**Section 438.APPENDIX A Battery or Batteries through Exhaust System**

a) BATTERY OR BATTERIES

PROCEDURES/SPECIFICATIONS:

A minimum of one battery must be installed. Two or more suitably connected batteries may also be installed.

Battery or batteries must be securely mounted and free of excessive corrosion.

REJECT VEHICLE IF:

Battery or batteries are not securely mounted or are excessively corroded.

b) BATTERY CABLES

PROCEDURES/SPECIFICATIONS:

Check condition.

REJECT VEHICLE IF:

Cables are corroded or are not securely attached.

c) BRAKES

1) SERVICE BRAKES (AIR)

PROCEDURES/SPECIFICATIONS:

Must be equipped with service brakes on all wheels. (See IVC Section 12-301(a)(5).)

Service brakes must provide braking action on any axle required to have brakes. Application of service brakes could cause the vehicle to reduce speed without creating steering problems. All brake components must be in good condition. Brake linings or pads must be clean, securely attached and of sufficient thickness. There must be no mismatch of air chamber sizes and slack adjuster lengths across the steering axle of any power unit.

Exception: If the vehicle was manufactured before July 25, 1980 and has 3 or more axles, brakes are not required on the front wheels. However, if two of those axles are steerable, one of them shall have brakes on all wheels.

AGENCY NOTE: Prior to inspecting any components located under the vehicle, be sure wheels have been chocked.

Observe braking action while service brakes are applied. Inspect for the absence of braking action on any axle required to have brakes. An example of absent braking action includes missing brakes or brake shoes that fail to move upon application of a wedge, S-cam, cam or disc brake.

When the following brake components are visible, inspect for good working condition and secure attachment:

Shoes

Lining

Pads

Springs

Anchor Pins

Spiders

Cam Shaft Support Brackets

Cam Rollers

Push Rods (Air Only)

Air Chamber (includes Mounting Bolts) (Air Only)

Inspect air brake chamber for any audible air leaks (examples include ruptured diaphragm, loose chamber clamp, etc.).

REJECT VEHICLE IF:

Absence of braking action on any axle required to have brakes.

Visible brake components are broken or not secure.

Audible air leak at brake chamber.

**Brake Performance Test**

PROCEDURES/SPECIFICATIONS:

If Using Drive-On Pad Type Brake Tester:

Check vehicle's stopping ability before testing.

Drive vehicle onto brake machine pads at 4 through 8 m.p.h.

Apply service brakes to bring vehicle to a halt. Do not lock wheels.

Note the braking forces registered by the brake machine.

If Using Roll-On Type Tester:

Each axle must be tested separately. Transmission must be in neutral when testing brakes on any drive axle. Check vehicle's stopping ability before testing.

Drive front axle onto rollers and start roller motor.

Apply service brakes but do not lock the wheels.

Note the braking forces registered by the brake machine.

Repeat the above steps for each axle.

The total braking force on a vehicle must be determined by adding the results of the test on each axle.

REJECT VEHICLE IF:

Drive-On Tester:

Machine does not register a total braking force of at least 60% of the vehicle empty weight. Braking forces at opposite wheels on same axle vary more than 20%.

Computerized tester does not register a total braking force of at least 45% of the vehicle empty weight.

Roll-On Tester:

Machine does not register a total braking force of at least 60% of the vehicle empty weight. Braking forces at opposite wheels on same axle vary more than 20%.

2) Brake Linings AND Pads

Inspect brake linings and pads for firm attachment to the brake shoe.

Inspect linings and pads for oil, grease or brake fluid saturation.

Measure brake linings for minimum thickness:

Air drum brakes – thickness must measure at least ¼ inch at the shoe center.

Air disc brakes – thickness must measure at least ⅛ inch.

Hydraulic brake linings or pad thickness must measure more than 1/16 inch.

REJECT VEHICLE IF:

Any brake lining or pad is not securely attached to the shoe.

Any brake lining or pad is saturated with oil, grease and/or brake fluid.

Brake linings with a thickness less than ¼ inch at the shoe center for air drum brakes; less than ⅛ inch for air disc brakes; 1/16 inch or less for hydraulic brake linings or pads.

