

The Use of Inaccurate Tare Weights in Vehicle Weighing



National Conference on
Weights and Measures



Background

- The Roles of:
 - The National Conference on Weights and Measures
 - National Institute of Standards and Technology
 - State and Local Weights and Measures Officials

The National Conference on Weights and Measures

- A standards-development organization for weights and measures regulatory agencies of states, counties and cities as well as some Federal Departments.
- Also works with international legal metrology groups to foster uniformity in weights and measures requirements and to facilitate trade.

The purpose of the NCWM

- To bring together government officials, representatives of business, industry, trade associations and consumer organizations to hear and discuss subjects that relate to the weights and measures field.
- To develop and recommend laws and regulations, technical codes for weights and measures devices used in commerce, test methods, enforcement procedures and administrative guidelines.

NIST



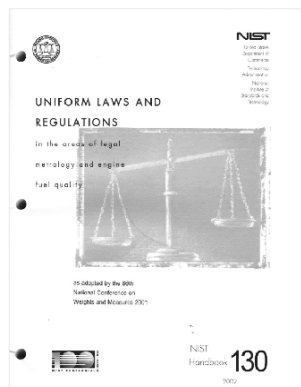
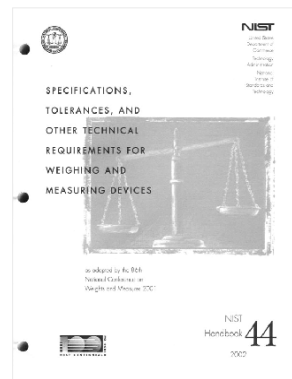
- Not a regulatory agency.
- 15 U.S. Code Chapter 7, Sec 272
 - (4) - Cooperate with the States in Securing Uniformity in Weights and Measures Laws and Methods of Inspection.
 - (10) Cooperate with other departments and agencies of the Federal Government, with industry, with State and local governments, with the governments of other nations and international organizations, and with private organizations in establishing standard practices, codes, specifications, and voluntary consensus standards.
 - (11) advise government and industry on scientific and technical problems.

State Role: Law Enforcement

- Commercial
 - buying or selling by weight or measure
 - service
 - transportation (freight, household moving).
 - storage, processing.
 - vehicle weighing service.
- Other
 - vehicle weights (total and axle loads)
 - statistical purposes

Basis of WM Inspection

- NIST Handbook 44 “Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices.”
- NIST Handbook 112 “Examination Procedures Outlines for Commercial Weighing and Measuring Devices”
- NIST Handbook 130 “Uniform Laws and Regulations...”



Weights and Measures Law

- **1.2. Weight.** - The term "weight " as used in connection with any commodity or service means net weight.
- **1.10. Net "Weight."** - ... means the weight of a commodity excluding any materials, substances, or items not considered to be part of the commodity.*

*Materials, substances, or items not considered to be part of the commodity include, but are not limited to, containers, conveyances, bags, wrappers, packaging materials, labels, individual piece coverings, decorative accompaniments, and coupons, except that, depending on the type of service rendered, packaging materials may be considered to be part of the service (e.g., the service of shipping includes the weight of packing materials).

15. Misrepresentation of Quantity*

No person shall:

- sell, offer, or expose for sale a quantity less than the quantity represented, nor
- take more than the represented quantity when, as buyer, he/she furnishes the weight or measure by means of which the quantity is determined, nor
- represent the quantity in any manner calculated or tending to mislead or in any way deceive another person.

*The fact that a scale may overregister within established tolerances and is approved for commercial service is not a legal justification to deliver less than the stated quantity.

16. Misrepresentation of Pricing

- No person shall misrepresent the price of any commodity or service sold, offered, exposed, or advertised for sale by weight, measure, or count, nor represent the price in any manner calculated or tending to mislead or in any way deceive a person.

Most States adopt NIST Handbooks

- 41 States automatically adopt NIST Handbook 44
- All 50 states adopt some version of Handbook 44
- 46 States have adopted variations or sections of NIST Handbook 130, in particular, "The Uniform Packaging and Labeling Regulation"

Authority

- State laws and regulations give officials the authority to conduct inspections, conduct investigations and seek criminal or civil penalties.
- Most states adopt the handbooks either by reference or through their administrative procedure acts.
- All states set their own policies regarding frequency of inspection and enforcement actions.

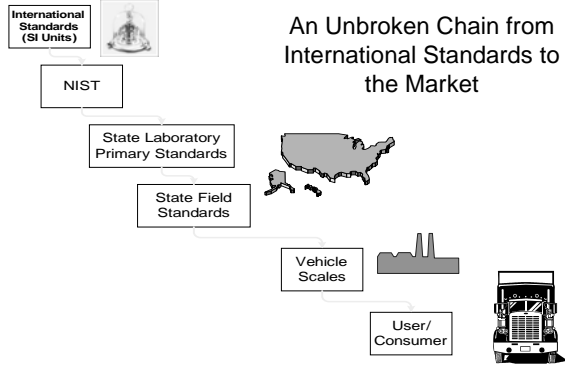
Purpose of Inspection

- Equity and fair competition
- Business and consumer protection
- Accurate: a scale is "accurate" when its performance ... its indications, its deliveries, its recorded representations, or its capacity or actual value, etc., as determined by tests made with suitable standards conforms to the standard within the applicable tolerances and other performance requirements. Scales that fail to conform are "inaccurate."

