Item and Method of Inspection	Reject If

Body Structural Integrity Inspection Standards

- The alignment of the chassis or of the unitized body must conform to the manufacturer's standards and tolerances relative to the safe use of the vehicle, in particular with regard to the position of the suspension and steering components.
- The four wheels must be aligned in accordance with the manufacturer's tolerances.
- The repair and assembly of the components of the body must be carried out in such a way as to provide occupant protection that is comparable to the original protection.
- Non-repairable components of the structure must be replaced.
- Repairable components of the body must be repaired in accordance with methods or techniques that do not affect their original properties in accordance with manufacturer's recommendations.
- The assembly joints of the body must be located in the places recommended by the manufacturer or other agencies such as ICAR.
- Those joints which are a part of a repair or replaced component must be accessible when the structural integrity inspection is made. No sealant, soundproofing or rust-proofing compound must have been applied to the areas repaired or replaced prior to the inspection.
- The components of the chassis of the unitized body must be assembled using methods that do not affect the mechanical and metallurgical properties of the materials of which they are made.

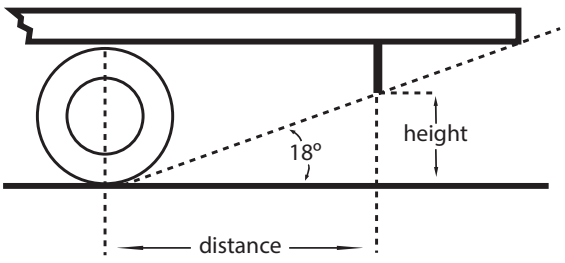
Body Structural Integrity is defined as:

"Critical components designed as stress and weight/load bearing member/elements such as radiator support, inner fender skirts, floor pan, rocker panels, engine compartment side rails, upper reinforcements, lower body rails in the rear, inner fender wells, luggage compartment floors and the unibody are within 3 mm (less than 1/8 in.) of the critical manufacturing dimensions, alignments and tolerances. All fits and alignments are determined by the accuracy of the welded structural panels."

If you see any of the following, you MUST refer the vehicle for a structural integrity assessment.

1. Hood
   - Crush Zone modifications on the hood
   - Damage to crush zone on the hood
2. Body
   - Torn metal on body
3. Frame Rails and Mounts
   - Cracked, broken, bent perforated or separated due to corrosion or collision damage
4. Unibody
   - Rusted through sufficiently or improperly repaired so as to allow exhaust gases to enter occupant compartment or affect safety and/or structural integrity
   - Kinks or wrinkles in sub sheet metal eg. cowl, strut towers, firewall, floor pans, suspension
5. Frame/Structural Components
   - Evidence of frame splicing
   - Signs of welding on unibody
   - Welding on frame or suspension components that were originally bolted items

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
1. Hood	
a) latches	a) broken, missing, seized, insecurely mounted, inoperative, will not close or open easily
b) secondary latches	b) broken, missing, inoperative, parts missing
c) hinges	c) missing, broken, cracked, seized, inoperative, parts missing
d) safety retainer pins	d) missing, inferior substitute
e) hood reinforcement	e) reinforced other than by a method approved by the manufacturer or an approved I-Car or equivalent process and standard – any modifications to crush zones
2. Body	
a) torn metal	a) sharp edges, torn in a manner as to reduce structural integrity of the panel – protrudes out in a manner that could be hazardous to passengers, pedestrians and/or cyclists
b) moulding	b) loose or protrudes out in a manner that could be hazardous to passengers, pedestrians and/or cyclists
c) fenders, quarter panels and mudflaps **NOTE: The following vehicles do not require fenders and/or mudguards to receive a pass with caution:** **1. Manufactured vehicles in 1940 or earlier;** **2. Vehicles manufactured or designed to resemble 1940 or earlier vehicles; or** **3. Vehicles described in Motor Vehicle Act Regulation 7.01 (4).** **All other vehicles including modified collectors, vintage, ubilt, replicar, replikit and speciality vehicles require fenders/quarter panels.**	c) so damaged or corroded that factory installed lamps cannot be secured as per factory installation method, missing section torn or corroded away so road spray is not controlled, not full-tread width of tire, fitted so that it could cause interference with steering mechanism or cause rubbing of tires when suspension bottomed and steering moved stop to stop, includes rear wheels
d) height of mud flaps from ground  (vehicle unloaded)	d) distance from ground to bottom of mud flap exceeds 1/3 of hoizontal distance from mud flap to centre of wheel – where the 1/3 rule cannot be applied due to vehicle configuration, the bottom of mud flap is more than 14 in. from ground, measured when vehicle is not loaded.

