

A Tale of Two Testing Methods, Part Two

In Part Two of this series, your author looks at the information, data and results of an established electronic testing methodology.

by Kevin Heling

What would you think if you took your automobile to a maintenance repair shop and they told you they would be checking your brakes by adding some weights to the inside of your car, taking it out on the highway, slamming on the brakes and then measuring the length of the skid mark on the road to determine whether your brakes generate enough force to safely stop

your car? I'm sure you'd think: what!? This is effectively how key stopping forces are still being evaluated with most elevators in North America today.

Hyperbole is used here for emphasis and extra effect. After more than 10 years of direct experience working with an available, proven and accepted "alternative" Category 5 (CAT 5) testing method, we have seen that, while the old and established method of "testing" suggests it is assuring safe emergency stops, we have seen that, in many cases, it likely is not.

The weight method is flawed, and even worse, there is no assurance for us that the testing was done correctly or even done at all. It is not positive to go to such an accusation; though I can tell you I have personally seen this happen and have had respected industry professionals assure me it happens (more often than we'd like to know). There is often pressure to just get CAT 5s done and move on. No checklist is ever better than actual numerical results of a proven and valid test. For this reason alone, it is surprising there are still any AHJs that will not, at minimum, "accept" this more than 10-year-old alternative. Why not allow service contractors in their area to at least try a new method and find out for themselves that it is indeed better? The riding public also deserves this change, as it gives us safer AND better-maintained elevators.

Going forward, we recommend it would be helpful for us to stop using the term "alternative" and call it electronic (data-focused) or better yet: Instrumentation-based CAT 5 testing. A move has been made to change terminology in A17.1/B44; addressing the fact that the "alternative" term causes more confusion than understanding. Electronic testing will be seen as the best method. All the advantages of electronic testing and the shortcomings of rudimentary weight-testing were revealed and detailed in Part One (EW, February 2025) of this three-part series. Go back to Part One if you want to look at the detailed explanations and review discussion of the Code and how it came into the A17.1/B44 Standard.

In this Part Two article, we look generally at the information, data and results of an established electronic testing methodology. We will see exactly how better maintenance and testing is possible.

HENNING ELVI 2 – A Comprehensive CAT 5 Testing System

One currently developed electronic CAT 5 Testing System (ELVI 2) represents a significant advancement in elevator safety testing methodology, compared to weight-based CAT 5 testing according to ASME A17.1/CSA B44. Central to

Learning Objectives

After reading this article, you should know that:

- ◆ "Observational" Category 5 Testing, which we have relied upon for going on 60 years, may now be replaced by available technology using accelerometers and other accurate load and force measurement devices and processes.
- ◆ Data-focused, instrumentation-based testing and measurement devices are replacing arcane methods of testing that rely on elevator and labor stressing and property-damaging weights.
- ◆ Some people in the industry (including a few labor leaders and appointed heads of AHJs) continue to misunderstand the real effect of this change and how it improves traction elevator maintenance and safety.
- ◆ The ASME A17.1-2013/B44-2013 Safety Code for Elevators and Escalators intentionally established the framework for this progress. One available system currently meets all the demands and requirements; the ELVI 2 System's test reports exemplify how they do it.
- ◆ An electronic data-based measurement and testing system has its own advantages and how this helps with knowing an elevator will be operating safely after testing. Also, disadvantages, if any.



Value:
1 contact hour
(0.1 CEU)

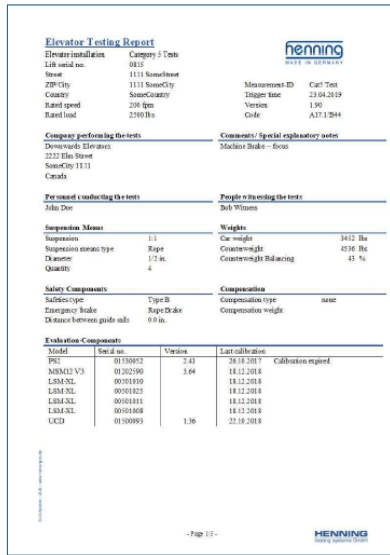
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Continued

REPORT: COVER PAGE

- Installation name/location
- Jurisdiction # (serial no.)
- Rated Speed/Load
- Date of Test—auto captured
- Company Performing Test
- Logo insertion
- Special notes or comment
- Software version
- Responsible person conducting testing (space for license/ Training Cert. #)
- Witness(es), if any required



Report cover page

this system’s effectiveness is its comprehensive reporting capability, which provides detailed documentation, reproducible results and permanent records of all safety-critical tests. This article examines the structure, content and practical benefits of ELVI 2 system reports. Every ELVI 2 report begins with a comprehensive cover page that serves as both an identification document and a quality system record.

