# Auto Collision Standards and Skills

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## Health & Safety Standards

### Standard 1: Safety and Health in the Automotive Collision Repair Environment

Students will be able to demonstrate health and safety practices in a shop environment, including the management and maintenance of equipment and tools, use of personal protective equipment (PPE), and personal safety practices.

* Aligned Industry Recognized Credentials: OSHA10 – General Industry

#### Skills:

1. Apply safety procedures when using all pneumatic, electric, and gas tools.
2. Use the National Institute for Occupational Safety and Health (NIOSH) approved personal sanding respirator.
3. Select and use a NIOSH approved (Fresh Air Make-up System) personal painting/refinishing respirator system.
4. Identify, describe, and apply safety practices related to types of automotive lifts and dedicated frame equipment according to current industry and OSHA standards.
5. Demonstrate procedures for safe lift operations.
6. Demonstrate safe use and storage of hydraulic floor jacks and jack stands.
7. Apply manufacturer’s safety procedures when using a frame machine.
8. Identify and describe safety procedures when dealing with high pressure systems equipment according to current industry and OSHA standards.
9. Describe and explain the importance of safety procedures to be used when servicing high-pressure air-conditioning systems.
10. Demonstrate safe use when storing, handling, and installing high-pressure gas cylinders.
11. Identify and comply with environmental concerns and current industry and OSHA standards relating to refrigerants and coolants.
12. Identify and describe safety procedures when dealing with electric circuits.
13. Describe safety procedures to be followed when servicing airbag/supplemental restraint systems.
14. Describe safety awareness of high voltage circuits of electrical or hybrid electric vehicles and related safety precautions as per manufacturer’s recommendations.
15. Describe and apply safety procedures when using all tools.
16. Describe and apply safety procedures when using pneumatic tools.
17. Describe and apply safety procedures when using electric tools.
18. Describe and apply safety procedures when using hand tools.
19. Describe safety equipment and procedure for refinishing operations.
20. Inspect condition and operation of equipment.
21. Perform maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulation.
22. Perform maintenance in accordance with EPA40 CFR Part 63, Subpart HHHHHH (6H Rule) and applicable state and local regulation.

## Technical & Integrated Academic Standards

### Standard 2: Basic Tools and Hardware

Students will be able to correctly select and use the tools and hardware needed to complete common automotive tasks.

