

SCHOOL BUS INSPECTION

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SCHOOL BUS INSPECTION PROGRAM

STATE INSPECTION PROGRAMS

School bus safety programs vary greatly from state to state. Each state is urged to establish a neutral third-party inspection program. Personnel conducting school bus safety inspections must be knowledgeable in the mechanical components of a school bus and be aware of all the applicable construction standards, laws, rules and all other requirements of their jurisdiction.

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INSPECTION PROCEDURE

School bus safety inspections should consist of a standardized inspection where vehicles are placed out-of-service based on uniform criteria. States should also develop specific inspection regulations, rules, procedures and out-of-service criteria for all vehicles utilized in student transportation. States are encouraged to develop a system to compile the data for analysis.

OUT-OF-SERVICE CRITERIA

The purpose of criteria is to identify critical school bus components and provide tolerances that inspectors can utilize to determine if a school bus is safe for student transportation. While it is recognized that each state may enforce more stringent standards, this document is intended to establish a baseline for inspecting and placing school buses out-of-service.

RESOURCE INFORMATION

49 CFR PARTS 570.1-570.63, *Vehicle in Use Inspection Standards*

49 CFR PARTS 400-599, *Federal Motor Vehicle Safety Standards*

49 CFR PARTS 393, 396, *Federal Motor Carrier Safety Regulations*

49 CFR APPENDIX G to Subchapter B, *Minimum Periodic Inspection Standards*

Commercial Vehicle Safety Alliance (CMVSA), North American Uniform Out-of-Service Criteria

SCHOOL BUS RECOMMENDED OUT-OF-SERVICE CRITERIA

BODY EXTERIOR

- A. Any panel, rub rail or trim that is loose, torn, dislocated or protruding from the surface of the bus, creating a hazard (393.203); or
- B. Any engine, battery or other door that is not properly secured (393.203).

BODY INTERIOR

Aisle

- A. Aisle does not have the required clearance (571.217); or
- B. Obstructions in aisle that prevent passengers from egress to emergency exits (393.62) (393.203).

Door (Entrance)

- A. Student entrance door does not open or close properly;
- B. Door control handle does not lock in the closed position; or
- C. Door is equipped with a padlock or similar locking device (excludes interlock systems).

Floor

Floor not maintained to prevent slipping or tripping by passenger(s).

Handrail

- A. Handrail loose or missing; or
- B. Handrail fails the nut/drawstring test as defined by NHTSA.

Panels

Any panel (e.g., ceiling, side or wheel well) protruding, having sharp edges or not secured so is likely to cause injury.

Seat (Driver)

- A. Driver seat is not securely fastened to vehicle and/or fails to maintain adjusted position (393.93); or

- B. Any part of the driver's safety restraint assembly is missing, not properly installed or defective as to prevent proper securement of occupant [393.93(a)(b)] (571.209).

Seat(s) and Barrier(s)

- A. Any seat or barrier that is not securely attached to the vehicle (393.91);
- B. Any seat or barrier material(s) that compromises the integrity of compartmentalization and occupant protection (571.222); or
- C. Seat spacing fails to comply with 571.222.

Stepwell

- A. Any part of the stepwell or support structure that is damaged; or
- B. Any part of the stepwell tread that is loose, torn or damaged that would present a tripping hazard.

BRAKE SYSTEM(S)

Adjustment

Any one brake beyond the adjustment limit (See Table 1: Brake Adjustment Specifications.)

Air System

- A. Absence of effective braking action upon application of service brakes [393.48 (a)] ©;
- B. Audible air leak at chamber (e.g., ruptured diaphragm, loose chamber clamp, etc.) [386.3(a)(1)] ©;
- C. If an air leak is discovered and either the primary or secondary reservoir pressure is not maintained when these conditions exist [396.3(a)(1)] ©:
 - 1. Governor is cut-in;
 - 2. Reservoir pressure is between 80-90 psi;
 - 3. Engine is at idle; and
 - 4. Service brakes are either fully applied or released; or
- D. ABS malfunction indicator light not functioning as designed or illuminated on all ABS required vehicles.

Axle Brakes, General

- A. Chamber size mismatched on axle [393.47(b)];
- B. Mismatched brake chamber long stroke verses regular stroke [393.47(b)]; or
- C. Mismatched slack adjuster length [393.47(c)].

Brake Shoe/Pad/Lining

- A. Any lining thickness less than allowed by 393.47;
- B. Lining pad is cracked, broken, not firmly attached or missing (393.47) (*surface or heat cracks in the lining should not be considered out of service*);
- C. The friction surface of drum, rotor or friction material are contaminated by oil, grease or brake fluid (393.47)Ⓢ;
- D. Loose or missing component (e.g., chambers, spiders, support brackets) (393.47);
- E. Fails to make contact with drum/rotor (e.g., frozen, binding, uneven) [393.48(a)];
- F. Absence of braking action on any axle (e.g., failing to move upon application of a wedge, S-cam, cam or disc brake);
- G. Rotor or drum has evidence of metal to metal contact on the friction surface [393.47(d)(1)]Ⓢ; or
- H. Brake pad, lining or shoe missing [393.47(a)].

Drums/Rotors

- A. External crack(s) that open upon application [393.47(a)]Ⓢ; or
- B. Any portion of the drum or rotor (discs) missing, broken, misplaced or cracked through rotor to center vent [393.47(a)].

Hoses and Tubing

- A. Brake hose with any damage extending through the outer reinforcement ply [393.45(a)]Ⓢ;
- B. Audible leak at other than a proper fitting or connection [393.45(a)]Ⓢ;
- C. Any bulge or swelling when brakes are applied [393.45(a)]Ⓢ;
- D. Any restriction due to cracked, broken or crimped line/hose [393.45(a)]Ⓢ; or

- E. Any line, tubing, hose or connection that is not constructed to meet standard (571.106).

Hydraulic Brake System

- A. System brake failure light or low fluid light on or inoperative (393.51);
- B. Reservoir is below minimum level [393.45(a)] (571.106) ©;
- C. Any seeping, leaking or swelling of hose(s) under pressure [393.45(a)] ©;
- D. Any leak in master cylinder unit [393.45(a)] (571.106);
- E. Any observable fluid leak in the brake system;
- F. Brake failure warning system is missing, inoperative, disconnected, defective, or activated while the engine is running with or without brake application [393.51(b)];
- G. ABS malfunction indicator light not functioning as designed or illuminated on all ABS required vehicles.

Parking Brake

- A. Fails to hold vehicle in stationary position on normal roadway conditions (absence of ice or snow) in forward or reverse (393.41) [571.105 S5.2.1 and S5.2.3(b)]; or
- B. Parking brake warning lamp fails to function as designed.

Pedal Reserve

No pedal reserve with engine running [393.40(b)].