3) AIR CHAMBER SIZE AND SLACK ADJUSTOR LENGTH

PROCEDURES/SPECIFICATIONS:

Inspect the steering axle to determine if air chamber sizes and slack adjuster lengths are the same.

REJECT VEHICLE IF:

Air chamber sizes and slack adjuster lengths are not the same on the steering axle.

4) PARKING BRAKE SYSTEM

PROCEDURES/SPECIFICATIONS:

Upon actuation of the parking brake control, including driveline hand controlled parking brakes, the brakes must be activated on the vehicle.

Apply parking brake control and determine if brakes have been activated.

REJECT VEHICLE IF:

Brakes on the vehicle are not activated when parking brake controls are applied.

Actuating mechanism does not fully release when brake control is operated.

5) BRAKE DRUMS OR ROTORS

PROCEDURES/SPECIFICATIONS:

The brake drums and rotors shall be free of cracks that open when brakes are applied. The brake drums and rotors shall not have any portion missing or in danger of falling away.

Inspect brake drums and rotors for overall integrity to identify if any portions are missing or if there are any flexural cracks.

AGENCY NOTE: A flexural crack is a crack resulting from the drum or rotor being "flexed" at a turn or bend in the metal. Caution should be taken to insure that short hairline heat cracks are not confused with flexural cracks.

REJECT VEHICLE IF:

Any drum or rotor has a portion missing or in danger of falling away.

Any flexural crack in the drum or rotor opens when the brakes are applied.

6) Brake Hose

PROCEDURES/SPECIFICATIONS:

All brake hoses shall be properly connected and free from damage or leaks.

Inspect hose for damage extending through outer reinforcement ply.

Agency Note: Rubber impregnated fabric cover is not a reinforcement ply. Thermoplastic nylon may have braid reinforcement or color difference between cover and inner tube. Exposure of second color is cause for rejection.

Inspect for any bulge or swelling when air pressure is applied.

Inspect for any audible leaks.

Inspect for two hoses improperly joined, such as a splice made by sliding hose ends over a piece of tubing and clamping hose to tube.

Inspect for cracked, broken or crimped hoses.

REJECT VEHICLE IF:

An audible leak is present in brake hoses.

A bulge or swell is present when air pressure is applied.

Hoses are cracked, broken or crimped.

7) BRAKE TUBING

PROCEDURES/SPECIFICATIONS:

Brake tubing must be free of leaks and damage from heat and must not be cracked, broken or crimped.

Inspect brake lines throughout the vehicle with special attention to areas where tubing may be subjected to stress to identify:

Any audible leaks;

Cracked tubing;

Tubing damaged by heat; or

Broken or crimped tubing.

REJECT VEHICLE IF:

Brake tubing:

Leaks;

Is damaged from heat; or

Is cracked, broken or crimped.

8) LOW PRESSURE WARNING DEVICE

PROCEDURES/SPECIFICATIONS:

The low pressure warning device must be properly installed and in good working condition.

Complete the following steps to evaluate the low pressure warning device:

Start the engine.

Apply service brakes and release until air compressor is activated.

Continue to run engine until compressor cut out pressure is reached.

Record compressor cut out pressure.

Shut off engine.

Apply brakes and release until low air pressure warning device functions.

Determine if low pressure warning device (audible or visible) is missing or inoperative.

Record the reading found on the pressure gauge at which the low pressure warning device functions.

REJECT VEHICLE IF:

Missing or inoperative low pressure warning device.

Low pressure warning device does not operate at 55 psi or one half cut-out pressure, whichever is less.

9) AIR COMPRESSOR

PROCEDURES/SPECIFICATIONS:

Air compressor must be securely mounted with brackets, braces or adapters in good order and with the pulley and belts in proper condition.

Visually inspect air compressor to identify:

Loose air compressor mounting bolts;

Air compressor mounting brackets, braces or adapters that are cracked or broken;

Drive belts in condition of impending or probable failure; or

Cracked, broken or loose pulley.

REJECT VEHICLE IF:

Air compressor is not securely mounted.

