



# VEHICLE EQUIPMENT SAFETY COMMISSION

## **Regulation VESC-5**

MINIMUM REQUIREMENTS FOR MOTOR VEHICLE  
CONNECTING DEVICES AND TOWING METHODS

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## **MINIMUM REQUIREMENTS FOR VEHICLE CONNECTING DEVICES AND TOWING METHODS**

### **1. PURPOSE**

- 1.1 The purpose of this regulation is to provide the states with a uniform minimum requirement for motor vehicle connecting devices and towing methods. It is designed to increase highway safety by reducing towing and hitch related accidents. This regulation is not intended to cover the fifth-wheel and pintle hook type of connecting devices or towing methods.

### **2. SCOPE**

- 2.1 The scope of this regulation is directed to the regulation of trailer hitches and towing devices, towing methods, testing methods, certification requirements, installation, compliance and other requirements as herein defined in this regulation.
- 2.2 Subject to Section 11.1 herein, on and after the effective date(s) of this regulation, every trailer and semi-trailer, having a maximum of gross vehicle weight of 10,000 pounds or less, while being drawn upon the public highways of this state, shall be attached to the vehicle drawing the same by a device of a type approved by the Commissioner. Accordingly, the Commissioner establishes this regulation relating to vehicle connecting arrangements used for drawing trailers by mechanical power on the public highways. This regulation is not for those arrangements used for drawing another vehicle by means of a tow truck or wrecker, a semi-trailer with a fifth wheel type hitch, or a semi-trailer made into a full trailer by means of a converter dolly.

### **3. DEFINITIONS**

- 3.1 The term "Commissioner" as hereinafter referred to within this regulation shall mean the appropriate state official or state agency responsible for promulgating rules and regulations governing vehicle equipment approval and/or use of motor vehicles over the highways of the state.
- 3.2 "Chain Attaching Means" means the bolt, hook, pin, hole, eye, clevis, bracket, bar or any other device mounted on and used for anchoring or attaching safety chains to the towed or towing vehicle or hitch.

- 3.3 "Coupling" means that part of the primary connecting system normally mounted on the trailer, such as a socket, by which the connection is actually made and including the supporting attachment to the trailer frame.
- 3.4 "Family of Hitches" means a series of hitches produced by a single manufacturer which have similar traits and characteristics in common with each other. Each regulated manufacturer shall determine which hitches may be appropriately included in a particular family, subject to review by the Commissioner. The necessary criteria which all hitches included within a family must exhibit are (1) similarity of design, (2) similar materials of construction, (3) similar means of attachment to the towing vehicle, and (4) similar strength and performance characteristics.
- 3.5 "Gross Vehicle Weight Rating (GVWR)" means the value specified by the vehicle manufacturer as the loaded weight of a single vehicle.
- 3.6 "Hitch," defined for specific uses under Section 3.6 (a. and b. below), generally means that part of the primary connecting system normally mounted on the towing vehicle, including a ball-support platform and those components which are attached to the towing vehicle.
- a. "Weight Distributing Hitch" means a mechanical device that connects the trailer to the towing vehicle, and by means of a leverage applied on both trailer and car structures or axles, when properly adjusted, distributes the imposed vertical load at the hitch and coupling connection between the structures or axles of towing vehicle and trailer. The towing vehicle thus loaded tends to retain a level position with respect to the road.
  - b. "Weight Carrying Hitch" means a mechanical and/or structural device that connects the trailer to the towing vehicle, and that does not employ features designed to redistribute the load imposed at the hitch and coupling connection. Weight carrying hitches may be designed for bolting or other attachment to the towing vehicle frame, unitized body, bumper structure, or to a combination of these or other points which meet the requirements of Sections 5.3 and 10.2 (Table 2).