#### Skills:

1. Perform correct use of various tools and hardware, including different types of fasteners, clips, retainers, rivets, screwdrivers, pliers, wrenches, sockets, and ratchets.
2. Demonstrate the appropriate use of cutting, filing, threading, hammering, and pneumatic and electric powered tools according to OSHA standards.
3. Identify commonly used fasteners and related hardware.
4. Identify Society of Automotive Engineers (SAE) and metric threaded fasteners.
5. Identify commonly used nuts and washers.
6. Identify, describe, and use commonly used clips and retainers.
7. Identify push type clips.
8. Identify threaded type retainers.
9. Identify commonly used rivets.
10. Identify self-piercing rivets.
11. Demonstrate use of common measuring tools.
12. Demonstrate and explain proper use of low precision measuring tools (steel ruler, tape measure).
13. Demonstrate and explain the use of a Phillips screwdriver according to current industry and OSHA standards.
14. Demonstrate and explain the use of a flat screwdriver according to current industry and OSHA standards.
15. Demonstrate and explain the use of a Torx screwdriver according to current industry and OSHA standards.
16. Describe and demonstrate the use of various types of pliers according to current industry and OSHA standards.
17. Demonstrate and explain the use of locking type pliers according to current industry and OSHA standards.
18. Demonstrate and explain the use of channel type pliers according to current industry and OSHA standards.
19. Demonstrate and explain the use of cutting pliers according to current industry and OSHA standards.
20. Demonstrate and explain the use of needle nose pliers according to current industry and OSHA standards.
21. Describe and demonstrate the use of various types of wrenches according to current industry and OSHA standards.
22. Demonstrate and explain the use of open-end wrenches according to current industry and OSHA standards.
23. Demonstrate and explain the use of combination wrenches according to current industry and OSHA standards.
24. Demonstrate and explain the use of ratcheting type wrenches according to current industry and OSHA standards.
25. Demonstrate and explain the use of torque wrenches according to current industry and OSHA standards.
26. Demonstrate and explain the use of boxed wrenches according to current industry and OSHA standards.
27. Demonstrate and explain the use of Allen type wrenches according to current industry and OSHA standards.
28. Demonstrate and explain the use of tubing wrenches according to current industry and OSHA standards.
29. Describe and demonstrate the use of various types of hammering tools.
30. Demonstrate the use and knowledge of the different types of hammers.
31. Demonstrate the use and knowledge of the different types of dollies.
32. Demonstrate the use and knowledge of the different types of punches.
33. Demonstrate the use and knowledge of the different types of chisels.
34. Describe and demonstrate the use of various types of sockets and ratchets.
35. Demonstrate the use and knowledge of socket drive sizes.
36. Demonstrate the use and knowledge of socket point types.
37. Demonstrate the use and knowledge of ratchets and breaker bars.
38. Demonstrate the use and knowledge of extensions and swivels.
39. Demonstrate the use and knowledge of impact sockets.
40. Describe and demonstrate the use of various types of cutting, filing, and threading tools.
41. Demonstrate the use and knowledge of various types of files.
42. Demonstrate the use and knowledge of different types of hacksaws.
43. Demonstrate the use and knowledge of various types of thread cutting taps.
44. Demonstrate the use and knowledge of various types of thread cutting dies.
45. Demonstrate and explain the use of various commonly used pneumatic or electric powered tools.
46. Demonstrate and explain the use of commonly used sanders.
47. Demonstrate and explain the use of commonly used grinders.
48. Demonstrate and explain the use of commonly used buffers.
49. Demonstrate and explain the use of commonly used air ratchets and impact guns.
50. Demonstrate and explain the use of commonly used cutting tools.
51. Demonstrate and explain the use of High-Volume, Low Pressure (HVLP) and compliant spray guns.
52. Demonstrate and explain the use of blow guns.

### Standard 3: Diagnosis, Evaluation and Repair Planning

Students will be able to create and execute a repair plan based on diagnosis of structural damage, an initial damage report, and pre and post scan.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Skills:

1. Develop a hand-written or electronic damage report, including a record of old/unrelated damage.
2. Review damage report and analyze damage to determine appropriate methods for area to be repaired.
3. Develop and execute a repair plan.
4. Identify paint code according to vehicle manufacturer’s location.
5. Generate a cost estimate using various methods and reports.
6. Identify the extent of damage to structural steel and body panels.
7. Safely set up measuring equipment, including 3-D electronic measuring systems.
8. Determine the need for adhesive, rivet, or weld bonding to repair damage.
9. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants from those areas to be repaired.
10. Wash entire vehicle with appropriate cleaning materials.
11. Perform pre- post-scans; discuss recalibration procedures.

### Standard 4: Dent and Plastic Repair

Students will be able to perform a minor dent and plastic repair, including Paintless Dent Repair (DPR) and panel repair, replacement, and adjustment.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Skills:

1. Overhaul door and bumper assembly according to factory specifications.
2. Prepare panel to perform adhesive, airless welding, and nitrogen weld repairs.
3. Repair cosmetic damage, including body filler, corrosion protection, and repaint.
4. Inspect, remove, and store exterior trim and moldings.
5. Apply decals, transfers, tapes, and pinstripes.
6. Reassemble vehicle and perform final inspection to ensure all items on the repair order were completed.
7. Remove, install, and adjust bolts on exterior body panels.
8. Adjust panel gaps to factory specifications.
9. Set hardware to recommended torque specifications.
10. Overhaul bumper assembly.
11. Overhaul door assembly.
12. Inspect, remove, and store exterior trim and moldings.
13. Repair cosmetic damage on an exterior panel cosmetic repair.
14. Straighten and rough-out contours of damaged panel to a surface condition for body filling or metal finishing using power tools, hand tools, and weld-on pull attachments (for steel and aluminum).
15. Remove paint from the damaged area of a body panel.
16. Demonstrate hammer and dolly techniques.
17. Mix and apply body filler.
18. Sand body filler to match the contour of the vehicle.
19. Featheredge broken areas with designated grits of sandpaper to prepare for primer.
20. Restore corrosion protection.
21. Perform Paintless Dent Repair (PDR).
22. Identify the types of plastics used in vehicles and determine their reparability per OEM recommendations.
23. Explain plastic repair using product manufacturer’s recommendations.
24. Prepare panel to perform an adhesive repair per product manufacturer’s recommendation.
25. Prepare panel to perform an airless welding repair.
26. Prepare panel to perform a nitrogen weld repair.
27. Reassemble and perform final inspection.
28. Inspect vehicle to ensure all items on the repair order were performed.
29. Apply decals, transfers, tapes, pinstripes.

### Standard 5: Welding

Students will be able to perform the appropriate welding procedures needed to repair vehicle collision damage.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Skills:

1. Identify weldable and non-weldable materials, joint types, and types of welds.
2. Perform the correct cutting and welding processes using the correct equipment on materials and locations according to the manufacturer’s recommendations.
3. Prepare metal and welding area and set up welding equipment.
4. Adjust a Metal Inert Gas (MIG) welder for a proper weld.
5. Perform a destructive test and squeeze type resistance spot weld.
6. Identify weldable and non-weldable materials used in collision repair.
7. Weld and cut mild steel, and high-strength steel, aluminum, and other metals using manufacturer/industry specification.
8. Identify cutting and welding processes and equipment used for different materials and locations in accordance with manufacturer’s recommendations and specification.
9. Determine the type of cutting process for the type of metal to manufacturer`s specification.
10. Determine the joint type (butt weld with backing, lap, etc.) for each specific welding operation according to manufacturer’s specification.
11. Determine the type of weld (continuous, butt weld with backing plug, etc.) for each specific welding operation according to manufacturer and industry specifications.
12. Explain the following welds: continuous, stitch, tack, plug, squeeze-type resistant spot welding (STRSW), butt weld, butt weld with backing and lap joints.
13. Set up welding equipment.
14. Determine the appropriate welder type (aluminum, steel, or +silicon bronze), electrode, wire type, diameter, drive roll tension, and gas to be used in a specific welding situation.
15. Adjust the welder to "tune" for proper electrode stick-out, voltage, polarity, flowrate, and wire-feed required for the material being welded.
16. Determine work clamp (ground) location and attach.
17. Prep metal and work area for welding and make test welds.
18. Prep metal and work area for welding and complete test welds.
19. Clean and prepare metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp as required.
20. Protect adjacent panels, glass, vehicle interior, etc., from welding and cutting operations.
21. Protect computers and other electronic control modules during welding procedures according to manufacturer`s specifications.
22. Make test welds to ensure proper welder tuning.
23. Make test welds and perform a destructive test.
24. Weld in the flat, horizontal, vertical, and overhead position using the proper angle of the gun to the joint and direction gun travel and perform a destructive test.
25. Explain the following welds: continuous, stitch, tack, plug, Squeeze-Type Resistant Spot Welding (STRSW), butt weld, butt-weld with backing, and lap joints and perform a destructive test.
26. Weld cracked or torn steel body panels; repair broken welds.
27. Identify welding problems.
28. Identify the causes of burn-through, lack of penetration, porosity, incomplete fusion, excessive spatter, distortion, and waviness of bead and make necessary adjustments.
29. Identify cause of contact tip burn-back and failure of wire to feed and make necessary adjustments.

### Standard 6: Structural Damage/Frame Repair

Students will be able to repair and install common structural and frame components.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Skills:

1. Set-up and measure structural damage using the appropriate measuring devices.
2. Attach vehicle to frame equipment using anchoring devices.
3. Demonstrate and explain use of self-centering, and tram gauge.
4. Analyze unibody or full frame dimensions using appropriate measuring devices per measuring system specifications.
5. Determine the extent of damage to structural steel and body panels to repair or replace panels.
6. Demonstrate and explain the use of adhesive bonding in vehicle repair.
7. Demonstrate and explain weld bonding and rivet bonding.

