

SCHOOL BUS CHASSIS

ITEM AND METHOD OF INSPECTION: POINT VALUE AND REQUIREMENTS
DESCRIPTION

(#) DESIGNATES POINTS TO BE DEDUCTED

<p>V. Chassis</p> <p>A. Mainleaf - including MOR-RYDE, etc. Inspection Procedure: Examine front and rear end suspension parts for conditions indicated at right.</p>	(25)	A	<p>1. A suspension system shall not have any broken, missing or loose main leaf springs, u-bolts, shackles, radius rods or other defective components likely to cause or permit an axle shift or cause an accident.</p>
<p>2. Capacity</p>			<p>2. The capacity of the springs or suspension assembly must commensurate with the chassis manufacturer's gross vehicle weight rating.</p>
<p>3. Spring type.</p>			<p>3. If rear springs are used, they must be of the progressive type.</p>
<p>B. Spring leaves: over 25% broken</p>	(25)	B.	<p>A suspension system utilizing leaf springs shall not have 25% or more of the support leaves in a leaf spring stack, other than a main leaf, broken, missing, loose, shifted or other condition likely to cause an axle shift, contact with the tire or accident.</p>
<p>C. Spring leaves: less than 25%</p>	(10)	C.	<p>A suspension system utilizing leaf spring having 25% or less broken support leaves in a leaf spring stack, other than a main leaf.</p>
<p>D. Shock Absorbers A school bus must be equipped with front and rear double acting shock absorbers compatible with the manufacturer's rated axle capacity.</p>	(10)	D.	<p>Shock absorber mountings, shackles, and u-bolts shall be securely attached. Shock absorbers shall not be leaking.</p>
<p>E. 20% or more bolts broken or missing.</p>	(25)	E.	<p>Wheels shall not have 20% or more lug bolts broken, missing, or missing studs.</p>

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| <p>F. Less than 20% lug bolts broken or missing.</p> | <p>(10)</p> | <p>F.</p> | <p>Wheels with one stud or lug nut broken or missing if it is less than 20% of total.</p> <p style="margin-left: 40px;">MS.169.47
CFR 49/570.61-.63</p> |
| <p>G. Wheel - Examine visually for the conditions indicated at the right.</p> | <p>(25)</p> | <p>G. 1.</p> | <p>A tire rim, wheel disc. or spider shall have no visible cracks, elongated bolt holes, or indications of in-service repair by welding.</p> <p style="margin-left: 20px;">2. Cast wheels shall not be cracked or show evidence of excessive wear in the clamp area.</p> <p style="margin-left: 20px;">3. All wheel nuts shall be in place and tight.</p> |
| <p>H. Cross members - floor sills</p> | <p>(2)</p> | <p>H. 1.</p> | <p>Primary - two consecutive primary sills having cracks through the sill shall be cause for replacement of at least one sill.</p> <p style="margin-left: 20px;">2. Secondary - rusted or cracked secondary sill shall be repaired.</p> |
| <p>I. Drive Shaft Guard</p> | <p>(25)</p> | <p>I.</p> | <p>Drive shaft shall be protected by adequate metal guard or guards. There should be a guard for each section of drive shaft.</p> |

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| J. Frame | (25) | J. 1. The frame or its equivalent must be designed to correspond at least to standard practice for trucks that have the same general load characteristics and that are used for highway service. Any person or secondary manufacturer that modifies the original chassis frame shall guarantee the performance of workmanship and materials resulting from the modification. Any frame modification must not be for the purpose of extending the wheelbase. |
| 1. Requirement | | <p>Extensions of frame lengths are permissible only when such alterations are behind the rear hanger of the rear spring or in front of the front spring hanger. Holes in top or bottom flanges of the frame side rail must not be permitted except as provided in the original chassis frame. Frame lengths shall be provided in accordance with School Bus Manufacturers' Institute design objectives.</p> <p>CFR 49/570.63 3520.4570</p> |
| 2. Frame Welding | | 2. There must be no welding to frame side rails except as provided or excepted by body or chassis manufacturer. |

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| 3. Trailer Hitch Installation | 3. Welding for installation of trailer hitch is permissible.

M.S. 169.4501 |
| 4. Frame Members | 4. The frame shall not have cracked or broken frame members. |
| K. 1. Body Mounting | (10) K. 1. Chassis frame shall extend to rear edge of rear body cross member. Bus body shall be attached to chassis frame in such manner as to prevent shifting or separation of body from chassis under severe operating conditions. Body front shall be attached and sealed to chassis cowl in such manner as to prevent entry of water, dust, and fumes through joint between chassis cowl and body. All openings between the chassis and passenger carrying compartment must be sealed after body manufacture.

