

# ARKANSAS



## Educational Information

## Appendix A

### Violation Severity by BASIC

#### *Overview*

The tables in this Appendix contain a breakdown of all FMCSRs and HMRs that can lead to roadside violations, with each table representing a unique BASIC. A severity weight is assigned to each regulation and reflects its relevance to crash risk. Within each BASIC, the regulations are grouped based on their attributes so that similar violations can be assigned the same severity weights. Severity weights, discussed in more detail below, are not comparable across the BASICs.

#### *Interpretation of the Severity Weights*

The violation severity weights in the tables that follow have been converted into a scale from 1 to 10, where 1 represents the lowest crash risk and 10 represents the highest crash risk relative to the other violations in the BASIC. Because the weights reflect the relative importance of each violation only within each particular BASIC, they cannot be compared meaningfully across the various BASICs. Therefore, a 5 in one BASIC is not equivalent to a 5 in another BASIC, but the 5 does represent the midpoint between a crash risk of 1 and 10 within the same BASIC. The “Violation Group” column in each table identifies the group to which each violation has been assigned. Each violation within a violation group is assigned the same severity weight.

#### *Derivation of the Severity Weights*

The severity weights for each violation were derived through the following six-step process:

1. **BASIC Mapping**—All roadside safety-related violations were mapped to an appropriate BASIC so the severity weight analysis could be conducted on each individual BASIC.
2. **Violation Grouping**—All violations in each BASIC were placed into groups of similar violations based on the judgment of enforcement subject matter experts. These groups, listed in the “Violation Group” column in each table, make it possible to incorporate otherwise rarely cited violations into the robust statistical analysis used to derive the severity weights. The violation grouping also ensured that similar types of violations received the same severity weight.
3. **Crash Occurrence Analysis**—Statistical analysis was performed to quantify the extent of the relationship between crash involvement on the one hand, and violation rates in each violation group, within each BASIC, on the other hand. A driver approach was used in this analysis. This approach was followed due to

strong demonstrable relationships between driver crashes and violations documented in prior research at the Volpe Center. The earlier research was conducted in support of FMCSA's CRWG, the CSA 2010 Initiative's predecessor. Based on the conclusions from this past research, the Volpe Center developed a Driver Information Resource (DIR) for FMCSA. The DIR uses individual crash and inspection reports from all states to construct multi-year driver safety histories on individual drivers. Multivariate negative binomial regression models were used to quantify the strength of relationships between driver violations rates in individual violation groups and crash involvement.

4. **Crash Consequences Analysis**—This analysis incorporates crash consequences attributable to the violation groups based on findings from the Violation Severity Assessment Study (VSAS).<sup>5</sup> The VSAS quantifies the crash risk associated with individual FMCSR and HMR violations in terms of comparable dollar values. These comparable dollar values represent the increased social cost attributable to the presence of a violation. Together, the regression analysis (Step 3) and VSAS findings make it possible to address total crash risk in terms of both crash occurrence and crash consequence.
5. **Subject Matter Expert Review**—Enforcement subject matter experts reviewed the results derived purely from the statistical approaches described in Steps 3 and 4. Modifications were made to the severity weights based on input from the subject matter experts. This approach helps to compensate for the limitations of the statistical analysis, such as lack of statistical significance of rarely cited violations.
6. **CSMS Effectiveness Test**—Various severity weighting schemes developed in Steps 1 through 5 were applied to the CSMS to provide an empirical evaluation of the weighting schemes. The empirical evaluation, or "CSMS Effectiveness Test," was modeled after the SafeStat Effectiveness Test.<sup>6</sup> The CSMS Effectiveness Test was accomplished through the following actions: (1) performing a simulated CSMS run that calculates carrier percentile ranks for each BASIC using historical data; (2) examining each carrier's crash involvement over the immediate 18 months after the simulated CSMS timeframe, and (3) observing the relationship between the percentile ranks in each BASIC and the subsequent post-CSMS carrier crash rates. The CSMS Effectiveness Test provides an environment to evaluate various severity weight schemes in terms of their impact in identifying high-risk carriers. It also provides a means of testing other weight schemes, such as the OOS weight, to help optimize CSMS's effectiveness.