Power Assist Unit

Fails to operate [396.3(a)(1)].

BUMPERS

- A. Front bumper is missing or not properly secured [393.203(e)]; or
- B. Rear bumper is missing or not secured (393.86).

CHASSIS/FRAME/UNIBODY

- A. Any cracked, loose, sagging or broken frame side rail [393.201(a)] ©;
- B. Any damage permitting the shifting of the body or imminent collapse of frame [393.201(a)] ©;

or

- C. Any cracked, loose, broken frame member affecting support of functional components (e.g., steering gear, engine, transmission, body part of suspension [393.201(a)]©.

Crossmembers

- A. Any crossmember, outrigger or other structural support which is cracked, missing or deformed that affects the structural integrity of the vehicle (393.201);
- B. Three or more adjacent crossmembers broken or detached (393.201); or
- C. Any area of the floor that is sagging or soft due to broken crossmembers (393.201).

Outriggers/Body Supports

Any crossmember, outrigger or other structural support which is cracked, missing, deformed or has rust holes where damage affects the safe operation of the vehicle.

DIFFERENTIAL

Cracked or leaking housing [393.207(a)].

DRIVESHAFT

- A. Driveshaft guard loose, missing, improper placement or bent (393.89); or
- B. Universal joint(s) worn or faulty, or obvious welded repair [393.209(2)(d)].

ELECTRICAL/BATTERY

Battery

- A. Battery not secured (393.30);
- B. Signs of leaking or excessive corrosion; or
- C. Battery lacks cranking capacity to start engine.

Cables

- A. Electrical cable insulation chafed, frayed, damaged or compromised insulation burnt, causing bare cable to be exposed [393.28, 396.3(a)(1)]©;
- B. Loose or corroded connections at battery posts or compromised insulation protection to

electrical components [393.28, 393.77(b), 396.3(a)(1)]; or

- C. Missing or damaged protective grommets insulating main electrical cables through metal compartment panels (393.30) ©.

Components

- A. Broken or unsecured mounting of electrical components [396.3(a)(1)] ©; or
- B. Electrical cable unsupported, hanging or missing clamps that may cause chafing or frayed conditions [393.28, 396.3(a)(1)] ©.

EMERGENCY EQUIPMENT

- A. Fire extinguisher missing, not of proper type or size, not fully charged, has no pressure gauge, is not secured or is not readily accessible to the driver or passengers (393.95);
- B. Any additional state-specific equipment (e.g., first aid kit, body fluid kit, webbing cutter and emergency reflectors) that fails to meet state specifications and places the vehicle out of service; or
- C. Missing emergency triangles (571.125).

EMERGENCY EXITS

- A. Any emergency door, window or roof hatch that fails to open freely or completely as defined in 571.217;
- B. Door prop-rod device is missing or inoperative (571.217);
- C. Any emergency exit is equipped with a padlock or similar locking device (excludes interlock systems);
- D. Any vehicle that lacks the required number of emergency exits (571.217);
- E. Any emergency exit that is not properly labeled and marked both inside and outside the vehicle as specified by 571.217;
- F. Any item or modification that reduces the size of the opening and limits egress to the emergency exit by all passengers; or
- G. Emergency exit warning device is not audible in the driver seating position and the vicinity of the emergency door or window (571.217).

ENGINE

- A. Any critical component that fails to function as designed (396.3); or
- B. Any fluid leak that would affect the safe operation of the vehicle (396.3).

EXHAUST SYSTEM

- A. The exhaust system is leaking or discharging directly below or at a point forward of the driver or passenger compartment [393.83(g)]©; or

Note: Does not apply to proper venting for emission systems.

- B. No part of the exhaust system shall be located and likely to result in burning, charring or damaging the electrical wiring, the fuel supply or any combustible part of the vehicle [393.83(a)]©.

FUEL SYSTEM

CNG or LPG Fuels©

- A. Any fuel leakage from the CNG or LPG system detected audibly or by smell and verified by either a bubble test using non-ammonia, non-corrosive soap solution, or a flammable gas detection meter [396.3(a)(1)].

Note: Verification is needed to ensure that the sound is not either internal to the fuel system (such as gas flowing in a pressure regulator, or pressure equalizing between manifold tanks) or a leak in the air brake system.

- B. Any fuel leakage from the CNG or LPG system detected visibly (evidence such as ice buildup at fuel system connections and fittings) and verified by either a bubble test using non-ammonia, non-corrosive soap solution, or a flammable gas detection meter [396.3(a)(1)].

Note: Some brief fuel leakage or decompression may occur during refueling, causing temporary frosting of CNG or LPG fuel system parts. If the vehicle has been refueled shortly before inspection, care must be taken to distinguish these temporary frosting occurrences from actual leaks.

Liquid Fuels

- A. Any part of the fuel tank or fuel system not securely attached to the vehicle (393.65);
- B. A fuel system with a dripping leak at any point (393.67 Tank)©;

- C. Dripping leak (396.3(a)(1) leak other than tank)Ⓢ; or
- D. Missing fuel cap or system does not seal as designedⓈ.

LAMPS/SIGNALS

- A. Any one of the following lamps that is not working: brake, turn signal, tail, head (low beam), school bus overhead warning light (amber or red), hazard warning or stop arm lamp (571.108, 571.131);

Note: vehicle LED lamps must have more than 25% of the diodes unlit to be considered not working.

- B. Horn fails to function as designed (393.81);
- C. Any critical brake, telltale lamp, buzzer or gauge that fails to function as designed;
- D. Required stop arm(s) fail to operate with overhead red lights as mandated (571.131); or
- E. If equipped, a crossing control device fails to extend and retract as designed.

MIRRORS (571.111)

- A. Any mirror required to provide the driver with the entire field of view, missing, damaged, clouded or otherwise obscured so as to place children in a hazardous position;
- B. Any crossover mirror system or portion thereof that fails to hold a set adjustment;
- C. Any crossover mirrors directed to view any area other than for which they were intended;
or
- D. Any part of the required field of vision obscured or not visible from the driver's seated position.

STEERING SYSTEM

Ball/Socket JointsⓈ

- A. Any movement under steering load of a nut stud [396.3(a)(1)];
- B. Any motion, other than rotational, between any linkage member and its attachment point of more than 1/8 inch measured with hand pressure only [393.209(d)]; or
- C. Any obvious welded repair [393.209(d)].

Front Axle Beam ©

Any crack(s) or obvious welded repair [396.3(a)(1)].

Nuts ©

Loose or missing fasteners on tie rod, pitman arm, drag link, steering arm or tie rod arm [396.3(a)(1)].

Pitman Arm ©

- A. Looseness of the pitman arm on the steering gear output shaft [393.209(d)]; or
- B. Any obvious welded repair [396.3(a)(1)] [393.209(d)].