M.S. 169.4501 |
| 2. Cushion | 2. Insulating material shall be placed at all contact points between body and chassis frame. Insulating material shall be one-fourth inch minimum |

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				thickness, shall have quality of sidewall automobile tire, and shall be so attached to chassis frame or body member that it will not move under severe operating conditions.
3. U-bolts	(25)	3.	Check all u-bolts that attach the body to the frames. See that they are secure.	
L. Fuel Systems	(0)	L. 1.	The fuel tank or tanks having a minimum capacity of 30 gals. must be provided by the chassis manufacturer.	
1-6. Requirements	(10)	2.	The fuel tank must be filled and vented to the outside of the body so that accidental fuel spillage will not drip or drain on any part of the exhaust system.	
* Visible fuel leak in system automatically places the bus out of service.	(10)	3.	The portion of the fuel system that is located to the rear of the engine compartment, except the filter tube, must not extend above the top of the chassis frame rail. The fuel lines must be mounted to obtain maximum possible protection from the chassis frame.	
	(10)	4.	The fuel filter with a replaceable element must be installed between the fuel tank and the engine.	

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| | (10) | 5. | The fuel tank must meet the national standards that apply for the type of fuel used. |
| | (10) | 6. | In rear engine powered buses, the fuel system must have the fuel tank or tanks located ahead of the engine compartment. |
| 7-8. | (10) | 7. | Flexible gasoline and oil proof connection shall be provided at engine end of fuel line. Tank shall be equipped with adequate baffles. Engine supply line shall be taken from top of tank. Drain plug of at least one-fourth inch diameter shall be located in center of bottom of tank. Fill-pipe cap shall be of such design as to minimize spillage of fuel when bus turns corners in either direction. If venting of fuel tank is done other than through fill-pipe cap, caps shall be non-vented type. Fuel filter with replaceable element shall be installed between fuel tank and carburetor. Fuel tank, fitting, or lines shall not extend above top of chassis frame rail.

CFR 49.571.301 |
| | | 8. | a. If tank sizes other than 30 gallons are specified, location of front of tank and filler spouts must remain as specified in 7 and parts A, B, and C. |

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Measurements shown in 1 to 7 and 2, 3, and 4 are for guidance of chassis manufacturers and serve only to prevent need for replacement of original tank. Inspectors concerned with state or local approval of vehicle need not consider them unless tank does not fit.

- 1) Tank shall not extend in height above side member of member of chassis.
- 2) Distance from center line of chassis to outside of tank shall not be more than 39 inches.
- 3) Bottom of tank shall not be more than 14 inches below top of frame.
- 4) Distance from cowl to front of tank shall be 42" minimum.
- 5) Distance from cowl to center of fill pipe shall be 57".
- 6) Distance from center line of chassis to center of fill pipe cap shall be 44" with plus or minus tolerance of one-half inch permitted.
- 7) Center of fill-pipe cap shall be one inch below top of frame with plus or minus tolerance of one fourth inch permitted.

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| d. Exception for vehicles of less than 54 passengers capacity constructed for transporting handicapped children. | d. Fuel tank may be located behind rear wheels, inside or outside chassis frame, with fill-pipe located on right side of body. |
| 9. Requirements for all | 9. All fuel tanks must have secure straps on fuel tanks and must not deviate from manufacturers' specifications. |
| | (10) a. 50% or more broken |
| | (10) b. Less than 50% broken. |
| 10. Liquefied Petroleum | 10. Liquefied petroleum gas (LPG) and Compressed Natural Gas (CNG).

Installations on school buses must meet National Fire Protection Association Standard Number 58 for "Installation of LP Gas System on Vehicles" as adopted by reference in the Minnesota Uniform Fire Code and FMVSS 304 compressed Natural Gas fuel container integrity. A school bus powered by liquefied petroleum or natural gas must display markings as required by Minnesota Statutes, section 169.762. |
| | a. The tank pressure is 312.5 psig. Stop fill devices are required on tanks manufactured after June 30, 1983. Relief valve piping must discharge upwards within 15° of vertical. |
| b. Locations Prohibited | b. Containers shall not be mounted on roofs or ahead of front axle or beyond the rear bumper of the vehicles. It shall not protrude beyond the sides or top of the vehicle at the point |

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- where it is installed. Containers will not be allowed on the interior of a school bus.
- c. Road Clearance c. The containers shall be installed with as much road clearance as practicable. This clearance shall be measured to the bottom of the container or the lowest fitting, support or attachment on the container or its housing.
- d. Deformation Resistance d. Fuel containers must be securely mounted to prevent jarring loose and slipping or rotating and the fastenings shall be designed and constructed to withstand without permanent visible deformation static loading in any direction equal to four times the weight of the container filled with fuel.
- e. Locations e. Containers shall be located in a place and in a manner to minimize the possibility of damage to the container and its fittings. Containers located in the rear of the vehicle, when protected by substantial bumpers, shall be considered in conformance with this requirement. In case a fuel container must be installed near the engine or exhaust system, it shall be shielded against direct heating. Liquefied petroleum fuel systems must meet gasoline engines rules on heat shield.