Mounting brackets, braces or adapters are cracked or broken.

Drive belt or belts in condition of impending or probable failure.

Pulley is cracked, broken or loose.

10) HYDRAULIC BRAKES (INCLUDING POWER ASSIST OVER HYDRAULIC AND ENGINE DRIVE HYDRAULIC BOOSTER)

PROCEDURES/SPECIFICATIONS:

A hydraulic brake system must have a sufficient supply of brake fluid. Fluid lines and hoses must be in good working order, with no leaks. Components must function as required.

Examine the hydraulic brake system to determine if the:

Master cylinder fluid is not below the manufacturer's minimum indicator line.

Brake pedal has no reserve when engine is running, except by pumping pedal.

Power assist unit fails to operate.

Brake hoses seep or swell with application of brake pressure.

Metering valve is missing or inoperative (if vehicle is so equipped).

Examine the hydraulic brake system to determine if:

A leak is observed in the brake system.

Any brake hose is abraded or chafed through outer cover-to-fabric layer.

Any fluid line or connections are leaking, restricted, crimped, cracked or broken.

Brake failure or low fluid warning light is on or inoperative.

REJECT VEHICLE IF:

Master cylinder fluid is below the manufacturer's minimum indicator line.

Brake pedal has no reserve when engine is running, except by pumping pedal.

The power assist unit fails to operate.

Brake hoses seep or swell with the application of brake pressure.

The metering valve is missing or inoperative (if vehicle is so equipped).

A leak is present in the brake system.

Any brake hose is abraded or chafed through outer cover-to-fabric layer.

Any fluid line or connections are leaking, restricted, crimped, cracked or broken.

Brake failure or low fluid warning light or lights are on or inoperative.

11) VACUUM BRAKE SYSTEMS

PROCEDURES/SPECIFICATIONS:

Any vacuum system must have sufficient vacuum reserve to permit one full application of brakes after engine is shut off. Hoses and lines must be in good condition. Any full vacuum system must be equipped with an operative low vacuum warning device.

Determine that sufficient vacuum reserve is present after engine is shut off to allow one application of brakes.

Examine hoses and lines. Insure that the lines and hoses contain:

No restrictions;

No abrasions (chafing) through outer cover to cord ply;

No crimps, cracks or breaks; or

Any area of collapse in the hose when vacuum is applied.

Physically examine the low vacuum warning device (if vehicle is so equipped) to insure that it is present and operable.

REJECT VEHICLE IF:

Insufficient vacuum reserve for one application of brakes.

Any condition listed in the third paragraph above is present.

Missing or inoperable low vacuum warning devices.

d) BUMPERS

PROCEDURES/SPECIFICATIONS:

Inspect front bumper for secure attachment. Inspect rear bumper, if vehicle is so equipped. (See Section 438.20 for definition of bumper.)

Exception: Vehicles with a GVWR of more than 9,000 lbs. are exempt from having a rear bumper. (See Section 12-608(a) of the Illinois Vehicle Equipment Law.)

REJECT VEHICLE IF:

The front bumper is missing or loosely attached. If vehicle is required to have a rear bumper, it is missing or loosely attached.

e) DOORS

PROCEDURES/SPECIFICATIONS:

If vehicle is equipped, inspect door latches and handles for proper operation.

REJECT VEHICLE IF:

The door does not operate properly (if the vehicle is so equipped).

f) EXHAUST SYSTEM

PROCEDURES/SPECIFICATIONS:

If vehicle is so equipped, inspect the manifold, muffler, resonator, all pipes, gaskets and supporting hardware.

The exhaust system must be located outside the vehicle's body and attached securely to the vehicle.

The exhaust system must not leak and must discharge outside the perimeter of the vehicle's body or must meet manufacturer's original design.

REJECT VEHICLE IF:

Any part of the system is not securely supported.

Any part of the system is leaking.

Any part of the system contains holes not made by manufacturer.

Any part of the system passes through the passenger compartment.

Exhaust discharge does not exit outside the perimeter of the vehicle's body or does not meet manufacturer's original design.

Any exposed exhaust stack does not have a protective shield or insulated lining to prevent burns.