Power Steering

- A. Auxiliary power assist cylinder loose [393.209(e)];
- B. Power steering system belts frayed, cracked or slipping [393.209(2)(e)]; or
- C. Power steering system leaking or insufficient fluid in reservoir [393.209(2)(e)].

Steering

- A. Any modification or condition that interferes with free movement of any steering component [393.209(d)] ©; or
- B. Steering travel restricted through the limit of travel in both directions [570.60(c)].

Steering Column/Wheel ©

- A. Absence or looseness of U-bolts or other positioning part(s) [393.209(c)];
- B. Welded or repaired universal joint(s) [393.209(d)];
- C. Steering wheel not properly secured [393.209(a)]; or
- D. Steering wheel lash/free play exceeds performance test (see Table #2) [393.209(b)].

Steering Gear Box ©

- A. Mounting bolt(s) loose or missing [393.209(d)];
- B. Crack(s) in gearbox or mounting brackets (393.209(d)) [396.3(a)(1)];
- C. Any obvious welded repair(s) [396.3(a)(1)] [393.209(d)]; or

- D. Looseness of yoke-coupling to the steering gear input shaft [393.209(d)].

Tie Rods/Drag LinksⓈ

- A. Loose clamp(s) or clamp bolt(s) on tie rod or drag link(s) [396.3(a)(1)]; or
- B. Any looseness in any threaded joint [396.3(a)(1)].

SUSPENSION COMPONENTS

Air SuspensionⓈ

- A. Deflated air suspension (one or more deflated air spring/bag) [393.207(f)]; or
- B. Air spring/bag is missing, broken, or detached at either the top or bottom (393.207(f)).

Axle Parts/Members

- A. Any U-bolt or other spring to axle clamp bolt(s) which are cracked, broken, loose or missing [393.207(a)]Ⓢ;
- B. Any axle, axle housing, spring hanger(s), or other axle positioning parts which are cracked, broken, loose or missing that results in shifting of an axle from its normal position [393.207(a)]Ⓢ ;
- C. Any worn (beyond manufacturer specifications) or improperly assembled U-bolt, shock, kingpin, ball joint, strut, air bag or positioning component [570.61 (a)];
- D. Any spring hanger, assembly part or portion of leaf which is broken, separated or missing [393.207(c)]Ⓢ; or
- E. Any broken coil spring [393.207(d)]Ⓢ.

TIRES/WHEELS/HUBS

Hub

- A. Excessive wheel bearing or kingpin play that exceeds ¼ inch [396.3(a)(1)], (570.61);
- B. Any bearing (hub) cap, plug, or filler plug that is missing or broken, allowing an open view into hub assembly [396.3(a)(1)];
- C. Smoking from wheel hub assembly due to bearing failure [396.3(a)(1)];

- D. When any wheel seal is leaking. This must include evidence of contamination of the brake friction material [396.5(b)];

Note: Grease/oil on the brake lining edge, back of shoe, or drum edge and oil stain with no evidence of fresh oil leakage are not conditions for an out-of-service violation.

- E. Lubricant is leaking from the bearing hub and is accompanied by evidence that further leakage will occur [396.5(b)]; or
- F. No visible or measurable of lubricant showing in bearing hub [396.5(a)].

Tires

- A. Any sidewall cut, worn or damaged to the extent that the steel or fabric cord is exposed [393.75(a)]Ⓢ;
- B. Any observable bump, bulge or knot related to sidewall or tread separation [393.75(a)]Ⓢ;
- C. Tire is flat or has noticeable leak [393.75(a)(3)]Ⓢ;
- D. Any front tire worn to less than $\frac{4}{32}$ inch [393.75(b)];
- E. Any rear tire worn to less than $\frac{2}{32}$ inch [393.75(c)];
- F. Any school bus operated with regrooved, recapped or retreaded tires on the front axle [393.75(d)]; or
- G. Any tire not of proper type (e.g., load range, size, mismatched on axle).

Wheels/Rims/Spiders

- A. Any nuts, bolts, studs, lugs or holes that are elongated, broken, missing, damaged or loose [393.205(b)];
- B. Any cracked or broken wheel or rim [393.205(a)]; or
- C. Any lock or slide ring broken, cracked, improperly seated, sprung or has mismatched rings [393.205(a)]Ⓢ.

WHEELCHAIR LIFT-EQUIPPED VEHICLES

- A. Wheelchair lift does not function as designed or is inoperable;
- B. Platform lift manufactured after April 1, 2005 must meet all the following criteria, (as referenced in FMVSS 403 and 404):

1. Jacking prevention;
 2. Manual backup operating mode;
 3. Interlocks to prevent forward or rearward mobility of the vehicle unless lift is stowed and lift doors are closed;
 4. Wheelchair retention device; and
 5. Platform outer barrier, inner roll stop and threshold warning device.
- C. Any hydraulic line leaking during lift operation;
- D. Wheelchair restraint system is missing, incomplete or improperly installed, loose, damaged or does not adhere to the securement manufacturer's recommendations; or
- E. Any required wheelchair occupant restraint system not in compliance (571.222).

WINDOWS

- A. Any glass or glazing that is broken through or missing (393.60);
- B. Any glass not of approved type [393.60(a)];
- C. Windshield has discoloration or other damage in that portion extending upward from the height of the topmost portion of the steering wheel but not including a two-inch border at the top and a one-inch border at each side of the windshield or each panel thereof, except as follows:
1. Color or tint applied by the manufacturer for the reduction of glare;
 2. Any crack not over ¼ inch long, if not intersected by another crack;
 3. Any damaged area that can be covered by a disc ¾ inch in diameter, if not closer than three inches to any other such damaged area; and
 4. Any damage to the driver's side area window(s) or chips, clouding or cracks that obscure the driver's vision [393.60©]; or;
- D. No operable defrosting and defogging system to clear the driver's windshield (571.103).

WINDSHIELD WIPERS

- A. Inoperative, missing or damaged wiper (393.78); or
- B. Wiper does not clean sweep area of driver's windshield (393.78).

RECOMMENDED SCHOOL BUS INSPECTION PROCEDURES

WARNING! Please **READ and FOLLOW** these instructions to avoid personal injury or death. Prior to performing any inspection procedures, always ensure that the vehicle is properly secured, wheels are chocked, and that the ignition key is controlled. Proper safety equipment should always be used.

When working on or around a vehicle, the following general precautions should be observed at all times:

- A. Park the vehicle on a level surface, apply the parking brakes and always chock the wheels.
- B. Always wear safety glasses and other appropriate safety gear.
- C. Stop the engine and remove ignition key when working under or around the vehicle.
- D. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.