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
e) floor (includes trunk)	e) rusted through or in such condition as to cause a hazard or allow exhaust gases to enter the vehicle – other than a welded repair – repaired in a manner other than by an approved process or the repair compromises the safety and structural integrity features of the vehicle
f) body panels	f) reinforcement structures damaged so as to weaken the panel – panel cut, sliced, corroded through resulting in a loss of structural integrity
g) wheel panels	g) missing, incomplete, corroded through, improper repair resulting in a loss of structural integrity
h) body lift (height measurements must be recorded for headlights, front bumper, tire size and overall vehicle height)	h) vehicle modification or components not safe for use on highway
3. Frame Rails and Mounts	
With the vehicle raised, tap with ball peen hammer:	
a) frame rails	a) repaired other than by an approved standard and process, repaired in a manner that compromises structural integrity, cracked, broken, bent, kinked, – perforated or separated due to corrosion between front and rear suspension mounts and rear frame to body mounts
b) body mounts	b) split, broken, missing, missing bolts
c) cross members	c) missing, cracked, broken, loose, bent – Improperly repaired, separated due to corrosion or collision deeply enough to weaken member
d) welded and heated areas	d) no corrosion–resistant coating
	OUT OF SERVICE **i) Any frame member is broken, sagging or cracked so as to permit the body to contact any moving part or collapse of the frame is imminent.** **ii) Any frame member or component fails to adequately support directional stability or support components.** **iii) 37 mm (1 1/2 in.) or longer crack in frame which is directed toward bottom flange. Any crack extends from a frame web around radius and into bottom flange. Crack 25 mm (1 in.) or longer in bottom flange.**

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
4. Unibody	
Repairs to perforated metal floor pans require patches and repairs to be MIG or TIG welded with the same gauge metal as the pan. Manually inspect condition of:	
a) floor pan (tap with ball peen hammer)	a) repaired other than an approved process and standard, repaired in a manner that compromises structural integrity, rusted through sufficiently to cause a hazard or allow exhaust gases to enter occupant compartment
b) strut towers and spring shackle supports (tap with ball peen hammer)	b) cracked, broken, rusted through to such a depth as to weaken supports, repaired in a manner that compromises structural integrity, repaired other than by an approved standard and process
c) body panels	c) repaired in a manner that compromises structural integrity, repaired other than by an approved standard and process
d) high strength, front and rear structural side members	d) oxy-acetylene welded, braised, cracked, broken, rusted through to such a depth as to weaken member, repaired in a manner that compromises structural integrity, repaired other than by an approved standard and process
e) welding	e) components welded when originally bolted or riveted – components bolted or riveted when originally welded
f) unibody sheet metal	f) separated, flaking in structural areas, structural shapes distorted, indications of metal heating, hammer caused indentation
5. Bumpers – Front and Rear	
a) condition	a) missing, loose, broken, torn portion is protruding so as to create a hazard, perforated through
b) shock absorber and/or impact absorber (as OEM)	b) collapsed, welded to rail, solid or not collapsible