- 3.7 "Maximum Gross Trailer Weight (MGTW)" means the weight of the trailer plus the weight of all cargo, consumables, and equipment loaded on the trailer when in an actual underway towing condition.
- 3.8 "Maximum Vertical Load on Hitch (Tongue Weight)" means the vertical downward static force exerted on the hitch by the coupling at the point of connection of coupling and hitch, with weight distribution features or devices, if any, deactivated. Tongue weight is measured at the trailer coupling, with the trailer on a level surface (detached from the hitch), and with trailer consumables and cargo in maximum loaded conditions.
- 3.9 "Primary Connecting System" means the combination of devices and their attaching structures that are normally utilized to maintain the connection between towing vehicle and trailer during towing operations. This includes, but is not limited to the ball-and-socket type of connection or draft means. *Note:* this does not include a safety chain, which is part of a secondary system normally utilized only upon failure of the primary connection, nor does it include weight distributing or sway control features or devices whose function is accessory to the maintenance of the towing vehicle—trailer connection.
- 3.10 "Safety Chains" means flexible tension members connected from the front portion of the towed vehicle to the rear portion of the towing vehicle for the purpose of retaining connection between towed and towing vehicle in the event of failure of the connection provided by the primary connecting system. The term "safety chains" includes not only chains, cable, or wire ropes, or equivalent flexible member, but also any splice, clamp, socket, snap, eye, ring, thimble, pin, or other fastening device or forming method which is part of the assembly of any such flexible tension member.
- 3.11 "Tables 1, 2, and 3 and Figures 1, 2, 3, and 4" referred to in this regulation are contained in Section 10.

#### 4. LIGHT SERVICE DEVICES AND SYSTEMS

- 4.1 These are for use with trailers not exceeding 10,000 pounds gross vehicle weight rating. This includes, but is not limited to such types as the utility, boat, camping, travel and other trailers which are normally towed by the conventional

passenger car, or similarly constructed vehicle or light-duty truck. This Section is intended basically for the ball-and-socket type of primary connecting system, but is not necessarily limited to this type alone.

#### 4.2 TRAILER CLASSIFICATION

- a. Class 1—Trailers, with a gross weight (trailer weight including load) not exceeding 2,000 pounds.
- b. Class 2—Trailers, with a gross weight (trailer weight including load) over 2,000 pounds, but not exceeding 3,500 pounds.
- c. Class 3—Trailers, with a gross weight (trailer weight including load) over 3,500 pounds, but not exceeding 5,000 pounds.
- d. Class 4—Trailers, with a gross weight (trailer weight including load) over 5,000 pounds, but not exceeding 10,000 pounds.

#### 4.3 COUPLINGS

- a. Coupling Classification. There shall be four major strength classifications, or designations of couplings. The designation shall be based on the maximum gross trailer weight (MGTW) the coupling is qualified to tow. The No. 1 couplings shall be used for towing Class 1 trailers; No. 2 couplings for Class 2 or smaller trailers; No. 3 couplings for Class 3 or smaller trailers; and No. 4 couplings for Class 4 or smaller trailers. This is not intended to limit the number or variety of couplings in a given class, or designation.
- b. Coupling Ultimate Strength. Each coupling and hitch ball, when subjected to static bench tests in a rigid, non-yielding test fixture, shall withstand the test loads specified in Table 1 without incurring failure. For purposes of this regulation, failure occurs at the point at which the coupling or ball will accept no additional test load.
- c. Coupling and Hitch Ball Test Procedure. A new coupling or ball shall be used for each mode of load application. Each type of test load is to be applied in-

dividually to one component at a time, utilizing a non-yielding test fixture similar in design to the typical test fixture illustrated in Figure 1 of Section 10.1. When testing a coupling, a hardened ball shall be used; when testing a ball, a hardened coupling shall be used.

d. Attachment of Couplings. Each coupling is to be mounted to the trailer attaching member by bolting, welding or riveting in such manner that the towing loads are safely and adequately transferred to that member.

e. Provisions for Safety.

1) Each coupling, regardless of classification, or designation, must be equipped with a manually operated mechanism so adapted as to prevent disengagement of the unit while in operation. In addition to this positive locking mechanism, the coupling shall be so designed that the trailer can be disconnected from the towing vehicle regardless of the angle of the trailer to the towing vehicle.

2) Each hitch ball shall be equipped and installed with a lock washer or equivalent device and each replacement hitch ball shall be marketed with a lock washer or equivalent device with instructions as to proper installation provided by the responsible manufacturer.

## **5. HITCHES**

5.1 Hitch Rating. Hitches shall be rated by the maximum gross trailer weight (MGTW) and the maximum vertical load on hitch (tongue weight) each is qualified to tow.

5.2 Hitch Strength Requirements. Each hitch, when subjected to a static bench test, shall conform to the minimum strength requirements contained in Table 2.

5.3 Attachment of Hitch. Each hitch shall be attached to the structural member or members of the towing vehicle in such a manner that the tension, compression and transverse thrust loads shown in Table 2 are transferred to the towing vehicle without residual distortion or failure of either the attachment or the vehicle structure which would affect the safe towing of trailers, as defined in Table 2.



