

**§ 229.77**

(f) A flange worn to a  $\frac{7}{8}$  inch thickness or less, gauged at a point  $\frac{3}{8}$  inch above the tread.

(g) A tread worn hollow  $\frac{5}{16}$  inch or more on a locomotive in road service or  $\frac{3}{8}$  inch or more on a locomotive in switching service.

(h) A flange height of  $1\frac{1}{2}$  inches or more measured from tread to the top of the flange.

(i) Tires less than  $1\frac{1}{2}$  inches thick.

(j) Rims less than 1 inch thick on a locomotive in road service or less than  $\frac{3}{4}$  inch on a locomotive in yard service.

(k) A crack or break in the flange, tread, rim, plate, or hub.

(l) A loose wheel or tire.

(m) Fusion welding may not be used on tires or steel wheels of locomotives, except for the repair of flat spots and worn flanges on locomotives used exclusively in yard service. A wheel that has been welded is a welded wheel for the life of the wheel.

ELECTRICAL SYSTEM

**§ 229.77 Current collectors.**

(a) Pantographs shall be so arranged that they can be operated from the engineer's normal position in the cab. Pantographs that automatically rise when released shall have an automatic locking device to secure them in the down position.

(b) Each pantograph operating on an overhead trolley wire shall have a device for locking and grounding it in the lowest position, that can be applied and released only from a position where the operator has a clear view of the pantograph and roof without mounting the roof.

**§ 229.79 Third rail shoes.**

When locomotives are equipped with both third rail and overhead collectors, third-rail shoes shall be deenergized while in yards and at stations when current collection is exclusively from the overhead conductor.

**§ 229.81 Emergency pole; shoe insulation.**

(a) Each locomotive equipped with a pantograph operating on an overhead trolley wire shall have an emergency pole suitable for operating the pantograph. Unless the entire pole can be

**49 CFR Ch. II (10-1-06 Edition)**

safely handled, the part of the pole which can be safely handled shall be marked to so indicate. This pole shall be protected from moisture when not in use.

(b) Each locomotive equipped with third-rail shoes shall have a device for insulating the current collecting apparatus from the third rail.

**§ 229.83 Insulation or grounding of metal parts.**

All unguarded noncurrent-carrying metal parts subject to becoming charged shall be grounded or thoroughly insulated.

**§ 229.85 Doors and cover plates marked "Danger".**

All doors and cover plates guarding high voltage equipment shall be marked "Danger—High Voltage" or with the word "Danger" and the normal voltage carried by the parts so protected.

**§ 229.87 Hand-operated switches.**

All hand-operated switches carrying currents with a potential of more than 150 volts that may be operated while under load shall be covered and shall be operative from the outside of the cover. Means shall be provided to show whether the switches are open or closed. Switches that should not be operated while under load shall be legibly marked with the words "must not be operated under load" and the voltage carried.

**§ 229.89 Jumpers; cable connections.**

(a) Jumpers and cable connections between locomotives shall be so located and guarded to provide sufficient vertical clearance. They may not hang with one end free.

(b) Cable and jumper connections between locomotive may not have any of the following conditions:

- (1) Broken or badly chafed insulation.
- (2) Broken plugs, receptacles or terminals.
- (3) Broken or protruding strands of wire.

**§ 229.91 Motors and generators.**

A motor or a generator may not have any of the following conditions:

- (a) Be shorted or grounded.