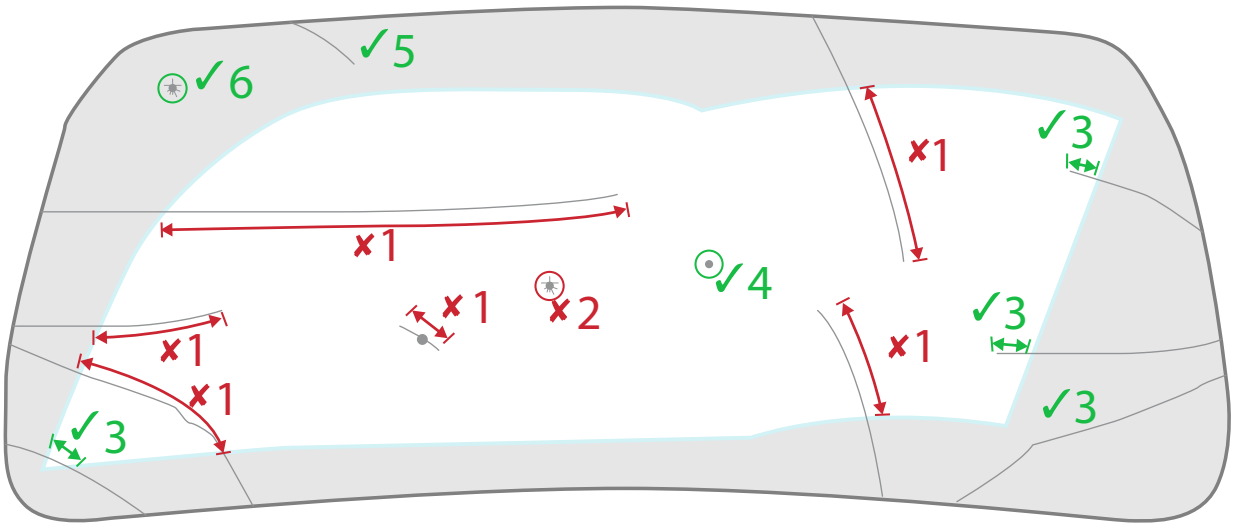
All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
c) height **NOTE: The OEM location will be the frame rails.** i) for passenger cars A) for modified collector vehicles only	A) centre of bumpers not between 180 and 560 mm (7 and 22 in.) from the ground
B) for all other passenger cars	B) centre of bumpers not between 400 and 500 mm (16 and 20 in.) from the ground
ii) for trucks rated less than 4,500 kg – rear bumper required on trucks where OEM equipped	ii) lowest part of truck bumpers higher than 750 mm (29.5 in.) from the ground as measured to OEM bumper location
d) dimensions (not applicable to modified collector vehicles)	d) not oem width on manufactured vehicle – less than track width on non-manufactured vehicle – vertical surface less than 100 mm (4 in.)
6. Doors	
OEM or equivalent must be present. Inspect:	
a) operation	a) binds, jams, closes insecurely, missing
b) door openers and handles	b) missing, broken, inoperative
c) catches	c) missing, broken, loose, worn so that it does not latch on primary and secondary catches
d) hinges	d) cracked, missing, broken, so loose that door will not close properly, seized
e) seals	e) missing, deteriorated or positioned so as to allow exhaust gases to enter passenger compartment
f) location	f) no exit on one side – exits as per original manufacturer are non-operational
g) intrusion beam	g) missing, loose, broken, bent, kinked, repaired other than by an approved standard and process
h) door panel	h) repaired in a manner that compromises structural integrity, repaired other than by an approved standard and process
i) shaved or removed outer door handles (modified collectors only) If outer door handles shaved (removed) inner door release mechanism must be readily available and identified.	i) inner-door release mechanism not readily available or identified

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
7. Windshield	
a) condition **NOTE: See following image for examples of pass and fail windshield crack conditions.**	a) missing or a defect in the area extending from the left side of the driver's side 500 mm (20 in.) toward the centre and extending over 75 mm (3 in.) down from the top or over 75 mm (3 in.) up from the bottom, excepting small stone injuries of 6 mm (1/4 in.) or less; – a crack over 300 mm (12 in.) long in any part; – more than 2 cracks over 150 mm (6 in.) long in any one piece of glass; – stone or shot injuries more than 40 mm (1 1/2 in.) in diameter; – two or more stone or shot injuries over 20 mm (3/4 in.) in diameter in any one piece of glass; – more than 75 mm (3 in.) clouding around the edge; – any clouding on the driver's side – broken glass showing sharp edge; – cracked, broken or clouded forward of a line parallel with the driver's shoulder – broken or clouded to such an extent that the driver is unable to see clearly 60 m (197 ft.) to the front

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.