- 5.4 Maximum Vertical Load on Hitch (Tongue Weight). The weight load carried by the hitch at its connection with the trailer coupling shall not, when on a level surface, exceed the maximum tongue weight load recommended by the manufacturer for the hitch.

## **6. SAFETY CHAINS AND ATTACHING MEANS REQUIRED**

- 6.1 Strength Requirements. Each safety chain and each attaching means shall meet strength requirements as shown in Section 10.3 (Table 3) and defined in Section 3.
- 6.2 Installation and Connections. The means of attachment of safety chains shall be located equally distant from and on opposite sides of the longitudinal centerline of the towing vehicle and of the trailer, except that where a single length of safety chain is connected to one single means of attachment of a trailer, such single attachment shall be on the trailer longitudinal centerline. Each means of attachment shall not be common with or utilize fasteners common with a ball or coupling. No welding operation shall be performed on a safety chain subsequent to its manufacture. Safety chains shall be so connected that the slack for each length of chain between trailer and towing vehicle is the same and is not more than necessary to permit the proper turning of the vehicles. When passing forward to the towing vehicle, safety chains must be oriented in such a manner as to prevent the tongue from dropping to the ground and to maintain connection in the event of failure of the primary connecting system. (See Figures 3 and 4, Section 10.)
- a. Every towed vehicle shall be coupled to the towing vehicle by means of a safety chain, cable, or equivalent device in addition to the regular drawbar, tongue, or other connection. Safety chains, cables, or equivalent devices may be attached to permanently installed hitch components if the components meet the strength requirements of Section 6.1.
  - b. Safety chain connections shall not be made to the hitch ball or to a ball mount designed to be readily removable when not in use.

## 7. IDENTIFICATION:

- 7.1 Device and Component Marking. Each coupling and each hitch shall be legibly and permanently marked (so as to be visible to consumers and any regulatory authority viewing the coupling and hitch as installed on a vehicle) on at least one hitch component or related component marketed with the hitch, as shown below. When hitch components (except hitch balls and their hardware) are marketed separately, the following markings must also appear on at least one of the components in the package or marketing unit.
- a. Manufacturer's or distributor's name, initials, trademark, trade name or code symbol. (Code symbol shall mean one assigned and approved by appropriate regulatory authority.)
  - b. Model number, part number, or style and; for couplings only, the class.
  - c. Maximum Gross Trailer Weight (MGTW) to be drawn.
  - d. Maximum vertical load on hitch (tongue weight) to be imposed on the ball or other points of connection.
  - e. The symbol V-5  
Note: Placement of the symbol V-5 on any coupling or any hitch indicates certification of compliance of the product on which the symbol is placed with all requirements contained in VESC Regulation V-5.
- 7.2 Hitch Ball Marking. Each hitch ball sold for use in a primary connecting system shall be permanently and legibly marked to show both the spherical diameter of the ball; e.g., 1-7/8", 2", etc. and the maximum gross trailer weight (MGTW) which it is designed to draw.
- 7.3 Labelling. Each crate, box, or other container in which a coupling or hitch is packed shall be imprinted or labeled to display at least the same information required in 7.1, above, for marking, except that the maximum gross trailer weight (MGTW) to be drawn must be shown for each coupling regardless of class. Further, the year, make, and model of each vehicle on which a hitch may be installed and meet the requirements of this regulation shall be shown but may be

shown on an enclosed sheet, or sheets, separate from the imprintation, or labelling, or on hitch manufacturer's application tables which are kept available at the locations where the device or system is sold, either for resale or for use. However, the provision contained in the preceding sentence shall not apply to hitches adaptable to a large number of vehicles and designated to be a universal type.

## **8. IDENTIFICATION—INSTALLATION—MAINTENANCE—COMPLIANCE**

8.1 **Marking and Labelling.** Each vehicle connecting device, method or system shall be marked and labelled as required by Sections 7 and 9.2. The marking and labelling shall show the responsible manufacturer (see Section 8.3). A pressure sensitive label will be acceptable if of a weather-resistant type which cannot be removed without destroying or defacing it.

### **8.2 Installation and Maintenance**

a. **Manufacturer, Packager, Seller.** The responsible manufacturer or seller of a vehicle primary connecting device or system shall provide with the device, or with devices making up or used in the system, clear and complete consumer instructions for use, maintenance and repair; and, where the device or system is not actually installed by the dealer, installation instructions, in accordance with the requirements of this regulation, and proper instruction of the purchaser, or owner, in use and care.

b. **Owner, Lessor, Lessee, Borrower.** Each owner or lessor shall keep his connecting devices, and systems in good condition, maintained, repaired, and rebuilt in accordance with manufacturer's instructions and recommendations. Each owner or lessor who leases or lends a connecting device or system, shall properly instruct the lessee, or recipient, in the safe and proper use and care for the device(s), or system. Each lessee or borrower shall use and maintain the device, method, or system in accordance with the instructions of the lessor or lender. For the purposes of this regulation any person who rents a trailer shall be considered to be a lessor.