This six-step process made it possible to develop a conceptual framework for the CSMS in the form of violation groupings and associated severity weights. The associated

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<sup>5</sup> *Violations Severity Assessment Study Final Report* (October 2007). Prepared for FMCSA by John A. Volpe National Transportation Systems Center.

<sup>6</sup> *SafeStat Motor Carrier Safety Status Measurement System Methodology: Version 8.6* (January 2004). Prepared for FMCSA by John A. Volpe National Transportation Systems Center. Chapter 7. SafeStat Evaluation.

severity weights were based on both empirical analysis and valuable accumulated knowledge from field experts. The data-driven component of the process, in particular, differentiates the CSMS from SafeStat and addresses some of the criticisms of the SafeStat algorithm.

Tables 1 through 6 list all of the violations in the CSMS, with the first two columns of each table identifying each violation by regulatory part and its associated definition. The third column in each table identifies the violation group to which each violation is assigned, followed by the violation groups' severity weights in the fourth column. The final column in these tables specifies whether or not each violation is also included in the DSMS; violations included in the DSMS are the subset of CSMS BASIC violations of which the CMV driver could also be a responsible party.

**Table 6. CSMS Cargo-Related BASIC Violations <sup>15</sup>**

<b>Section</b>	<b>Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection</b>	<b>Violation Group Description</b>	<b>Violation Severity Weight<sup>16</sup></b>	<b>Violation in the DSMS (Y/N)</b>
178.703(a)	Intermediate bulk container (IBC) manufacturer Markings - HM	Package Integrity - HM	8	N
178.703(b)	Intermediate bulk container additional Markings - HM	Package Integrity - HM	8	N
178.704(e)	Intermediate bulk container bottom discharge valve protection	Package Integrity - HM	8	N
180.205(c)	Periodic re-qualification of cylinders	Package Testing - HM	7	N
180.213(d)	Re-qualification Markings - HM	Package Testing - HM	7	N
180.352(b)	Intermediate bulk container retest or inspection	Package Testing - HM	7	N
180.405(b)	Cargo tank specifications	Package Testing - HM	7	N
180.405(j)	Certification withdrawal (failed to remove/cover/obliterate spec plate)	Package Testing - HM	7	N
180.407(a)(1)	Cargo tank periodic test and inspection	Package Testing - HM	7	N
180.407(c)	Failing to periodically test and inspect cargo tank	Package Testing - HM	7	N
180.415(b)	Cargo tank test or inspection Markings - HM	Package Testing - HM	7	N
180.605(k)	Test date marking	Package Testing - HM	7	N
385.403	No HM Safety Permit	Documentation - HM	3	Y
392.9	Failing to secure load	Load Securement	10	Y
392.9(a)	Failing to secure load	Load Securement	10	Y
392.9(a)(1)	Failing to secure cargo/§§ 393.100-393.136	Load Securement	10	Y
392.9(a)(2)	Failing to secure vehicle equipment	Load Securement	10	Y
392.9(a)(3)	Driver's view/movement is obstructed	Load Securement	10	Y

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392.62(c)(1)	Bus — baggage/freight restricts driver operation	Load Securement	10	Y
392.62(c)(2)	Bus — Exit(s) obstructed by baggage/freight	Load Securement	10	Y
392.62(c)(3)	Passengers not protected from falling baggage	Load Securement	10	Y
392.63	Pushing/towing a loaded bus	Load Securement	10	Y
393.87	Warning flag required on projecting load	Warning Flags	4	Y
393.87(a)	Warning flag required on projecting load	Warning Flags	4	Y
393.87(b)	Improper warning flag placement	Warning Flags	4	Y
393.100	Failure to prevent cargo shifting	Load Securement	10	Y
393.100(a)	Failure to prevent cargo shifting	Load Securement	10	Y
393.100(b)	Leaking/spilling/blowing/falling cargo	Load Securement	10	Y
393.100(c)	Failure to prevent cargo shifting	Load Securement	10	Y
393.102(a)	Improper securement system (tiedown assemblies)	Load Securement	10	Y
393.102(a)(1)	Insufficient means to prevent forward movement	Load Securement	10	Y
393.102(a)(3)	Insufficient means to prevent lateral movement	Load Securement	10	Y
393.102(a)(2)	Tiedown assembly with inadequate working load limit	Load Securement	10	Y
393.102(b)	Insufficient means to prevent vertical movement	Load Securement	10	Y
393.102(c)	No equivalent means of securement	Load Securement	10	Y
393.104(a)	Inadequate/damaged securement device/system	Load Securement	10	Y
393.104(b)	Damaged securement system/tiedowns	Load Securement	10	Y