### Standard 7: Mechanical and Electrical Components

Students will be able to remove and install common mechanical and electrical components, including suspension, brakes, heating and air conditioning systems, and electrical systems.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Skills:

1. Identify and explain common suspension and braking components.
2. Identify suspension system fasteners that should not be reused.
3. Reinstall wheel and torque lug nuts according to manufacturer’s specifications.
4. Identify and replace damaged or worn suspension components; align vehicle.
5. Identify heating and cooling system components.
6. Inspect heating and air conditioning systems.
7. Identify air conditioning (A/C) components.
8. Evacuate and recharge the air conditioning system.
9. Identify electrical systems components.
10. Inspect, clean, and charge or replace a battery.
11. Inspect, clean and repair or replace battery cables, connectors, and clamps.
12. Aim headlight assemblies and fog/driving lamps per manufacturer’s recommendations; determine needed repairs.
13. Check the operation of power or manual options in vehicle such as locks, windows, mirrors, etc.
14. Identify electric hybrid vehicles and disarm high voltage system per manufacturer’s recommendations.
15. Identify vehicle restraint systems.
16. Disable and enable restraints systems per manufacturer’s specifications.
17. Identify and describe Advanced Driver Assistance Systems (ADAS).

### Standard 8: Refinishing, Cleaning and Detailing

Students will be able to correctly refinish, clean, and detail a vehicle post repairs.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Skills:

1. Protect interior and exterior of vehicle for both the repair and refinish process.
2. Sand a surface and apply primer, undercoat, and topcoat paint per manufacturer’s recommendations.
3. Blend and mix paint with the proper proportions and remove paint imperfections.
4. Cover, mask, and protect exterior and interior of vehicle for both repair and refinish process.
5. Identify and explain spray mask procedures.
6. Mask area for primer.
7. Identify and describe accurate liquid measuring procedures.
8. Explain and demonstrate the calculation of mixing ratios.
9. Explain and demonstrate the calculation of percentage.
10. Mix and apply undercoats per paint manufacturer’s recommendations.
11. Select, mix, and apply appropriate undercoat.
12. Dry or wet sand area to which topcoat will be applied.
13. Select appropriate grit sandpaper and apply sanding techniques.
14. Clean area to be refinished using cleaning solutions.
15. Select and use final cleaning solutions.
16. Explain and demonstrate procedures for blending a panel per paint manufacturer’s recommendations, current industry, and OSHA standards using product technical data sheets.
17. Determine paint color with variant decks, mix paint, and tint, if necessary, for a blendable match.
18. Demonstrate and explain procedures to make a spray out card and a letdown panel using a color corrective light to match the paint.
19. Blend basecoat into adjacent panel.
20. Explain and demonstrate procedures for overall panel refinishing per paint manufacturer’s recommendations, current industry, and OSHA standards using product technical data sheets.
21. Identify dirt or dust in the paint surface.
22. De-nib, buff, and polish finishes, where necessary, to remove imperfections such as runs, sags, orange peel, and dirt.
23. Identify, diagnose, and repair paint problems.
24. Identify blistering or lifting (i.e., raising of the paint surface) fisheyes (crater-like opening), solvent popping; determine the cause(s) and correct condition.
25. Identify sags and runs, dry spray, orange peel, and tape tracking in the paint surface; determine the cause(s) and correct the condition.
26. Detail exterior of vehicle.
27. Demonstrate the use of cleaners and techniques to clean exteriors of vehicles following current industry and OSHA standards.
28. Wash and dry the exterior of vehicle with soap and water.
29. Inspect and remove environmental contaminants such as sap, road tar, etc.
30. Inspect and diagnose surface imperfections such as scratches, brake dust, oxidation, acid rain, etc.
31. Apply and remove wax or other UV protective coating using manufacturer’s recommendations.
32. Clean and restore conditioner to tires and rims.
33. Identify and remove/repair buffing related imperfections (i.e., swirl marks, wheel burns).
34. Remove buffing related imperfections.
35. Identify and remove/repair overspray conditions.
36. Detail Interior of vehicle.
37. Vacuum and shampoo upholstery and carpets.
38. Clean dirt, dust, and stains from interior door panels, dashboard, and other interior trim.
39. Clean and apply conditioner to leather components.
40. Clean interior and exterior glass.
41. Clean body openings with necessary cleaners.
42. Demonstrate the correct use of a pressure washer per manufacturer’s recommendations.
43. Demonstrate the correct use of a carpet extractor or steamer to remove stains per manufacturer’s recommendations.