- c. No person shall put into use or continue in use a device or system on which the marking required in Section 8.1 has been removed, altered, obliterated, disfigured, or otherwise damaged so as to prevent identification of the device(s), method(s) or system(s).

8.3 Compliance with Requirements. Each manufacturer shall be responsible for the performance ability of the device(s) or system which he manufactures for use by a prospective owner, lessee, or borrower. Where a manufacturer, packager, or seller assembles or packages (unites, collects, aggregates) for use by a prospective owner, lessee, or borrower a device or system from parts, subassemblies or assemblies made or assembled by others, such manufacturer, packager, or seller (person, firm, association or corporation) shall be deemed responsible for the performance of the device(s) or system which he assembles or packages. For the purpose of this Section 8, each manufacturer, packager, or seller described in the preceding two sentences shall be known as the "responsible manufacturer".

## 9. CERTIFICATION AND/OR TESTING

9.1 Each responsible manufacturer shall certify to the Commissioner or to an Equipment Approval Program or other agency designated by the Commission, that each of his devices or systems, when installed in accordance with his published instructions (including instructions of manufacturers of weight distributing hitches for use by local installers who fabricate the undercar attachments means for such hitches), complies with and meets the requirements of this regulation. Such certification shall be corroborated by submission of a properly executed Product and Certification Test Report form containing test results and required certifications, accompanied by photographs of the test site and equipment and a concise description of the test methodology followed. [A suggested format for this report is incorporated herein as Appendix I.] To demonstrate compliance with this regulation, the necessary tests shall be conducted by or supervised by an approved certified laboratory or an approved certified testing organization, and the officer or employee of the approved certified testing organization who personally conducted or supervised the testing shall execute the appropriate certification statement contained in the Product and Certification Test Report.

9.2 **Registration.** No vehicle connecting device or system shall be sold within \_\_\_\_\_ (name of jurisdiction)\_\_\_\_\_ unless the responsible manufacturer has registered his product with the Commissioner, has furnished the Commissioner five copies of instructions for installation (as applicable), use, maintenance and repair, and has stated the maximum towing capacity of his product in terms of the maximum gross trailer weight (MGTW) to be drawn, as measured in accordance with the provisions of Section 4.3 and Section 5. There shall be imprinted on each copy of instructions provided with the device or otherwise furnished to the owner the following statement: "This product complies with Regulation V-5." The responsible manufacturer of light Service Class 1 connecting devices or systems for trailers not exceeding 2,000 pounds gross weight who produces not more than five (5) such devices or systems in one calendar year must produce a product which complies with all applicable requirements of this Regulation, except the requirements of this Section 9.2.