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393.104(c)	Damaged vehicle structures/anchor points	Load Securement	10	Y
393.104(d)	Damaged Dunnage/bars/blocking-bracing	Load Securement	10	Y
393.104(f)(1)	Knotted tiedown	Load Securement	10	Y
393.104(f)(2)	Use of tiedown with improper repair	Load Securement	10	Y
393.104(f)(3)	Loose/unfastened tiedown	Load Securement	10	Y
393.104(f)(4)	No edge protection for tiedowns	Load Securement	10	Y
393.104F4R	No edge protection for tiedowns	Load Securement	10	Y
393.105(f)(5)	No edge protection for tiedowns	Load Securement	10	Y
393.106(a)	No/improper front end structure/headerboard	Load Securement	10	Y
393.106(b)	Cargo not immobilized or secured	Load Securement	10	Y
393.106(c)(1)	No means to prevent cargo from rolling	Load Securement	10	Y
393.106(c)(2)	Cargo without direct contact/prevention from shifting	Load Securement	10	Y
393.106(d)	Insufficient aggregate working load limit	Load Securement	10	Y
393.110	Failing to meet minimum tiedown requirements (	Load Securement	10	Y
393.110(b)	Insufficient tiedowns, without headerboard/blocking	Load Securement	10	Y
393.110(c)	Insufficient tiedowns, with headerboard/blocking	Load Securement	10	Y
393.110(d)	Large/odd-shaped cargo not adequately secured	Load Securement	10	Y
393.112	Tiedown not adjustable by driver	Load Securement	10	Y

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393.114	No/improper front end structure	Load Securement	10	Y
393.114(b)(1)	Insufficient height for front-end structure	Load Securement	10	Y
393.114(b)(2)	Insufficient width for front-end structure	Load Securement	10	Y
393.114(d)	Front-end structure with large opening(s)	Load Securement	10	Y
393.116	No/improper securement of logs	Load Securement	10	Y
393.116(d)(1)	Short, over 1/3 length past structure	Load Securement	10	Y
393.116(d)(2)	Short, insufficient/no tiedowns	Load Securement	10	Y
393.116(d)(3)	Short, tiedowns improperly positioned	Load Securement	10	Y
393.116(d)(4)	Short, no center stakes/high log not secured	Load Securement	10	Y
393.116(e)	Short, length, improper securement	Load Securement	10	Y
393.118	No/improper lumber/building materials securement	Load Securement	10	Y
393.118(b)	Improper placement of bundles	Load Securement	10	Y
393.118(d)	Insufficient protection against lateral movement	Load Securement	10	Y
393.118(d)(3)	Insufficient/improper arrangement of tiedowns	Load Securement	10	Y
393.120	No/improper securement of metal coils	Load Securement	10	Y
393.120(b)(1)	Coil/vertical improper securement	Load Securement	10	Y
393.120(b)(2)	Coils, rows, eyes vertical, improper secure	Load Securement	10	Y
393.120(c)(1)	Coil/eye crosswise improper securement	Load Securement	10	Y

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393.120(c)(2)	X-pattern on coil(s) with eyes crosswise	Load Securement	10	Y
393.120(d)(1)	Coil with eye lengthwise—improper securement	Load Securement	10	Y
393.120(d)(4)	Coils, rows, eyes length—improper securement	Load Securement	10	Y
393.120(e)	No protection against shifting/tipping	Load Securement	10	Y
393.122	No/improper securement of paper rolls	Load Securement	10	Y
393.122(b)	Rolls vertical—improper securement	Load Securement	10	Y
393.122(c)	Rolls vertical /split—improper securement	Load Securement	10	Y
393.122(d)	Rolls vertical /stacked—improper securement	Load Securement	10	Y
393.122(e)	Rolls crosswise—improper securement	Load Securement	10	Y
393.122(f)	Rolls crosswise/stacked load—improperly secured	Load Securement	10	Y
393.122(g)	Rolls length—improper securement	Load Securement	10	Y
393.122(h)	Rolls lengthwise/stacked—improper securement	Load Securement	10	Y
393.122(i)	Improper securement—rolls on flatbed/curb-side	Load Securement	10	Y
393.124	No/improper securement of concrete pipe	Load Securement	10	Y
393.124(b)	Insufficient working load limit—concrete pipes	Load Securement	10	Y
393.124(c)	Improper blocking of concrete pipe	Load Securement	10	Y
393.124(d)	Improper arrangement of concrete pipe	Load Securement	10	Y
393.124(e)	Improper securement, up to 45 in. diameter	Load Securement	10	Y