## Employability Standards

### Standard 9: Employability Skills

Students will understand and demonstrate the roles of professional communication, critical thinking, problem solving, professionalism, teamwork, and collaboration within the context of automotive collision repair technician careers.

#### Skills:

1. Demonstrate the impact of communication skills on the success of an automotive repair technician.
2. Describe appropriate methods of communication for internal and external stakeholders.
3. Evaluate the impact of poor communication by technicians on the safety of a shop.
4. Evaluate the impact of poor communication by technicians on the quality of a repair project.
5. Troubleshoot a project plan to find mistargeted or extraneous work that does not contribute to the ultimate objectives of the project.
6. Build a team-based project plan that results in a successful automotive repair project and that includes recruiting teammates and assigning roles for a project.
7. Examine the role of the automotive collision repair industry in society, particularly in terms of its significance for employability and career opportunities.

## Entrepreneurship Standards

### Standard 10: Entrepreneurship

Students will be able to explain various career pathways in the automotive field, describe opportunities for entrepreneurship and be able to evaluate the value proposition of business ownership in the auto collision field.

#### Skills:

1. Students will understand and be able to describe the role of an auto collision technician in the overall operations for a startup automotive collision repair business.
2. Describe the concept of professional networking and demonstrate personal introductions and an “elevator speech” appropriate for other automotive collision repair experts, and other potential business partners.
3. Evaluate the licensing, regulatory, and tax implications of self-employment and business ownership as an automotive collision repair specialist compared to W-2 employment.

## Digital Literacy Standards

### Standard 11: Digital Literacy

Students will be able to demonstrate the use of common software and information technology in a modern automotive repair environment.

#### Skills:

1. Describe the use of online resources in licensing and professional development as an automotive repair technician.
2. Demonstrate the use of common scheduling, resource management, ticketing, and/or customer relationship software systems.
3. Understand where to find online resources that support effective automotive collision repair and how to be a safe and ethical consumer and creator of digital content.
4. Apply strategies for using digital tools and technology to drive business and commerce.

## Sample Performance Tasks

### Standard 1: Safety and Health in the Automotive Collision Repair Environment

Students will be able to demonstrate health and safety practices in a shop environment, including the management and maintenance of equipment and tools, use of personal protective equipment (PPE), and personal safety practices.

* Aligned Industry Recognized Credentials: OSHA 10 – General Industry

#### Sample Performance Tasks:

* Students will demonstrate safe automotive lifting procedures and frame equipment.
* Students will safely evacuate and recharge an air conditioning system according to current industry and OSHA standards.
* Student will safely disarm and reactivate an airbag system per manufacturer’s recommendations.
* Student will pass a written and performance test before working with all tools.
* Student will select and use the personal safety equipment for surface preparation, spray gun, and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye, and ear protection, etc.) in accordance with OSHA, federal, state, and local regulations.

### Standard 2: Basic Tools and Hardware

Students will be able to correctly select and use the tools and hardware needed to complete common automotive tasks.

#### Sample Performance Tasks:

* Student will choose the correct hardware to match the assigned task.
* Student will demonstrate measurement skills using both American and metric system using variety of low precision measuring tools.
* Student will select and demonstrate use of proper socket and handle for given task.
* Student will demonstrate the use of various types of screwdrivers.
* Student will demonstrate the use of various types of pliers.
* Student will demonstrate the use of various types of wrenches.
* Student will demonstrate cleaning a spray gun using the specified gun washer system.
* Student will demonstrate the use of dent removal equipment according to current industry and OSHA standards.