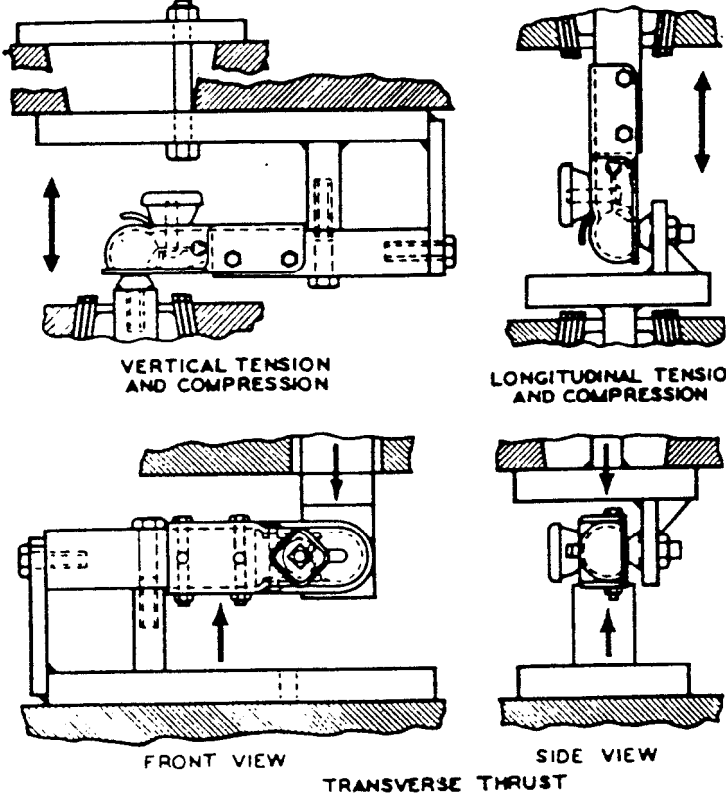
10. TABLES

10.1 Table 1.

**LIGHT SERVICE DEVICES  
BREAKING STRENGTH FOR COUPLINGS AND BALLS**

Trailer Classification	Trailer Couplings Designation	Minimum Ball Diameter-Inches (Where Ball-type hitch is used)	Minimum Breaking Point Requirements	Pounds
Class 1 (2,000 lbs. or less MGTW)	No. 1	1 7/8	Longitudinal tension: Longitudinal compression: Transverse thrust: Vertical tension: Vertical Compressions:	6,000 6,000 2,000 2,500 2,500
Class 2 (2,001 thru 3,500 lbs. MGTW)	No. 2	2	Longitudinal tension: Longitudinal compression: Transverse thrust: Vertical tension: Vertical compression:	10,500 10,500 3,000 4,500 4,500
Class 3 (3,501 thru 5,000 lbs. MGTW)	No. 3	2	Longitudinal tension: Longitudinal compression: Transverse thrust: Vertical tension: Vertical compression	15,000 15,000 4,000 7,000 7,000
Class 4 (5,001 thru 10,000 lbs. MGTW)	No. 4	Ball & Bolt shall be of such size and strength as to conform to the minimum breaking strength requirements of the mating coupling required for the specific load of Class 4 trailer	Longitudinal tension: Longitudinal compression: Transverse thrust: Vertical tension: Vertical compression:	MGTW x 3 MGTW x 3 MGTW x 1 MGTW x 1.3 MGTW x 1.4

10.1 FIGURE 1



TRANSVERSE THRUST  
NOTE: TEST FIXTURE BARS TO BE SOLID AND FIT SNUGLY  
INSIDE OF HOUSING CHANNELS

TYPICAL COUPLER AND BALL TEST FIXTURE ARRANGEMENT

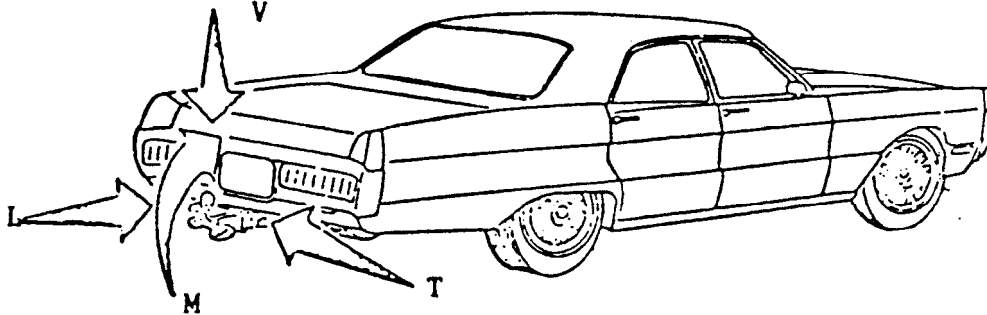
10.2

**Table 2**  
**HITCH TEST FORCES\***

STEP	WEIGHT CARRYING HITCH		WEIGHT DISTRIBUTING HITCH	
	Force	Direction	Force	Direction
a	V = .47R + 480 L = .47R + 480	Downward Compressive	V = .045R + 1650 M = 51,000	Downward See Figure 2
b	L = .23R + 1530 V = .15R	Tensile Downward	L = .067R + 2070 V = .15R	Tensile Downward
c	L = .23R + 1530 V = .15R	Compressive Downward	L = .067R + 2070 V = .15R	Compressive Downward
d	T = .20R + 500	Leftward	T = .20R + 500	Leftward
e	T = .20R + 500	Rightward	T = .20R + 500	Rightward
f	Not Applicable	Not Applicable	M = 93.2X + 21000 V = .15R	See Figure 2 Downward

- V = Vertical Force (lbs.)
- L = Longitudinal Force (lbs.)
- T = Transverse Force (lbs.)
- M = Spring Bar Moment (inch-lbs.)
- R = Hitch Rating in terms of MGTW (lbs.) (Maximum Gross Trailer Weight)
- X = Hitch Rating for Maximum Vertical Load on Hitch (lbs.) (Tongue Weight)
- \*\* = Leveling Force Couple