BODY EXTERIOR

- A. Visually inspect the body exterior to ensure that there is not any panel, rub rail or trim that is loose, torn, dislocated or protruding from the surface of the bus that would create a hazard.
- B. All engine, battery or other doors must be securely mounted and properly installed.

BODY INTERIOR

Aisle

- A. Visually inspect the aisle to ensure that all aisles, including aisle (or passageway between seats) leading to emergency door are a minimum of 12 inches.
- B. Visually inspect to ensure that there are no obstructions in an aisle that would prevent passengers from egress to emergency exits.
- C. On school buses with a side emergency door, check that aisle space from center aisle to side of emergency door is 12 inches by measuring between the vertical line of the seat back and the face of the next seat cushion or bottom of a flip seat.
- D. On buses equipped with flip up seats, inspect to ensure the seat cushion rises to a vertical position automatically when not occupied.

Door, Entrance

Visually inspect and operate entrance door and inspect door to properly open and close without any obstruction of movement. Inspect manually operated door to make sure door will maintain an open and closed position. Door shall not have any locking device except for interlock systems. On power-operated entrance doors, the emergency release valve, switch or device to release the entrance door must be placed above or to the immediate left or immediate right of the entrance door and must be clearly labeled.

Floor

Visually inspect floor covering, aisle and cove molding strips for condition and adhesion. Check fastening holes for cracks, and check condition of rubber in aisle to ensure that there are no unsealed holes or cracks through the underside of the bus and that there is no damage to the coverings which could cause a trip or slip hazard.

Handrail

Handrail must be securely mounted and all OEM hardware present. Perform the NHTSA *Nut and String Test* as described and illustrated below.

Nut and String Test

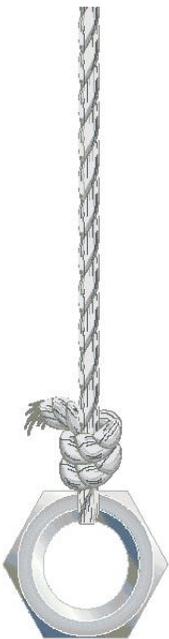
The Handrail Inspection Tool and Procedure

The inspection tool is inexpensive and the procedure for detecting potentially fatal handrail designs is quite simple. The inspection tool is a standard $\frac{1}{2}$ inch hex nut measuring $\frac{3}{4}$ inch across the flats. This nut is tied to $\frac{1}{8}$ inch thick cotton cord measuring 36 inches in length with overhand knots. The drawstring should have a minimum length of 30 inches, when tied to the nut and attached so that a pull of at least 10 pounds does not separate the nut from or break the drawstring.

Steps to conduct a handrail inspection are:

- Stand on the ground outside of the bus;
- Drop the inspection tool between the handrail and stepwell wall, simulating the typical way students exit the bus;
- Draw the inspection tool through the handrail in a smooth, continuous slow motion; and
- Repeat this procedure several times (minimum of three times).

Note: It is important to drop the inspection tool over the handrail in such a way as to simulate a child exiting the bus. This is a drop-and-drag test. Do not create a snagging



situation by placing the nut in an area that would not be exposed to a drawstring or other articles.

Inspection Results

Take the bus out of service and repair it if the inspection tool catches or snags anywhere on the handrail. If the nut separates from the drawstring or the drawstring breaks, reassemble the tool and retest. If the inspection tool pulls freely without catching or snagging, the bus should not be rejected.

Panels

Visually inspect all interior sidewall, rear, ceiling and driver's area paneling for secure fastening, projections or sharp edges and general condition.

Seat(s) and Barrier(s)

- A. Visually inspect all seats and barriers to ensure that all are securely mounted and not loose or broken.
- B. All seats shall be forward-facing and securely fastened to the bus body. Passenger seat cushions shall be fastened to prevent the cushions from disengaging from the seat frames in the event of an accident. There shall be a minimum space of 24 inches between the forward surface of a seat back and the rear surface of the seat or barrier ahead measured across the seat cushion without depressing any surface. The forward surface may have side bolsters that briefly reduce the width to less than 24 inches provided the remainder of the seat measures at least 24 inches.
- C. Seats and barriers should appear symmetrical. Seats/barriers that do not appear symmetrical should be physically inspected to ensure seat covering and/or padding is not significantly compromised and complies with FMVSS 571.222.

Seat, Driver

- A. Visually inspect driver's seat to ensure that it is securely fastened to the vehicle.
- B. Visually inspect the driver's seat for its ability to maintain the adjusted position. Inspect driver's restraining device (seat belt) for fraying, attaching hardware and the capacity of the seat belt for maintaining the driver in the seated position.

Stepwell

Visually inspect the stepwell for the condition of support structure to ensure structural stability. Inspect stepwell treads to ensure proper securing and adhesion to stepwell. Visually inspect step treads for any excessive worn areas that may pose a tripping or slip hazard.

BRAKE SYSTEMS

Air System

- A. With full system air pressure, depress the brake pedal and inspect each wheel-end brake to determine if effective braking forces are applied to each wheel-end brake. There should be no audible air loss at supply lines, fittings, valves or brake chambers.
- B. With full system pressure, make a single full-service brake application with the parking brake and ignition off. Note the gauges and listen for air leaks. Release the service brake.
- C. If an air leak is detected at any point in the inspection process, the inspector should check the vehicle's air loss rate following these procedures:
 - 1. Set engine at idle and release brakes;
 - 2. Reduce air pressure in reservoir to 80 psi;
 - 3. Make a full brake application with governor cut-in; and
 - 4. Check air pressure gauge after initial application for air loss. Air pressure should be maintained or increase. A drop in pressure indicates a serious air leak in the brake system.

Air Brakes Measurement

The following procedure is based on the applied stroke method for measuring the movement of the brake chamber push rod:

- A. Release the spring brakes and visually check each brake to ensure that it is in the normal released position.
- B. With the brakes released, make a mark where the pushrod exits the brake chamber.
- C. With the engine off, make a series of brake applications to reduce the reservoir pressure to between 90 to 100 psi.
- D. Apply and hold a full brake application (90 to 100 psi).

- E. Measure the distance between the mark and the face of the brake chamber. The difference between measurements is called the chamber applied stroke.

Note: *Any brake that is beyond the re-adjustment limit will require repairs and/or adjustment. (See Table 1: Brake Adjustment Specifications below.)*

Table 1: Brake Adjustment Specifications

Brake adjustment: Shall be less than those specifications contained herein relating to “Brake Adjustment Limit.” (Dimensions are in inches.)