### Standard 3: Diagnosis, Evaluation and Repair Planning

Students will be able to create and execute a repair plan based on diagnosis of structural damage, an initial damage report, and pre and post scan.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Sample Performance Tasks:

* Student will soap and water wash the entire vehicle to identify damage on the vehicle.
* Student will execute a repair plan to the assigned task.
* Student will generate an estimate using various methods.
* Student will prepare a repair plan using manufacturer’s recommended procedure.

### Standard 4: Dent and Plastic Repair

Students will be able to perform a minor dent and plastic repair, including Paintless Dent Repair (DPR) and panel repair, replacement, and adjustment.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Sample Performance Tasks:

* Student will demonstrate a minor dent repair using various body repair methods.
* Student will apply decals and pin striping tape.

### Standard 5: Welding

Students will be able to perform the appropriate welding procedures needed to repair vehicle collision damage.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Sample Performance Tasks:

* Student will identify weldable and non-weldable materials.
* Student will safely set-up and adjust a Metal Inert Gas (MIG) welder for a proper weld.
* Student will use body repair manuals or electronic software to look up proper cutting and welding procedures per the manufacturer’s recommendations.
* Student will properly prep area for welding and properly protect vehicle for welding.
* Student will weld a test panel and perform a destructive test.
* Students will weld in the flat, horizontal, vertical, and overhead position using the proper angle of the gun to the joint and direction of gun travel.
* Students will identify and correct burn through, lack of penetration, porosity, incomplete fusion, excessive spatter, distortion, and waviness of bead and make necessary adjustments.
* Student will set-up and adjust various types of welders for various types of materials.
* Student will perform squeeze type resistance spot weld.
* All welds will have a destructive test performed.
* Student will set up and adjust aluminum MIG pulse welder.
* Student will set up and adjust silicon bronze MIG pulse welder.

### Standard 6: Structural Damage/Frame Repair

Students will be able to repair and install common structural and frame components.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Sample Performance Tasks:

* Student will safely set-up, measure and diagnose structural damage using appropriate measuring devices.
* Student will set-up and measure structural damage using 3-D electronic measuring system.
* Student will select and demonstrate the use of pulling equipment.

### Standard 7: Mechanical and Electrical Components

Students will be able to remove and install common mechanical and electrical components, including suspension, brakes, heating and air conditioning systems, and electrical systems.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Sample Performance Tasks:

* Student will properly identify suspension and brake components.
* Student will remove and install a tire/wheel assembly using the torque sequence per manufacturer’s recommendations.
* Students will identify heating and air conditioning components.
* Student will safely remove, inspect, and install a battery.
* Student will safely install jump-pack, battery charger.
* Student will properly aim headlights, fog lights per manufacturers recommendations.

### Standard 8: Refinishing, Cleaning and Detailing

Students will be able to correctly refinish, clean, and detail a vehicle post repairs.

* Aligned Industry Recognized Credentials: ASE Entry Level

#### Sample Performance Tasks:

* Student will mix and apply undercoats per paint manufacturer’s recommendations, current industry, and OSHA standards.
* Student will safely prep substrate for primer-surfacer and prime the panel following paint manufacturer’s recommendations.
* Demonstrate the sanding techniques using the appropriate grit sandpaper according to paint manufacturer’s recommendations and current industry and OSHA standards.
* Student will use the correct cleaning solutions in accordance with paint manufacturer’s recommendations and OSHA standards.
* Students will demonstrate the ability to blend paint.
* Students will demonstrate the ability to create a spray out card and let down panel.
* Student will apply a topcoat to a prepared surface per paint manufacturer’s recommendation and OSHA standards.
* Student will identify and remove paint imperfections.
* Student will recondition interior to industry standards.
* Student will perform a final detail on a vehicle.
* Student will identify and remove overspray.
* Student will wash and wax outside of vehicle.