10.2 FIGURE 2





\*Footnotes to 10.2—Table 2 and Figure 2

1. When a hitch is to be tested:
  - a. Assemble the hitch in its normal configuration as recommended by the hitch manufacturer.
  - b. Attach the hitch to a non-yielding restraining fixture. The hitch-to-fixture attaching means must be the same as the normal hitch-to-car attaching means recommended by the hitch manufacturer.
  - c. The points of hitch-to-fixture attachment must be located in the same positions as the hitch-to-car attachment point locations recommended by the hitch manufacturer.
  - d. Attach a ball to the ball support platform in the manner recommended by the hitch manufacturer.
2. Hitch Test Force Applications. With the hitch attached to the test fixture as specified in footnote (1), immediately above, apply the forces designated in Table 2, in any sequence, as follows:
  - a. Apply the specified downward vertical force concurrently with the specified compressive longitudinal force or spring bar moment.
  - b. Apply the specified tensile longitudinal force concurrently with the specified downward vertical force.
  - c. Apply the specified compressive longitudinal force concurrently with the specified downward vertical force.
  - d. Apply the specified leftward transverse force.
  - e. Apply the specified rightward transverse force.
  - f. For hitches with weight distributing capability, apply the specified spring bar, or leveling moment, (leveling force couple) concurrently with the specified downward vertical force.

All forces in steps (a) through (c) are to be applied along an axis which intersects the center of the ball. All forces are to be applied with an onset rate of not more than 150 pounds per second, and maintained at the maximum specified force level for at least five seconds.
3. Each hitch, when tested as specified above, shall be capable of withstanding the forces applied in accordance with footnote (2), immediately above, without causing permanent deformation of the ball platform, such that the final position of the ball axis shall not depart more than five degrees from its original, nominally vertical, position.

**10.3 TABLE 3**

**LIGHT SERVICE DEVICES—MINIMUM STRENGTHS  
OF SAFETY CHAINS AND ATTACHING MEANS\***

Trailer Classification	Minimum Longitudinal Load, Tension, Pounds (See Figures 3 and 4)	
	Each Safety Chain	Each of Two Chain Attaching Means
Class 1	2,000	2,000
Class 2	3,500	3,500
Class 3	5,000	5,000
Class 4**	MGTW	MGTW

\* Load shown shall be applied in the same manner as would prevail if the trailer were being towed by the safety chain in a straight ahead direction.

Safety chain and attaching points and hardware shall withstand load shown without breaking.

\*\* "MGTW" means the Maximum Gross Trailer Weight, pounds, which is to be towed.

10.4 Figures 3 and 4

TYPICAL SAFETY CHAIN INSTALLATION

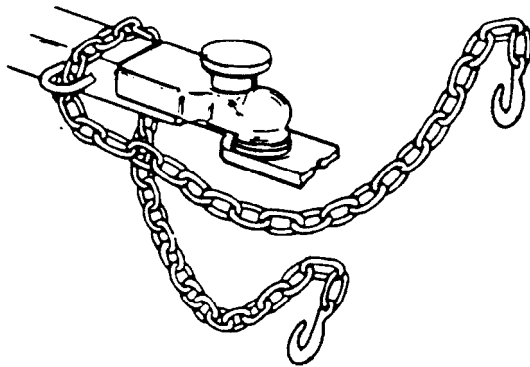


FIG. 3—TYPICAL SINGLE SAFETY CHAIN INSTALLATION

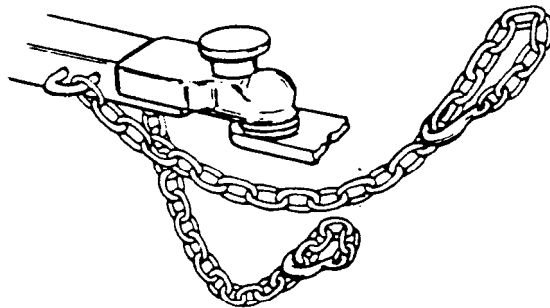


FIG. 4—TYPICAL DOUBLE SAFETY CHAIN INSTALLATION

**APPENDIX I**  
**Suggested Format**

**PRODUCT AND CERTIFICATION TEST REPORT**  
**IN COMPLIANCE WITH VESC REGULATION V-5**  
**(NAME OF JURISDICTION)**

**1. Reporting Manufacturer:**

(a) Name \_\_\_\_\_  
 (b) Address \_\_\_\_\_  
 (c) Telephone Contact \_\_\_\_\_  
(Name)  
 \_\_\_\_\_  
(Title) (Telephone)

**2. Testing Organization:**

(a) Name \_\_\_\_\_  
 (b) Address \_\_\_\_\_  
 (c) Is testing organization approved by  
 (name of jurisdiction) \_\_\_\_\_  
 \_\_\_\_\_  
 Yes  No

**3. Regulated Device or System:**

List below (or on separate sheet if additional space is required) the device(s) and/or systems (s) included in the same Family of Hitches as the hitch being tested and to which this test report also applies.