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393.124(f)	Improper securement, greater than 45 inch diameter	Load Securement	10	Y
393.126	Fail to ensure intermodal container secured	Load Securement	10	Y
393.126(b)	Damaged/missing tiedown/securement device	Load Securement	10	Y
393.126(c)(1)	Lower corners not on vehicle/structure	Load Securement	10	Y
393.126(c)(2)	All corners of chassis not secured	Load Securement	10	Y
393.126(c)(3)	Front and rear not secured independently	Load Securement	10	Y
393.126(d)(1)	Empty container not properly positioned	Load Securement	10	Y
393.126(d)(2)	Empty container, more than 5 foot overhang	Load Securement	10	Y
393.126(d)(4)	Empty container—not properly secured	Load Securement	10	Y
393.128	No/improper securement of vehicles	Load Securement	10	Y
393.128(b)(1)	Vehicle not secured—front and rear	Load Securement	10	Y
393.128(b)(2)	Tiedown(s) not affixed to mounting points.	Load Securement	10	Y
393.128(b)(3)	Tiedown(s) not over/around wheels	Load Securement	10	Y
393.130	No/improper heavy vehicle/machine securement	Load Securement	10	Y
393.130(b)	Item not properly prepared for transport	Load Securement	10	Y
393.130(c)	Improper restraint/securement of item	Load Securement	10	Y
393.132	No/improper securement of crushed vehicles	Load Securement	10	Y
393.132(b)	Prohibited use of synthetic webbing	Load Securement	10	Y

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393.132(c)	Insufficient tiedowns per stack cars	Load Securement	10	Y
393.132(c)(5)	Insufficient means to retain loose parts	Load Securement	10	Y
393.134	No/improper securement of roll/hook container	Load Securement	10	Y
393.134(b)(1)	No blocking against forward movement	Load Securement	10	Y
393.134(b)(2)	Container not secured to front of vehicle	Load Securement	10	Y
393.134(b)(3)	Rear of container not properly secured	Load Securement	10	Y
393.136	No/improper securement of large boulders	Load Securement	10	Y
393.136(b)	Improper placement/positioning for boulder	Load Securement	10	Y
393.136(c)(1)	Boulder not secured with chain	Load Securement	10	Y
393.136(d)	Improper securement—cubic boulder	Load Securement	10	Y
393.136(e)	Improper securement—non-cubic boulder with base	Load Securement	10	Y
393.136(f)	Improper securement—non-cubic boulder without base	Load Securement	10	Y
397.1(a)	Driver/carrier must obey part 397	HM Other	2	Y
397.1(b)	Failing to require employees to know/obey part 397	HM Other	2	Y
397.2	Must comply with rules in parts 390-397—transporting HM	HM Other	2	Y
397.7(a)	Improperly parked explosives vehicle	Fire Hazard - HM	6	Y
397.7(b)	Improperly parked HM vehicle	Fire Hazard - HM	6	Y
397.11(a)	HM vehicle operated near open fire	Fire Hazard - HM	6	Y
397.11(b)	HM vehicle parked within 300 feet of fire	Fire Hazard - HM	6	Y
397.15	HM vehicle fueling violation	Fire Hazard - HM	6	Y
397.17	No tire examination on HM vehicle	HM Other	2	Y

**Federal Motor Carrier Safety Administration's Cargo  
Securement Rules:**

**[http://www.fmcsa.dot.gov/rules-  
regulations/truck/vehicle/cs-policy.htm](http://www.fmcsa.dot.gov/rules-regulations/truck/vehicle/cs-policy.htm)**