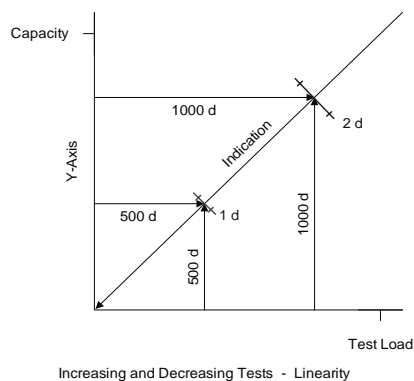
Laws

- Control commercial weighing and measuring instruments through:
 - Type Evaluation
 - Inspection and testing
- Enforce sale by net weight.
- Misrepresentation of weights and pricing.
- Prevent "misrepresentation" of weight caused by
 - apathy
 - accidental or intentional acts
 - ignorance

Measurement Traceability



Overview: Typical Vehicle Scale Test Procedures Used by State Weights and Measures Officials



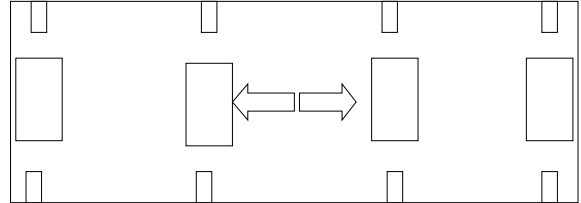
Examination Procedure Outline

- Zero
- Increasing load test (using 10,000 lb to 40,000 lb of known test weights)
- Shift test
- Decreasing load test (automatic scales only)
- Strain or substitution tests to verify higher scale capacities.
- Return to zero

Zero Test
then
Increasing-
Load
Test



Directional Test Load Pattern -
(4) Section Scale



Strain Load Test



Evaluation of Test Results

- Tolerance results at all test loads
- Agreement of section test results
- Repeatability
- Return to zero
- Sensitivity at zero and maximum test load
- Compliance with other requirements such as overcapacity blanking and motion detection for printing.

Theory of Tolerances

- Tolerances:
 - are primarily accuracy criteria for use by regulatory officials.
 - values are fixed so the permissible errors are sufficiently small so that there is no serious injury to either buyer or seller of commodities or services.
 - Historically vehicle scale tolerances have been 0.1 % and 0.2 % of test load (i.e., 1 lb or 2 lb per thousand pounds of weight).

Scale Capacity 120,000 x 20 lb

+/- Acceptance	Load in lb	+/-Maintenance
10	0 to 10,000	20
20	20,000	40
30	30,000	60
40	40,000	80
50	50,000	100
60	60,000	120
70	70,000	140
80	80,000	160
90	90,000	180
100	100,000	200
110	110,000	220
120	120,000	240

Scale Capacity 200,000 x 50 lb

+/- Acceptance	Load in lb	+/- Maintenance
25	0 to 25,000	50
50	50,000	100
75	75,000	150
100	100,000	200
125	125,000	250
150	150,000	300
175	175,000	350
200	200,000	400
225	225,000	450
250	250,000	500
275	275,000	550
300	300,000	600

Stored Tare Weight Surveys

Definitions

- Gross Weight = truck + cargo
- Tare Weight = truck, driver, fuel and other.
- Net Weight = weight of the product, commodity or cargo carried.

How are weights used?

- Seller
 - Basis for buying and selling (+/- errors)
 - Services (freight, storage, weight for service)
 - Inventory
 - Highway weight limit compliance
- Commercial Transaction:
 - Seller to Buyer (single or multiple transactions)
 - Seller to Buyer and Third or Multiple Parties

Example of Tare Weight Error

Stored Tare Used for Trade: 33,140 lb

Actual Tare: 33,700 lb

Error: - 560 lb

Gross Wt: 50,000 lb

Gross Wt: 50,000 lb

False Tare: 33,140 lb

Actual Tare: 33,700 lb

False Net Weight: 16,860 lb

True Net Weight: 16,300 lb

Customer Shortweighed: 560 lb

Stored Tare

- Stored and recalled from memory in digital indicators and computers.
- Charts with truck-id and tare weight taped to the wall.
- Marked on vehicle or driver information.

What Changes Tare Weight?

- Driver/Passengers on-off truck
- Repairs or modifications to vehicle (e.g., new tires, paint, welding etc.)
- Tools, material handling equipment, personal effects.
- Fuel and other fluid levels.
- Mud, dirt and others (e.g., product retained in bed of dump truck).