Type of Device or System	Product Family Characteristics	Class (for Couplings Only.) Model No., Part or Style

**TEST PROTOCOL FOR CONNECTING  
DEVICES AND TOWING METHODS  
WITH SUMMARY OF RESULTS**

**Check  
List**

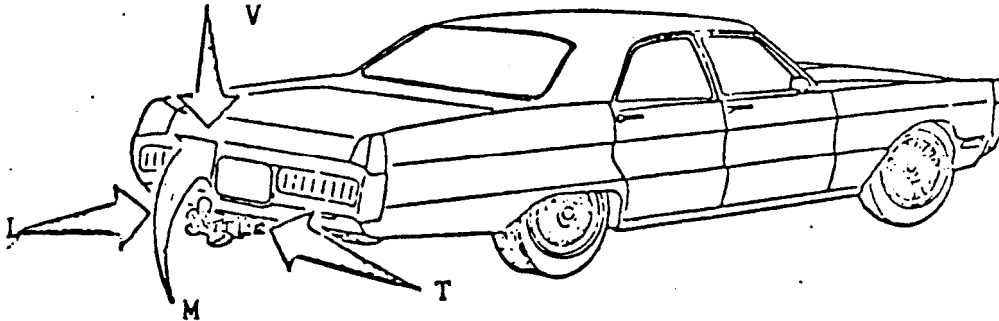
**4. Background Data:**

- (a) Model Number of Hitch Being Tested: \_\_\_\_\_
- (b) Type of Hitch:  Weight Carrying  
 Weight Distributing
- (c) Date of Test: \_\_\_\_\_
- (d) Location Where Test Performed: \_\_\_\_\_
- (e) Name of Person Supervising Test: \_\_\_\_\_

**5. Preparation for Test:**

- Step 1.** Assemble the hitch in its normal configuration, in strict compliance with the assembly instructions provided by the manufacturer.
- Step 2.** Attach the hitch to a non-yielding restraining fixture, utilizing only the attaching means recommended by the manufacturer for hitch-to-car attachment.
- Step 3.** Check carefully to see that the hitch-to-fixture attachment points are located in the same relative positions as the hitch-to-car attachment points recommended by the manufacturer. If not, hitch and fixture must be placed in proper position before proceeding to the next step.
- Step 4.** Attach a ball to the ball support platform in the manner recommended by the manufacturer.
- Step 5.** Check to be sure steps 1 through 4 above have been completed.

6. Application of Test Forces to Hitch:



**FIGURE 1**

- Legend: V = Vertical Force (lbs.)  
L = Longitudinal Force (lbs.)  
T = Transverse Force (lbs.)  
M = Spring Bar Moment (inch-lbs.)\*  
R = Hitch Rating in Terms of MGTW (lbs.)  
(Maximum Gross Trailer Weight)  
X = Hitch Rating for Maximum Vertical Load on Hitch  
(lbs.) (Tongue Weight)  
\* = Leveling Force Couple

- Enter "R" value of Hitch Being Tested: R =                    lbs.  
 Enter "X" value of Hitch Being Tested: X =                    lbs.

**DO NOT PROCEED WITH STEPS (a) THROUGH (f) UNTIL STEPS 1 THROUGH 5 ARE COMPLETE.**

**Procedural Note:** All forces are to be applied along an axis which intersects the center of the ball, and at an onset rate of not more than 150 pounds per second. Maintain the maximum specified force level for a minimum of five (5) seconds.

- Step (a) Apply the specified downward vertical force concurrently with the specified compressive longitudinal force or spring bar moment.

**WEIGHT CARRYING HITCH**

Force	Direction
$V = .47 R + 480$ $.47 ( \quad ) + 480 = \quad \text{lbs.}$	Downward
$L = .47 R + 480$ $.47 ( \quad ) + 480 = \quad \text{lbs.}$	Compressive

**WEIGHT DISTRIBUTING HITCH**

Force	Direction
$V = .045 R + 1650$ $.045 ( \quad ) + 1650 = \quad \text{lbs.}$	Downward
$M = 51,000 \text{ inch-lbs.}$	Compressive

- Step (b): Applying the specified tensile longitudinal force concurrently with the specified downward vertical force.