Examples of Windshield Pass and Reject Conditions:

Reject condition 1	Crack through one layer that extends more than 50 mm into the area swept by wipers
Reject condition 2	Star chip larger than 13 mm in diameter in area swept by wipers
Pass condition 3	Crack extends less than 50 mm into the area swept by wipers
Pass condition 4	Star chip smaller than 13 mm in diameter in area swept by wipers
Pass condition 5	Crack through one layer that is more than 50 mm long, but outside the area swept by wipers
Pass condition 6	Star chip larger than 13 mm in diameter, but outside the area swept by wipers

Over the whole windshield:	
b) missing area	b) any portion of windshield glass, or the complete windshield glass area, missing
c) tinting (other than original by vehicle manufacturer)	c) tinting of windshield more than 75 mm (3 in.) below top
d) type (marking applies to all vehicles manufactured on and after January 1, 1971)	d) windshield is other than a laminated safety glass of type AS-1, AS-10 or AS-14, or is not marked with the AS grade
e) obstructions **NOTE: Wipers must be OEM length.**	e) decals or devices located in an area swept by the wipers – externally mounted sun visor extends more than 150 mm (6 in.) measured vertically from top of windshield to lowest part of visor
f) adhesive sealant	f) not automotive urethane type, type other than manufacturer's specifications

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
8. Side and Rear Windows	
a) operation	a) cannot be opened or closed readily
b) type	
b1) front side window	b1) other than safety glass type AS-1, 2, 10 & 11
b2) rear side and rear window	b2) other than safety glass type AS-1, 2, 3, 10 & 11
c) condition	c) any window is cracked more than 300 mm (11 13/16 in.), broken; rear window is broken to the extent that the driver is unable to see 60 m (197 ft.) to the rear – broken, exposed, sharp edges, more than one crack – any crack or stone shot through both layers of glass
d) tinting	d) any tinting (by film or any material or coating that reduces light transmittance) of any driver's side window or any front passenger side window
9. Seats	
a) condition	a) mounted insecurely, loose, frame broken, covering material torn and exposing a metal component or spring, seat pedestal removed or seat assembly not OEM or CMVSS equivalent
b) seat track locks	b) driver's seat adjusting mechanism does not operate, adjustable seats will not lock into position, loose
c) seat back locks	c) missing, loose, broken, inoperative, do not hold seat back in locked position
d) head restraints (headrest) if OEM equipped	d) missing, broken, does not function as OEM, not CMVSS compliant
e) location	e) not in OEM, certified or CMVSS compliant location
	OUT OF SERVICE **i) Driver seat is rejected or defective.**

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
10. Seats Belts/Occupant Restraints	
Seat Belts and Occupant Restraints are not required where a designated seating position has been removed. **Seat Belts and Occupant Restraints MUST comply with CMVSR 208 for year of vehicle manufacture.**	
a) condition	a) -missing, not equipped as originally manufactured, broken, excessively frayed, torn webbing, warning indicator exposed, insecurely mounted, cut – lap belts are not attached to the seat and not equipped with a secondary belt from the seat to the floor if equipped with air ride, hydraulic or spring seat – compliance label missing
b) anchors	b) missing, broken, insecurely mounted
c) retractors (if OEM equipped) Belt retractor must remove belt slack at all positions.	c) fail to allow belt to extend to its maximum length, do not release properly, will not adjust properly
d) position **NOTE: If seat belt is down behind seat cushion, pull it out and place it on the cushion.**	d) removed, type other than required by the CMVSS for vehicle model year and type, not available for each passenger position as per factory installation