States Reporting Survey Results

Across all Industries

- Arizona
- California
- Connecticut
- Florida
- Iowa
- Maryland
- Minnesota
- Nebraska
- Pennsylvania
- Tennessee
- Virginia
- West Virginia

Frequency of Tare Updates based on User Comments

- Yearly (but firm was using tare weights that were 3 years old).
- Tare weight established by 3 separate weighings is used.
- Only when customer requests.
- Monthly

- Once in every 10 weighings (3, 2, or 5)
- Every day or twice per day
- 2 years, 5-1/2 years (+ 860 lb)(+ 640 lb)
- Every 2 days
- Every 3 months
- Once per week, every two-weeks, year, and beginning of paving season
- Weigh-in and weigh-out
- Never

Survey Results

(tolerance allowed on at vehicle weights in parentheses)

- 26 locations
 - Errors: - 180 to + 570 (60 – 80 lb) [750]
- 183 tare weights
 - Errors: - 740 to + 400 lb (40 – 80 lb) [1140]
- 48 tare weights
 - Errors: -1300 to + 660 (20 – 80 lb) [1960]
- 140 tare weights
 - Errors: - 8900 to + 2340 (20 – 100 lb) [11240]

Survey Results

(tolerance allowed on at vehicle weights in parentheses)

- 8 tare weights
 - Errors: - 340 to + 300 (40 – 80 lb) [640]
- 39 tare weights
 - Errors: -1020 to + 680 lb (20 – 80 lb) [1700]
- 44 tare weights
 - Errors: -4920 to + 540 (60 – 80 lb) [5460]
- 113 tare weights
 - Errors: -4680 to + 1060 (20 – 80 lb) [5740]

Survey Results

(tolerance allowed on at vehicle weights in parentheses)

- 36 tare weights
 - Errors: - 320 to + 260 (40 – 60 lb) [640]
- 57 tare weights
 - Errors: -660 to + 2680 lb (20 – 100 lb) [3340]
- 84 tare weights
 - Errors: -480 to + 1200 (40 – 100 lb) [1680]

Individual Vehicles

(d-daily, 3 – 90 days, 1- yearly)

Used	Actual	Error	%
d23,300	23,380	- 80	- 0.34
d25,300	25,200	+100	+ 0.39
d24,340	24,380	- 40	- 0.16
s35,760	36,340	+ 580	+ 1.62
s34,000	37,000	-3,000	- 8.82
s33,500	34,440	- 940	- 2.80
i34,600	32,260	+2,340	+ 6.76
i42,360	45,500	-3,140	- 7.41
i23,680	24,800	-1,120	- 4.72
i27,500	30,900	-3,400	- 12.36

Individual Vehicles

(Largest Variations)

Used	Actual	Error	%
31,800	24,800	+ 7,000	+ 22 (quarry)
42,780	51,680	- 8,900	-20.8 (landfill)
28,760	33,680	- 4,920	-17 (aggregate)
42,360	45,500	- 3,140	- 7.4 (landfill)
27,500	30,900	- 3,400	- 12.3 (recycler)
34,600	32,260	+ 2,340	+ 6.7 (landfill)
27,380	28,680	-1,300	- 4.7 (different trailer)

Individual Vehicles

Daily - Quarry

Used	Actual	Error	%
23,300	23,380	- 80	- 0.34
23,200	23,140	+60	+ 0.25
23,520	23,500	+20	+ 0.08
24,340	24,380	- 40	- 0.16
23,300	23,320	- 20	- 0.08
26,100	26,140	- 40	- 0.16
23,180	23,200	- 20	- 0.08
24,820	24,780	+ 40	+ 0.16
25,300	25,200	+ 100	+ 0.39
22,800	22,820	- 20	- 0.08

Proposed Actions

- Coordinate a new survey to obtain current data on stored vehicle tare weights.
- Contact industry and trade associations and solicit their assistance in sharing survey results with their members so the economic impact of the errors is recognized and good weighing practices are initiated to correct weighing inaccuracies.

Proposed Actions

- Develop “Good Weighing Practice” guide for distribution to device owners-users.
- Educate W&M Officials about the problem and provide guidance on how they can control violations through supervision and enforcement action.
- Consider HB 44 & HB 130 proposals? (e.g., require stored vehicle tares to be deleted from memory each day ?)

Other Weighing Practices that Result in Inaccuracies

- Double-Draft or split-weighing:
Kansas recently found using the same truck that 100 % of the double-draft weights differed from the single-draft weights, and 73 % differed by an amount greater than the applicable 120 lb tolerance for the vehicle. The average plus error was 320 lb and the average minus error was 210 lb. Several errors exceeded 1,000 lb.



Agreement of Weigh-in & Weigh-out Scales



- Weigh-in and Weigh-out Scales are within tolerances but one is plus and other is minus (e.g., at 80,000 lb on a 20 lb division scale this difference could be as much as 320 lb)

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