**WEIGHT CARRYING HITCH**

Force	Direction
$L = .23 R + 1530$ $.23 ( \quad ) + 1530 = \quad \text{lbs.}$	Tensile
$V = .15 R$ $.15 ( \quad ) = \quad \text{lbs.}$	Downward

**WEIGHT DISTRIBUTING HITCH**

Force	Direction
$L = .067 R + 2070$ $.067 ( \quad ) + 2070 = \quad \text{lbs.}$	Tensile
$V = .15 R$ $.15 ( \quad ) = \quad \text{lbs.}$	Downward

- Step (c) Apply the specified compression longitudinal force concurrently with the specified downward vertical force.

**WEIGHT CARRYING HITCH**

Force	Direction
$L = .23 R + 1530$ $.23 ( \quad ) + 1530 = \quad \text{lbs.}$	Compressive
$V = .15 R$ $.15 ( \quad ) = \quad \text{lbs.}$	Downward

**WEIGHT DISTRIBUTING HITCH**

Force	Direction
$L = .067 R + 2070$ $.067 ( \quad ) + 2070 = \quad \text{lbs.}$	Compressive
$V = .15 R$ $.15 ( \quad ) = \quad \text{lbs.}$	Downward

- Step (d): Apply the specified leftward transverse force.

**WEIGHT CARRYING OR WEIGHT DISTRIBUTING HITCH**

Force	Direction
$T = .20 R + 500$ $.20 ( \quad ) + 500 = \quad \text{lbs.}$	Leftward

- Step (e): Apply the specified rightward transverse force.

**WEIGHT CARRYING OR WEIGHT DISTRIBUTING HITCH**

Force	Direction
$T = .20 R + 500$ $.20 ( \quad ) + 500 = \quad \text{lbs.}$	Rightward



- Step (f): WEIGHT DISTRIBUTING HITCHES ONLY: Apply the specified spring bar, or leveling moment (leveling force couple) currently with the specified downward vertical force.

**WEIGHT DISTRIBUTING HITCH**

Force	Direction
$M = 93.2 X + 21,000$ $93.2 ( \quad ) + 21,000 =$ inch-lbs.	See Figure 1
$V = .15 R$ $.15 ( \quad ) +$ lbs.	Downward

**Summary of Test Results:**

1. Hitch withstood each of the forces applied during testing.  
 Yes  No

FORCE	PASS	FAIL
Step (a)	L	M
Step (b)	L	V
Step (c)	L	V
Step (d)	T	
Step (e)	T	

Weight Distributing Hitches Only	M	V
Step (f)	M	V

2. The final position of the ball axis following testing did not depart more than five degrees ( $5^\circ$ ) from its original, normally vertical, position.

Yes  No

Remarks: EXPLAIN FULLY ANY NEGATIVE ANSWER TO THE ABOVE TWO QUESTIONS:

(Continue on attached sheet, if necessary)

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8. Certification of Testing Organization:

I certify that the above-described trailer hitch was tested by me or under my immediate supervision at the time and place set out above, and that the facts contained herein are a full and accurate report of the test results obtained.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
Date:

(Title)

## CERTIFICATION OF RESPONSIBLE MANUFACTURER

9. \_\_\_\_\_  
(Name of Responsible Manufacturer)  
in accordance with the requirements of the VESC Regulation V-5, hereby certifies that the device(s) and/or systems(s) listed in numbered paragraph 3 above, when installed in accordance with the company's published instructions, as applicable, compl(ies) with and meet(s) the safety specifications and requirements of the Regulation.

\_\_\_\_\_  
(Signature)

Date: \_\_\_\_\_  
(Name and Title)

### 10. Attachments to Test Report:

(a) The following documentation must be attached to this Report, with the designations and in the order listed:

**Exhibit A** – Photographs of test site(s) and equipment.

**Exhibit B** – Five (5) copies of instructions (for each Family of Hitches) for installation, use, maintenance and repair, indicating the maximum towing capacity of product(s) involved in terms of the maximum gross weight to be drawn (See VESC, Regulation V-5, Sections 4.3 and 5.)

(b) List below, as applicable, additional Exhibits attached to this Report.

**Exhibit C** –

SC  
VE