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
e) belt release and buckle	e) missing, broken, inoperable, does not release easily under pressure
f) air bags and SRS (if OEM equipped)	f) evidence that the air bag is missing, disconnected, inoperative or not re-installed to OEM standards – the air bag indicator lamp fails to light in the manner prescribed by the manufacturer
g) onboard diagnostic scan	g) fails diagnostic scan test
h) indicator light (if OEM equipped)	h) indicator light remains on
	OUT OF SERVICE **i) Any seat belt not functional.**
11. Sun Visors (Driver)	
Manually inspect:	
a) location	a) missing on driver side, or as required by OEM standards
b) attaching parts	b) missing, broken, bent, loose
c) positioning	c) cannot be maintained in a set position
12. Rear View Mirrors	
a) location	a) none located on the left side – none located on the right side if not equipped with unobstructed rear window with inside mirror
b) view	b) obstructed, not a clear view of highway for at least 60 m (200 ft.) to the rear
c) mounts	c) loose, broken, insecure, will not maintain adjustment
d) glass condition	d) cracked, pitted, clouded so as to obscure vision
e) adjustment	e) not adjustable, will not hold position

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
13. Windshield Wipers and Washers	
a) wipers	a) missing, fail to operate, will not operate on two speeds
b) blades	b) missing, torn, fail to wipe 75% of windshield, or wipe less than OEM requirements, fail to contact windshield
c) arms	c) missing, broken, bent, distorted
d) washers	d) missing on vehicles manufactured on and after January 1, 1971, fail to operate
e) modified and collector vehicles only Wipers may be of removable type.	e) missing, not functional when installed.
	OUT OF SERVICE **i) Any vehicle has an inoperative wiper, missing or damaged parts that render it ineffective on the driver's side.**
14. Windshield Defroster	
Turn on the defroster fan and feel for warm air coming out of the ducts. Inspect:	
a) fan	a) fails to operate, no air flow – Insufficient volume of air as to clear area swept by wipers (aux fan may be used).
b) controls	b) fail to operate, fail to direct air flow
15. Interior Heaters	
Turn on fan and feel for warm air coming out of heater duct. Manually inspect:	
a) fan	a) fails to operate, no air flow
b) condition	b) coolant leaks are present
c) controls	c) fail to operate, fail to direct air flow as per control indicator position
16. Trunk	
Open trunk and check:	
a) lid/hatch	a) will not open, close and latch – seal cracked, broken or missing
b) area (TAXI ONLY)	b) no space for luggage

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
17. Trailer Hitch (if equipped) (hitch may be removed)	
a) condition	a) any part is bent , twisted, cracked, broken, loose, wear exceeds OEM
b) attachments	b) insecurely attached – bolts loose, missing or improper size
18. Canopy, cover or equivalent	
a) condition	a) loose, not attached correctly
19. Deck or equivalent	
a) condition	a) loose, not attached correctly, lamps missing (as required)

Body Integrity for Total Loss Vehicles

Repair Standard

The repair/rebuild process shall meet or exceed the rebuilding standards specified by the Inter-Industry Conference On Auto Collision Repair (I-CAR) and/or the Original Equipment Manufacturer (OEM) or an equivalent standard.

DIMENSION SPECIFICATIONS

In the event that the OEM body dimension manuals are not available, jobber manuals such as those produced by Mitchell may be used and are acceptable for gauging to pull the vehicle's body into dimension and specification standards. This may also be applied to full frame vehicles when applicable.

Prior to performing a wheel alignment check or alignment adjustment, the unitized vehicle body, including engine cradle, must conform to the OEM dimension standards. Particular attention must be observed in areas where steering and suspension components are attached. Full frame vehicles must comply with the OEM, I-Car or equivalent dimensions and repair standards.

The unitized vehicle body, engine cradle, suspension control arm, lower strut and pivots, and lower ball joint location must conform to OEM dimension standards. This inspection must be performed during the body integrity inspection process. Particular attention must be observed in an area where steering and suspension components are attached.

All stationary glass must be installed in the vehicle before an inspection is completed. This is to ensure correct installation and that specific body opening specifications are adhered to during the body integrity inspection process.

WHEEL ALIGNMENT

When the vehicle's body is within OEM measurement specifications, a four-wheel alignment must be performed and the steering angles adjusted within the OEM's tolerances.

OCCUPANT PROTECTION

The repair and assembly of body components must be performed in a manner that provides occupant protection that is at least equal to or exceeds that required by the OEM or I-Car standards.

Non–repairable components identified by the OEM or I-Car process must be discarded and replaced.