Clamp Type Chamber Data			
Type	Rated Stroke Marking	Outside Diameter	Brake Adjustment Limit
6	A	4 1/2	1 1/4
9	B	5 1/4	1 3/8
12	B	5 11/16	1 3/8
16	D	6 3/8	1 3/4
20	D	6 25/32	1 3/4
24	D	7 7/32	1 3/4
30	E	8 3/32	2
36	(none)	9	2 1/4

“Long Stroke” Clamp Type Brake Chamber Data			
Type	Rated Stroke Marking	Outside Diameter	Brake Adjustment Limit
12	D	5 11/16	1 3/4
16	E	6 3/8	2
20 (2 1/2" Rated Stroke)	E	6 25/32	2
20 (3" Rated Stroke)	F	6 25/32	2 1/2
24 (2 1/2" Rated Stroke)	E	7 7/32	2
24 (3" Rated Stroke)	F	7 7/32	2 1/2
30	F	8 3/32	2 1/2

DD-3 Brake Chamber Data		
Type	Outside Diameter	Brake Adjustment Limit
30	8 1/8	2.25
<i>Note: This chamber has three air lines and found on motorcoaches.</i>		

Wedge Brake Data
The combined movement of both brake shoe lining scribe marks shall not exceed 1/8 inch (3.18mm).

Brake Shoe/Pad/Lining

- A. Visually inspect all brake linings/shoes/pads. Linings may be checked through inspection slots. All shoes/pads/linings shall comply with the applicable standards.
- B. The brake lining/pad thickness shall not be less than $\frac{3}{16}$ inch at the shoe center for a shoe with a continuous strip of lining, less than $\frac{1}{4}$ inch at the shoe center for a shoe with two pads, or worn to the wear indicator if the lining is so marked, for air drum brakes.
- C. The brake lining/pad thickness shall not be less than $\frac{1}{8}$ inch for air disc brakes, or $\frac{1}{16}$ inch or less for hydraulic disc brakes.
- D. Visually inspect the brake lining/pad to ensure that it is firmly attached to the shoe, is not cracked or broken, and that the friction surface is not saturated with oil, grease, or brake fluid.
- E. Visually inspect all brake components mounting hardware for any loose, cracked, broken or missing items. This inspection should be performed with the brakes released and with the brakes applied. It may be necessary to remove inspection access covers, brake dust covers or, in some instances, pull wheels and drums to accomplish the inspection.

Chamber Size

Visually inspect all brake chambers to ensure they are properly marked, in good operating condition, have no visible damage, and are properly matched. Chambers must be matched by size, type and stroke.

Drums/Rotors

- A. Visually inspect all brake drums/rotors for any external cracks that open when brakes are applied. (Do not confuse short hairline internal check cracks with flexural cracks.)
- B. Inspect for any portion of the drum/rotor missing or in danger of falling away.

Note: *It may be necessary to remove inspection access covers, brake dust covers or, in some instances, pull wheels and drums to accomplish the inspection.*

Hoses and Tubing

- A. Carefully perform a visual inspection of all system hoses, lines, and tubing.
- B. Inspect all hoses, lines, and tubing for any audible leak (if air), or visible leak (if hydraulic), any bulging/swelling when the system is pressurized, any hose, line, or tubing is cracked, broken or crimped in such a manner as to restrict flow, any hose abraded (chafed) through outer cover to fabric layer or any line/tubing, and for proper securement and support.

Hydraulic Brakes Measurement/**Pedal Reserve**

- A. With the brake pedal in the full upright position, the inspector shall measure the distance between the brake pedal and the floor or firewall. With the engine running, a single firm brake application shall be made and the distance between the brake pedal and the floor or firewall shall be measured a second time. The difference shall be recorded.
- B. With vehicle stopped and engine running, depress brake pedal. The system must be able to maintain brake pedal height under moderate foot force (40-60 pounds) for one minute without pumping. With vehicle in stopped position and brake pedal depressed under moderate foot force (40-60 pounds) there should be a minimum of $\frac{1}{3}$ of the total available pedal travel (manufacturer's specification) remaining on non-powered systems.

Hydraulic Brake System

- A. With the engine off, turn the ignition switch to the "on" position and check the instrument panel for visible and audible warning signals to indicate system malfunction. If bus is equipped with vacuum assist, it shall have a visible warning signal and gauge to indicate any loss of vacuum. Audible signals must be loud enough to be heard over engine noise.
- B. Visually inspect the master cylinder to determine if it is below the minimum fill requirements, is leaking, is loose or improperly mounted.
- C. Visually inspect the hydraulic fluid reservoir level in the master cylinder unit. Inspect for any fluid leaks on wheel cylinders/calipers, master cylinders, hose connection and hydrovac and on buses using vacuum-assisted brakes. Check for brake fluid around the brake booster between the booster and firewall.

Parking Brake

- A. With the engine operating and the park brakes set, place the transmission in both forward and reverse gears to determine if brakes will hold vehicle stationary.
- B. Visually and physically check condition of parking brake system and parking brake warning light.

Power Assist Unit

- A. Electric/Hydraulic Assist: With engine off, depress the brake pedal. The electric/hydraulic brake assist motor must operate.
- B. Hydrovac Assist: With engine off, the driver shall pump the brakes to exhaust all reserve. Hold firm pressure on the brake pedal and start the engine. The pedal should fall slightly. Failure of the pedal to fall slightly indicates a malfunction of the power-assist unit.

- C. Hydro-boost: After 2-3 brake applications with the engine off, start the vehicle while maintaining pressure on the brake pedal. The pedal should push briefly, and then fall as the power assist engages.

Slack Adjuster Length

Measure from the center of the S-cam to the center of the push rod clevis pin. All slack adjusters on a single axle shall be of the same type and length.

BUMPERS

Visually inspect front and rear bumpers for missing attaching hardware or broken hardware. Ensure bumpers are properly mounted and secure and there is no point protruding beyond the confines of the vehicle so as to create a hazard.

CHASSIS/FRAME/UNIBODY

- A. **Visually inspect frame for cracks, loose attaching hardware, sagging, broken, or unapproved welds to frame side rail or flange;**
- B. **Visually and physically inspect for body hold-down components for damage that would permit the shifting of the body; and**
- C. **Visually inspect for cracked, loose, bent, broken or unapproved welds to frame member that affect support of functional components (e.g., steering gear, engine, transmission, body parts or suspension). Welding to frame should be performed only by manufacturer or designee.**

Crossmembers

- A. **Visually and physically inspect all crossmembers, attaching hardware and other structural supports for cracks or deformations; visually inspect for three or more adjacent crossmembers that are missing, broken, damaged or loose; and**
- B. **Inspect any area of the floor that is sagging, weak or damaged due to broken, damaged or loose crossmembers.**

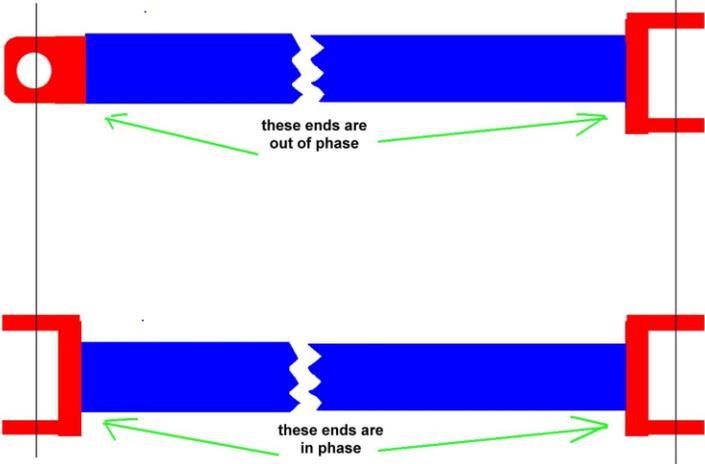
Outriggers/Body Supports

Visually inspect all outriggers and attaching hardware for cracks, missing bolts and damage.

