between solvent and waterborne technologies.

#### Performance Standards 7.5: Paint Defects—Causes and Cures

- 7.5.1 Identify methods to prevent paint defects (e.g., booth maintenance, air compressor maintenance, employee cleanliness, vehicle cleanliness).
- 7.5.2 Identify blistering (i.e., raising of the paint surface, air entrapment); determine the cause(s) and correct the condition.
- 7.5.3 Identify a dry spray appearance in the paint surface; determine the cause(s) and correct the condition.
- 7.5.4 Identify the presence of fish-eyes (i.e., crater-like openings) in the finish; determine the cause(s) and correct the condition.
- 7.5.5 Identify lifting; determine the cause(s) and correct the condition.
- 7.5.6 Identify clouding (i.e., mottling and streaking in metallic finishes); determine the cause(s) and correct the condition.
- 7.5.7 Identify orange peel; determine the cause(s) and correct the condition.
- 7.5.8 Identify overspray; determine the cause(s) and correct the condition.
- 7.5.9 Identify solvent popping in freshly painted surface; determine the cause(s) and correct the condition.
- 7.5.10 Identify sags and runs in paint surface; determine the cause(s) and correct the condition.
- 7.5.11 Identify sanding marks or sand scratch swelling; determine the cause(s) and correct the condition.
- 7.5.12 Identify contour mapping/edge mapping while finish is drying; determine the cause(s) and correct the condition.
- 7.5.13 Identify color difference (i.e., off-shade); determine the cause(s) and correct the condition.
- 7.5.14 Identify tape tracking; determine the cause(s) and correct the condition.
- 7.5.15 Identify low-gloss condition; determine the cause(s) and correct the condition.
- 7.5.16 Identify poor adhesion; determine the cause(s) and correct the condition.
- 7.5.17 Identify paint cracking (e.g., shrinking, splitting, crow's feet or line-checking, micro-checking); determine the cause(s) and correct the condition.
- 7.5.18 Identify corrosion; determine the cause(s) and correct the condition.
- 7.5.19 Identify dirt or dust in the paint surface; determine the cause(s) and correct the condition.
- 7.5.20 Identify water spotting; determine the cause(s) and correct the condition.
- 7.5.21 Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
- 7.5.22 Identify finish damage caused by airborne contaminants (e.g., acids, soot, rail dust, other industrial-related causes); correct the condition.
- 7.5.23 Identify die-back conditions (i.e., dulling of the paint film showing haziness); determine the cause(s) and correct the condition.
- 7.5.24 Identify chalking (i.e., oxidation); determine the cause(s) and correct the condition.
- 7.5.25 Identify bleed-through (i.e., staining); determine the cause(s) and correct the condition.
- 7.5.26 Identify pin-holing; determine the cause(s) and correct the condition.
- 7.5.27 Identify buffing-related imperfections (e.g., swirl marks, wheel burns); correct the condition.

#### CONTENT STANDARD 8.0: REASSEMBLY AND TESTING

##### Performance Standard 8.1: Predelivery Process

- 8.1.1 Reapply corrosion protection per OEM recommendations (e.g., cavity wax, undercoat, seam sealer, thin-film technology).



- 8.1.2 Demonstrate reassembly procedures and test and verify systems (e.g., lighting, windows, doors, safety sensors).
- 8.1.3 Describe ADAS system check per OEM recommendations.
- 8.1.4 Describe post-scan and determine recalibrations.
- 8.1.5 Check for water leaks, dust leaks, and wind noise.
- 8.1.6 Torque lug nuts to OEM specifications if wheel was removed.

**CONTENT STANDARD 9.0: DETAILING**

**Performance Standards 9.1: Detail Procedures**

- 9.1.1 Apply decals, transfers, tapes, and pinstripes.
- 9.1.2 Sand, buff, and polish fresh or existing finish to remove defects, as required.
- 9.1.3 Clean interior, exterior, and glass.
- 9.1.4 Clean body openings (e.g., door jambs, edges).
- 9.1.5 Remove overspray.
- 9.1.6 Perform vehicle cleanup.
- 9.1.7 Complete quality control, using a checklist.

## IDCTE Document Control Information

**Program Standard Revision: TI Automotive Collision Repair**

Date	Standard #	Original	Summary of Change	Revised By	Approved By