Repairable components of the body must be repaired in accordance with the methods, procedures and standards that will return the component to its original standard, quality and properties in accordance with OEM or I-Car recommendations.

The assembly joints of the body must be located in places and by a procedure recommended by the OEM or by I-Car.

All structural components of a vehicle must be assembled and repaired using methods in accordance with OEM or I-Car procedure and standards.

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
CORROSION PROTECTION Welded and structural components that require protection must be corrosion protected as required by the OEM or to I-Car standards. **INSPECTION VISIBILITY** Joints which are part of a repair or replaced component must be visibly accessible for structural integrity inspection. The joint must not be covered with sealant, sound proofing material or rust proofing material that will inhibit visual identification of the joint or component prior to inspection. **BODY STRUCTURAL INTEGRITY** **Definition:** Structural integrity parts are defined as components that are designed as stress and load bearing members. Almost every body component in a unibody structure is used for structural integrity. Critical components in this category are, but not limited to: (i) radiator support; (ii) engine cradle; (iii) front and rear body rails; (iv) A, B and C pillars; (v) floor pan; (vi) strut towers and aprons; (vii) rocker panels; (viii) suspension crossmembers; (ix) trunk floor pan; and (x) stationary glass	
20. Frame and/or Structural Body Components	
a) corrosive deterioration. Inspect for corrosive deterioration or deterioration of structural components such as frame assemblies on full frame or semi-monocoque vehicle construction and floor pan on unibody and monocoque construction. Corrosive weakening can be evaluated by tapping with rounded end of a 10 to 12 oz. ball peen hammer or jacking at front or rear and measuring rear edge of door to "B" pillar clearance before and after jacking	a) frame rails or cross-members are perforated or separated due to corrosion between the front and rear suspension mountings and near frame-to-body mountings on vehicles with frames and sub-frames – unibody sheet metal is separated – perforated or flaking in area near suspension component mounting or where structural shapes have been stamped into the floor pan – frame fails, cross-members, sub-frame assemblies and unibody or monocoque stamped structural shapes are distorted or cracking is visible – signs of heating to straighten unibody structure – tapping with hammer causes indentation indicating extensive corrosive weakening of metal in structural shapes – rear edge of door to "B" pillar clearance changes significantly during jacking

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

Item and Method of Inspection	Reject If
21. Unibody Structural Integrity	
Inspect unibody structural components for:	
a) alignment	a) structural components are obviously misaligned (doors, trunk, hood)
b) securement	b) door latches, hood catch, trunk latch, fail to operate properly and hold unit secure
c) welding techniques	c) high-strength steels are oxy-acetylene or stick electrode welded – structural components are gas welded
d) structural components Check as per body structural integrity section.	d) structural components have been sectioned or repaired by other than an approved standard and process
22. Inspect the Vehicle Components Below for Examples of	
a) designed stress concentrators b) Factory panel mating flanges c) non-sectioned structural panels d) sectioned structural panels	– structural components have been sectioned or repaired by other than approved standard and process
23. Vehicle Components	

A. Radiator Support
A1. Radiator centre support
B. Tie bar panel
C. Fender inner shield
D. Strut tower reinforcement
E. Front side rail
F. upper splash shield beam
G. Hinge pillar extension
H. Front Side rail extension
I. Cowl side
J. Dash panel
K. Cowl Plenum
L. Cowl top
M. Windshield frame side inner
N. Centre upper windshield frame
O. Side aperture
P. Inner quarter/outer wheel house
Q. Inner wheel house
R. Roof panel

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

S. Front floor pan
T. Inner sill pan
U. Side sill panel extension
V. Roof rail inner
W. Rear floor pan
X. Tail panel
Y. Lower tail panel
a. Rear side rails
b. Rear side rail cross member
c. Front floor pan cross member, seat mount
d. Strut lower extension to dash
e. Aperture retainer, drip rail
f. Rear roof brace

24. Additional Information Pertaining to the Inspection of Unibody Vehicles (TLV/FTR only)

The unibody design uses nearly every part of the vehicle as a stress and weight bearing element. To maintain proper steering and handling the tolerances must be held within 3 mm (less than 1/8 in.) of the critical manufacturing dimensions. All fits and alignments are determined by the accuracy of the welded structural panels.

a) Welding

Do not oxyacetylene or stick electrode arc weld on high strength steels. The problem with the oxyacetylene torch is that the flame does not provide a concentrated heat source to create a satisfactory weld before adjacent areas are overheated.