DIFFERENTIAL

The Inspector shall visually inspect the differential and differential housing for cracks and leaks. Careful attention shall be made to the areas of mounting attaching hardware and wheel end areas. Housing vent shall be inspected to ensure that it is not clogged and is functional by twisting the vent cap by hand.

DRIVESHAFT

- A. Visually and physically inspect each segment of the driveshaft and associated hardware. Inspect for bends, cracks, missing weights or debris entangled in the shaft. Each shaft more than 18 inches long shall be equipped with a suitable guard to prevent an accident or injury in the event of its fracture or disconnection. The inspector shall check to ensure that the driveshaft guards are not loose, bent or missing.
- B. Visually and physically inspect each universal joint and center bearing. The universal joint(s) and center bearing(s) shall not be loose or worn and shall have all attaching hardware securely fastened. The inspector shall check for lateral and vertical movement of the universal joints and center bearing by grasping the universal joint laterally and vertically. Inspector shall inspect universal joints substandard or welded repairs.
- 
- C. Visually inspect driveshaft for proper phasing. (See illustration.)

ELECTRICAL/BATTERY

Battery

- A. Visually and physically inspect that the battery(ies) is(are) securely mounted and no signs of leaking, or excessive corrosion.
- B. Crank engine to ensure adequate battery capacity to start engine.

Cables

- A. Visually inspect all electrical cabling and wiring for chafed, frayed, damaged or burnt insulation.
- B. Visually and physically inspect for corroded or loose connections at the battery terminals. Inspect for unsuitable insulation to electrical cabling.

- C. Visually inspect for missing or damaged protective grommets insulating all electrical cables through metal compartment panels. All electrical cabling passing through a metal surface shall pass through an insulated grommet as to provide adequate protection against chaffing and shorting.
- D. Visually and physically inspect for any broken or unsecured mounting of electrical components.
- E. Visually and physically inspect electrical cabling for securement, routing or any unsecured wiring that may cause chafing or frayed conditions.

EMERGENCY EQUIPMENT

- A. Visually inspect that the fire extinguisher is readily accessible to the driver and passengers, that it is fully charged of proper type and size, is properly secured and has a working pressure gauge.
- B. Visually inspect any other state-required equipment such as first aid kits, body fluid kits, webbing cutters and emergency reflectors and ensure that these items are fully stocked, functional and properly secured.

EMERGENCY EXITS

- A. Visually inspect all emergency exits.
 - 1. Operate all emergency exits. Exits must open freely and completely.
 - 2. Door prop rods must operate freely and hold door or exit in open position without obstructing exit.
 - 3. There shall be no padlocks or any other locking devices on exits except interlocking systems.
- B. Visually inspect all exits to ensure they are clearly labeled and marked on both the inside and outside of the bus.
- C. Ensure that all exits have an audible device to alert the driver of an open exit door or window.

Note: FMVSS 571.217 defines the number of exits for each type of bus.

ENGINE

- A. Visually inspect engine and surrounding components for evidence of fluid leaks and loose or damaged components. Inspector shall start engine. While engine is operating, inspector shall visually and audibly monitor engine for proper operation, leaks and unusual noises of engine or components.
- B. Visually inspect cooling fan per manufacturer's recommendations.
- C. Visually and physically inspect all drive belts for proper alignment and tension per manufacturer's recommendations. All belts shall be free of cracking, frays, fluid, glazing and excessive wear. Inspect belt-tensioner per manufacturer's recommendations.
- D. Visually inspect all hydraulic, coolant, fuel and pneumatic hoses for damage, proper routing, proper type and proper securement. Hoses shall be routed in such a way as to avoid contact with exhaust, rotating or moving engine components or sharp edges. Hoses shall not be cracked, leaking, swollen or chaffed.

EXHAUST SYSTEM

- A. Visually and audibly inspect the complete exhaust system including muffler, diesel particulate filter (DPF) and diesel oxidation catalyst (DOC) for leaks, restrictions and damage and to ensure that exhaust is not discharging directly below the driver or passenger compartment. All exhaust emission control devices shall be installed and operating per the manufacturer's recommendations.
- B. Visually inspect for the presence and condition of heat shielding over and around all piping, and components where specified by vehicle manufacturer.
- C. Visually and physically inspect all exhaust system mounting hardware for loose, missing or damaged components and that it is securely attached. Inspect to ensure that all clamps are in place and secure.
- D. Visually inspect exhaust system for indications of, and areas likely to result in, burning, charring or damaging the electrical wiring, the fuel supply or any combustible part of the vehicle.

FUEL SYSTEM

- A. Visually inspect all parts of the fuel tank, fuel tank cage and fuel system to include lines, hoses, filters, fill cap and fittings for indications of damage or leaks.
- B. Visually and physically inspect fuel lines and hoses for proper securement, routing and

missing or loose clamps that may cause chafing or that may come in contact with electrical components.

LAMPS/SIGNALS

- A. Visually inspect all lamps, such as brakes, turn signals, tail, head (low beam), overhead warning lights (amber and red), hazard warning and stop arm lights to ensure proper visibility and operation. Turn signals should flash at a rate of 60 to 120 times per minute.
- B. Visually inspect that the horn functions and is audible from approximately 200 feet away.
- C. Visually inspect the crossing control device, if equipped, for proper operation (e.g., that it extends and retracts as designed).

MIRRORS

Visually inspect all mirrors to identify any mirror that is damaged, clouded or otherwise has an obscured area. All mirrors should hold a set adjustment. All mirrors should be directed to view the intended area for which they are designed.

STEERING SYSTEM

Ball and Socket Joints

- A. With the bus on the ground, the inspector shall examine the ball joint nut stud for movement while the steering wheel is being rocked in a back-and-forth action. The inspector shall examine the ball/socket joint for weld repairs.
- B. Check for lateral and vertical movement by grasping the tie rod and drag link sockets attempting to laterally and vertically move the ball joint. (Rotational movement will not be considered.) Any motion other than rotational, greater than $\frac{1}{8}$ inch that can be detected by movement with two hands with moderate strength in any connecting joint is a defect.