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M. Speedometer	(10)	M. 1. A chassis must be equipped with an operational speedometer which must be easily accessible for repair and maintenance.
2. Mounting	(2)	2. The speedometer must be mounted on the instrument panel to be clearly visible to the driver in a normal driving position (exception: tacograph does not have to be mounted in instrument panel).
3. Illumination	(2)	3. The instrument panel must have lamps of sufficient candle power to illuminate all instruments.
N. Battery and alternator	(10)	1. The storage battery, as established by the manufacturer's rating must be of sufficient capacity to care for starting, lighting, signal devices, heating, and other electrical equipment in Minnesota.
2-4. Amperage required before 7/1/89		2. No bus shall be equipped with a battery system of less than 150 ampere hours at 12 volts, measured at 20 hour rate (negative ground system only).
		3. Option: Battery system of at least 90 ampere hours may be installed in engine compartment and shall be used only in combination with generator or alternator of at least 120 amperes.
		4. When a battery is to be mounted outside of engine compartment, it may be temporarily mounted to chassis. Body company will permanently mount battery on

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			sliding tray located so that centerline of battery is 52 inches back of cowl. One piece, one gauge battery cables shall be provided by chassis manufacturer, such cables to be at least 36" longer than normally required to accommodate battery when located 52" to rear of cowl.
5-10. Amperage required after 7/1/89 and before 1/1/95.	(10)	5.	In a bus with a gas-powered chassis, the battery or batteries must provide a minimum of 800 cold cranking amperes.
	(10)	6.	In a bus with a diesel powered chassis, the battery or batteries must provide a minimum of 1,070 cold cranking amperes.
		7. a.	It is optional to use a 550 cold cranking ampere battery installed in the engine compartment if the battery is used in combination with a generator or alternator of at least 120 amperes. NOTE: This option applies to gas-powered only.
		b.	A bus with a gross vehicle weight rating of more than 10,000 pounds, but not more than 15,000 pounds GVWR may be equipped with a battery to provide a minimum of 475 cold cranking amperes if used only in combination with an alternator of at least 80 amperes. (Does not apply to wheelchair buses.)

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| | (10) | 8. | When a battery is to be mounted on a sliding tray rather than the standard installation provided by the chassis manufacturer, the final location of the battery and the appropriate cable lengths shall agree with the SBMI Design Objectives, January, 1985 edition. |
| 9. Alternator Belts | (10) | 9. | <p>a. Alternator belts shall not be damaged or broken.</p> <p>b. Dual belts are required on Type I buses over 15,000 lbs. unless belt is a wide single belt with longitudinal multi-grooves.</p> <p>c. School buses under 15,000 gross vehicle weight rating with a wheelchair lift must use a 2 belt system on the alternator. Wide single belt with longitudinal multigroove is acceptable.</p> |
| 10. Alternator | | 10. | a. Must have 100 amp output with minimum charging rate of 30 amp at idle. |
| 11.-15. Amperage required after 12/31/94. | (10) | 11. | In a bus with a gas powered chassis, the battery or batteries must provide a minimum of 800 CCA. |
| | | 12. | In a bus with a diesel powered chassis, the battery or batteries must provide a minimum of 1050 CCA. |
| | | 13. | a. In a Type C bus powered by other than diesel fuel, a battery providing at least 550 CCA installed in the engine compartment may be used only in combination with an alternator of 120 amperes. |

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- b. A bus with a GVWR of 15,000 pounds or less, a battery with a minimum of 550 CCA may be used only in conjunction with an alternator of 130 amperes. (This does not apply to busses with diesel engines or wheel chair lifts.)
14. Alternator Belts (10) 14. a. Alternator belts shall not be damaged or broken.
- b. Belt drive shall be capable of handling the rated capacity of the alternator with no detrimental effect on other driven components.
- c. Direct drive alternator is permissible in lieu of belt drive.
15. Alternator (10) 15. a. All Type A and B buses up to 15,000 GVWR shall have a minimum 100 ampere alternator.
- b. Type B buses over 15,000 GVWR and all Types C and D buses shall be equipped a heavy duty truck or bus type alternator meeting SAEJ 180; having a minimum output of 100 amperes.
- c. Type A and B buses up to 15,000 GVWR equipped with electrical lifts shall have a minimum of 100 ampere alternator.
- d. Bus must be capable of providing enough current at 1400 RPM's to provide a positive charge to the battery with 80 percent maximum load with all lights and accessories on.