25. Examples and Characteristics of Various High Strength Steels (TLV/FTR only)

a) UHSS (Ultra-High-Strength Steel)
- extreme high strength
- strength destroyed by improper heating during repair
- metal is so hard that is cannot be straightened cold
- any member having this metal cannot be repaired, it must be replaced.

b) HSS (High-Strength Steel)
- heat sensitive (700-1200 degrees Fahrenheit for three minute maximum depending upon the manufacturer's recommendations
- can be straightened cold

c) HSLA (High-Strength Low-Alloy Steel)
- can be straightened cold
- can apply heat **(CAUTION: use care because of thin gauge)**
- higher strength than mild steel

d) Galvanized Steel
- HSS or HSLA can be galvanized (Zinc Coated)
- toxic fumes released when heated **(CAUTION: have proper ventilation and protection)**
- coating must be stripped to weld

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.

26. Welding (TLV/FTR only)

The gas welder can still be used for attaching panels, door skins and other panels. However, car manufacturers do not recommend gas torch welding on structural parts. Structural parts include rad supports, inner fender skirts, floor pan, rocker panels, engine compartment side rails, upper reinforcements, lower body rails in the rear, inner fender wells and luggage compartment floors. MIG welding is used in unibody repairs (MIG stands for metal inert gas). The other type of welding that is being recommended in collision repair work is portable resistance spot welding. When talking about resistance type spot welders we are describing the type of welding that required the actual weld to take place on both sides of all panels at the same time. Not the type of spot weld that welds panels together from the same side at the same time. Opposite side spot welding is a structural weld.

a) Example of opposite-side spot welding:
   - plug, butt or lap welds
   - the types of welds used for the repair or re-attachment of damaged or replacement sections are either spot, plug, butt or lap welds

b) Plug weld
   - the plug weld is used as a replacement for the spot weld
   - the plug welds are formed by drilling or punching a hole in the outer panel being joined
   - plug welds may be used to join more than two panels together

c) Spot weld
   - pot weld is formed by clamping the panels to be welded together between two electrodes and then passing an electrical current between the two electrodes

d) butt weld
   - butt welds are formed by fitting two edges of adjacent panels together and welding along the mating or butting edges of the panels
   - manufacturer's recommendations must be followed before butt welding
   - panels to be butt welded together, especially in stress bearing areas, should be of the same thickness
   - the butt weld should never be made continuously
   - when butt welding vertical sections of structural panels the butt weld cannot be made in a straight line on the structural panels
   - butt welds cannot be reinforced because stress or structural build-up at the area of reinforcement can create a weaker condition

e) lap weld
   - lap welds are formed by melting two surfaces to be joined at the edge of the top of one of two overlapping surfaces
   - lap welds should only be used to replace original factory lap welds or where outer panel and not structural panels are involved
   - lap welds should not be used to join more than two thickness' of material together

f) structural panels

   Structural panels should be serviced or replaced at the locations where they are normally attached to other panels during the production process (factory joints and seams). Manufacturers do not recommend the sectioning of structural panels. While outer panels like hoods, fenders, quarter panels and doors give some support to the total structure, they are not considered key structural panels of the unibody assembly. The individual panels are joined together at flanges of mating surfaces usually formed at the edges of the panels during factory production. The same number of welds as in manufacturing and in the right locations are required. This can usually be compared to the same part of the opposite side of a vehicle for inspection purposes. If reinforcements are added, stress concentrators are created and in the event of a second collision these parts will not respond in the fashion they were designed. Designed (Manufacturer's) stress concentrators should not be removed. They are designed into the unibody vehicles to control and absorb collision forces, minimize structural damage and increase occupant protection.

All inspection procedures are visual unless additional inspection procedures are indicated or where applied force is necessary to verify tightness and/or component security.