Hoses/Fluids

Visually examine the power steering fluid reservoir for proper fluid level. With the system operating, inspect all system components, hoses and fittings for leaks.

Nuts

Visually examine all tie rods, pitman arm, drag link, steering arm and tie rod arm for looseness and missing fasteners.

Pitman Arm

- A. While the steering wheel is being rotated in a back-and-forth motion; visually inspect the pitman arm and output shaft connection for looseness at the output shaft joint.
- B. The pitman arm shall also be visually inspected for damage, cracks or welded repairs.

Power Steering

- A. The inspector shall manually manipulate the auxiliary power assist cylinder to check for looseness. The inspector shall start the bus and rotate the steering wheel in a back-and-forth action to ensure the power steering pump is operable.
- B. With the engine stopped, visually inspect the system drive belt(s) for any fraying, cracks or fluid saturation. Check belt tension. On units equipped with automatic tensioner ensure that tensioner moves freely.
- C. Visually inspect the fluid reservoir while at operating temperature to ensure that the fluid level is not below "add" mark. Inspect for signs of fluid leakage.

Steering

- A. Visually inspect for any modification or other condition that interferes with free movement of any steering component. Turn steering wheel through a full right and left turn and feel for binding or jamming conditions. Both front wheels must be capable of being turned to full right or full left without binding or interference.
- B. Visually inspect turn stops by observing for shiny spots and/or signs of wear due to contact with other vehicle components on the sides of tires, drag links, pitman arm, shock absorbers or brake lines.

Steering Column/Wheel

- A. Visually inspect steering column for any looseness in bolts, clamps, positioning parts or universal joints. Inspect flexible coupling in steering column (if the vehicle is so equipped) for excessive misalignment and tightness of clamp bolt or nut.
- B. The steering column and components shall also be visually inspected for damage, cracks or welded repairs. Inspect steering wheel to ensure that it is properly positioned and secured.
- C. Place steering axle wheels in a straight-ahead position have an assistant turn the steering wheel until movement is observed at the left road wheel and measure the steering wheel movement from starting position to wheel movement position. Compare this measurement to the applicable listing in Table 2: *Steering Wheel Free Play*, below.

Table 2: Steering Wheel Free Play

Steering Wheel Free Play: Steering wheel free play shall not exceed the requirements listed in the following chart:

Steering Wheel Diameter	Manual System Movement 30	Power System Movement 45
16" (41cm)	2" (5.1cm)	4 1/2" (11.5cm)
18" (46cm)	2 1/4" (5.4cm)	4 3/4" (12cm)
20" (51cm)	2 1/2" (6.4cm)	5 1/4" (13.5cm)
22" (56cm)	2 3/4" (7cm)	5 3/4" (14.5cm)

Steering Gear Box

- A. Visually examine the steering gear box for any loose, damaged or missing mounting bolts. Inspect for cracks in the gear box, mounting brackets or any obvious welded repairs.
- B. While having an assistant rock the steering wheel back-and-forth; visually inspect the steering shaft and gear box for any looseness where the steering gear box is mounted to the frame. Visually inspect steering shaft coupler for cracks, damage or looseness.
- C. With the engine operating, inspect for excessive fluid and/or oil leak (observable movement of fluid).

Tie Rods/Drag Lin

- A. While having an assistant to rock the steering wheel back-and-forth, visually inspect the tie rod ends, crossbar and drag links for any looseness at the steering linkage pivot points.
- B. Check for lateral and vertical movement by grasping the tie rod and drag link sockets attempting to laterally and vertically move the ball joint (rotational movement will not be considered). Any motion, other than rotational, greater than 1/8 inch that can be detected by movement with two hands with moderate strength in any connecting joint is a defect.
- C. Check crossbar for structural damage and crossbar clamps for secure mounting.

SUSPENSION COMPONENTS

Axle Parts/Members

- A. Visually and physically inspect all front and rear axle components. Inspect all U-bolts and other suspension to axle mounting hardware for cracks, breaks, looseness or improper type.
- B. Visually inspect axle, axle housing, spring hanger(s), shackles or other axle components for alignment, cracks, breaks and loose or missing items that could result in shifting of an axle from its normal position.

- C. Visually inspect front axle beam for signs of improper repair (e.g., welding or heating).
- D. Visually inspect for any worn (beyond manufacturer's specifications) or improperly assembled U-bolt, shock, kingpin, ball joint, strut, air spring or positioning components.
- E. Visually inspect all leaf spring hangers, hanger assemblies or portions of leaf springs for broken, separated, sagging, bent, abnormally worn (beyond manufacturer specifications), shifted or missing components.
- F. Visually inspect pins and bushings for wear, off-center spring eye, rubbing shackle or non-symmetric joints. Inspect for any broken, weak or damaged coil spring and mounting assemblies.
- G. Visually and physically inspect all hydraulic shock absorbers for leaks, looseness, damage or missing components.
- H. Visually inspect air suspension (if equipped). Observe that the vehicle is lifting level. With the air system fully charged, inspect for any audible or visual air leakage at the air spring assembly, supply hoses and connections.

Caution: Inspector should use caution when positioned beneath the vehicle. There may not be sufficient room beneath the vehicle should a problem occur with the air suspension system.

TIRES/WHEELS/HUBS

Hub & Assemblies

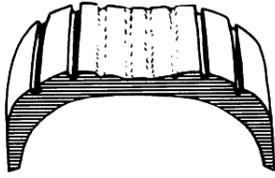
- A. Visually inspect kingpin and wheel bearing assemblies for looseness, damage, missing or loose fasteners. This shall include locking pins, draw keys, caps and bearings.
- B. Physically inspect kingpin and bearing assemblies for play as follows: with the tire raised off the ground, grasp tire at top and attempt to move the wheel assembly in and out. If movement is present, inspector can help to identify the source by following this procedure:

Have an assistant fully apply brakes while rechecking play. If movement disappears with brakes applied, then play is in the wheel bearings. If movement remains, it is most likely in the kingpin area. Assembly shall not have excessive kingpin play that exceeds .250 inch measured at outside edge of tire or wheel bearing movement that exceeds .010 inch measured at bearing hub.
- C. Visually inspect A-frames and bushings on Type A vehicles. Inspect bushings for wear, cracking, splitting, or severe extrusion from suspension parts.

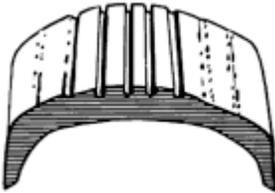
- D. For vehicles equipped with “wet hubs” or oil bath hubs the inspector should visually check the site glass for lubricant level.

Tire Inspection

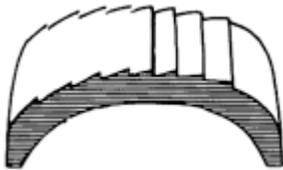
- A. Visually inspect that tires are properly inflated and do not have noticeable leaks. [See 393.76 (h)(1),(2)] If pressure is questionable, inspector shall use a tire pressure gauge to verify pressure.
- B. Visually inspect valve stem for damage and presence of valve cap.
- C. Visually inspect tire sidewall for cuts, wear and any observable bumps or bulges.
- D. Visually inspect for any front tire worn to less than $\frac{4}{32}$ inch.
- E. Visually inspect for any rear tire worn to less than $\frac{2}{32}$ inch.
- F. If a visual inspection cannot determine that the tire meets the minimum depth requirement, the inspector shall use a commercial tire depth gauge to verify tread depth.
- G. Visually inspect the steer axle (front) to ensure that no recapped, re-grooved tires are present.
- H. Visually inspect tires for improper wear patterns. (See Tire Wear Chart below.)
- I. Visually check proper type (i.e., load range, size, mismatched on axle).



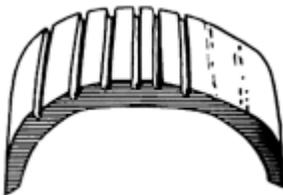
Over Inflation: Excessive wear at the center of the tread indicates that the air pressure in the tire is consistently too high. The tire is riding on the center of the tread and wearing it prematurely. Many times, this visual method of inflation (inflating the tires up until there is no bulge at the bottom) is at fault; tire inflation pressure should always be checked with a reliable tire pressure gauge.



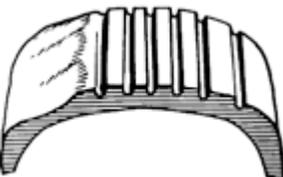
Under Inflation: This type of wear usually results from consistent under inflation. When a tire is under inflated, there is too much contact with the road by the outer treads, which wear prematurely. Tire pressure should be checked with a reliable pressure gauge. When this type of wear occurs, and the tire pressure is known to be consistently correct, a bent or worn steering component or the need for wheel alignment could be indicated. Bent steering or idler arms cause incorrect toe-in and abnormal handling characteristics on turns.



Feathering: Feathering is a condition when the edge of each tread rib develops a slightly rounded edge on one side and a sharp edge on the other. By running your hand over the tire, you can usually feel the sharper edges before you'll be able to see them. The most common cause of feathering is incorrect toe-in setting, which can be cured by having it set correctly. Occasionally toe-in will be set correctly and this wear pattern still occurs.



Side Wear: When an inner or outer rib wears faster than the rest of the tire, the need for alignment is indicated. There is excessive camber in the front suspension, causing the wheel to lean too much to the inside or outside and putting too much load on one side of the tire. Misalignment could be due to sagging springs, worn ball joints, worn control arm bushings or worn kingpin bushings.



Cupping: Cups or scalloped dips appearing around the edge of the tread on one side or the other, almost always indicate worn (sometimes bent) suspension parts. Adjustment of wheel alignment alone will seldom cure the problem. Any worn component that connects the wheel assembly to the vehicle (ball joint, kingpins, wheel bearing, shock absorber, springs, bushings, etc.) can cause this condition. Occasionally, wheels that are out of balance will wear like this, but wheel imbalance usually shows up as bald spots between the outside edges and center of the tread.

Wheels/Rims/Spiders

- A. Inspector shall inspect all nuts, bolts, studs, lugs and holes for damage. Visually inspect for broken, damaged, missing or loose fasteners. Rust around fasteners or on rim surface is sometimes an indication of cracked or loose mounting hardware.
- B. Visually inspect rim for, cracks, welds or broken components. Visually inspect for any lock or slide ring that is broken, cracked, improperly seated, sprung or has mismatched rings.

WHEELCHAIR LIFT-EQUIPPED VEHICLES

- A. Visually inspect and operate wheelchair lift to ensure proper function as designed. Inspect for any leaks that would hinder the operation of the lift.
- B. Visually inspect all safety systems of the wheelchair lift (e.g., hand rails, ramp stops, etc.) and ensure that they are functioning as designed and in compliance with FMVSS 403 and 404.
- C. Visually ensure that all pinch points are protected from seated passengers.
- D. Visually inspect all wheelchair and occupant securement devices to ensure none are missing or broken and that straps are not frayed.
- E. Visually inspect that all components for each wheel chair position are compatible with manufacturers' specifications.
- F. Visually and physically inspect all anchorage points, tracking and fasteners for securement.

WINDOWS

- A. Visually inspect all glass for missing or broken glazing and to ensure approved type [393.60(a)]; visually inspect windshield to ensure that there is no discoloration or damage in that portion extending upward from the height of the top-most portion of the steering wheel, but not including a two-inch border or at the top and a one-inch border at each side of the windshield or each panel thereof, except as follows:
 - 1. Color or tint applied by manufacturer for the reduction of glare;
 - 2. Any crack not over $\frac{1}{4}$ inch long, if not intersected by another crack;
 - 3. Any damaged area that can be covered by a disc $\frac{3}{4}$ inch in diameter, if not closer than three inches to any other such damaged area; and
 - 4. Any damage to the driver's side area window(s) or chips, clouding or cracks that obscure the driver's vision.
- B. Inspect the defrosting and defogging system to ensure that the driver's windshield is properly

cleared (571.103).

- C. Inspect windshield washer system to ensure proper operation.
- D. Visually inspect for any glass or glazing that is broken through or missing (393.60).
- E. Visually inspect for any glass not of approved type [393.60(a)].
- F. Visually inspect windshield to ensure there is no discoloration or other damage in that portion extending upward from the height of the topmost portion of the steering wheel, but not including a two-inch border at the top and a one-inch border at each side of the windshield or each panel thereof, except as follows:
 - 1. Color or tint applied by the manufacturer for the reduction of glare;
 - 2. Any crack not over $\frac{1}{4}$ inch long, if not intersected by any other crack;
 - 3. Any damaged area, that can be covered by a disc $\frac{3}{4}$ inch in diameter, if not closer than three inches to any other such damaged area; or
 - 4. Driver's side area window(s) have no chips, clouding, or cracks that obscure the driver's vision [393.60(c)].
- G. No operable defrosting and defogging system to clear the driver's windshield (571.103).

WINDSHIELD WIPERS/WASHERS

Operate wiper and washer system. The wiping system should be power-driven with at least two speeds and should be able to clean the area of the windshield within the wiping pattern. Wipers should operate with a minimum of 45 cycles per minute.