This standardized format ensures consistency across all installations and gives regulatory authorities immediate access to critical information. Code language added in 2013 established this. The report header captures fundamental installation data including the precise installation name and location, jurisdiction serial number, rated speed (needed in feet per minute or meters per second) and rated load capacity (in pounds or kilograms). The test date is automatically captured by the system, eliminating potential transcription errors and providing a report embedded (difficult to alter) time stamp that further supports regulatory compliance. This information is more detailed in the requirements of Section 8.6.11.10, beginning in the 2013 revision of A17.1/B44.

A critical aspect of Category 5 testing, intentional in the new and added language, is accountability and verification. ELVI 2 reports include dedicated fields for the person conducting the testing with provision for license or training certification numbers. This documentation satisfies regulatory requirements for qualified personnel and provides a clear chain of responsibility. When jurisdictional requirements mandate witness presence, the report accommodates adding witnesses, covering compliance with such local requirements.

+ MORE REPORT INFORMATION:

1. Looking at scales (axes) on graphics/charts; what each axis is showing as standard.
2. Final report is a pdf document that is generated from software (Henning Sensor Suite [HSS]). Data collected and stored in .cpf files. Able to Import and Export. Portability for maintaining data.
3. Results/data viewable within HSS before testing is finalized and pdf report produced. Report stays with the elevator (with each one as a Project). Data files .cpf can be shared and also passed along for further review.

Report cover page with more information

BASIC & VITAL STATISTICS...

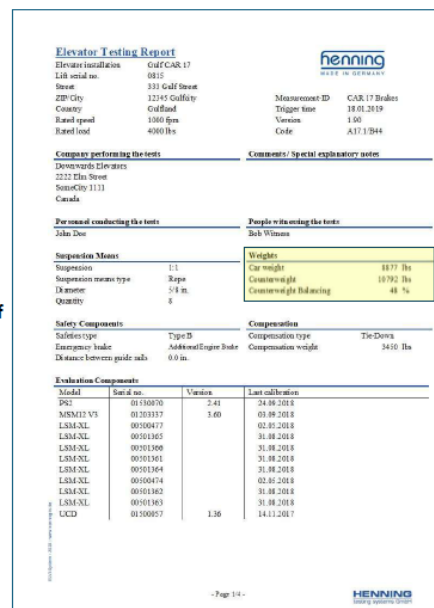
- Suspension and type
- Diameter and type
- Weight of Car and CWT*
- Balance percentage*
- Safeties (Type)
- Emergency Brake (Type)
- Compensation and weights, if applicable
- Detail of measurement and evaluation components, SN's, Firmware version, calibration status

Professional presentation is facilitated through company identification fields and logo insertion capabilities. This feature gives testing companies brand visibility and authoritative technical documentation. The company performing the test is clearly identified and can include complete contact information.

Version control of testing components assures testing integrity and reproducibility. The ELVI 2 report automatically documents the software version in use, creating an audit trail that can be referenced if questions arise about testing methodology or calculation algorithms. This feature is particularly valuable when regulatory bodies review historical test data or when comparing results across different time periods.

The report’s vital statistics section provides comprehensive technical data about the tested installation. This includes detailed suspension information (type and configuration), rope or belt specifications (diameter, type and quantity), precise weight measurements for both the car and counterweight and the calculated balance percentage. Check existing full-load testing “checklists,” and you will see that important data is often not completed – this is a big shortcoming of manual forms.

Safety component documentation is equally thorough, recording the type of safeties installed, emergency brake configuration and compensation system details when applicable. For jurisdictions requiring specific documentation of guide rail clearances or other dimensional data, these measurements can be captured with precision.



This is an immediate, added and important addition of alternative testing.

As noted, all of the above recorded data and most of the following are demanded in the ASME A17.1/B44 Elevator Safety Standard (Section 8.6.11.10). A required feature is detailed documentation of the measurement equipment itself. Each sensor, accelerometer and data acquisition component is identified by model number, serial number, firmware version and calibration status with specific calibration dates. This level of traceability ensures that the measurement system itself is subject to the same scrutiny as the elevator components being tested, reinforcing the validity and defensibility of test results.

Each system component’s calibration status is verified and documented, with the system alerting operators if calibration intervals have been exceeded. This automated calibration verification represents a significant quality improvement over traditional testing methods where equipment calibration might be tracked separately or even overlooked entirely. ELVI 2 employs a dual-format presentation strategy meeting both technical analysis and regulatory compliance needs. Each test result is presented with both numerical data tables and graphical representations, allowing for immediate visual assessment while showing precise measurements and detailed analysis.

Every individual test within an ELVI 2 report receives an automatic date and time stamp, captured directly from the system clock at the moment of test execution. This feature serves multiple purposes: It establishes a chronological sequence of testing activities, provides unambiguous documentation for regulatory review and creates an audit trail that can resolve questions about test sequence or timing. Unlike manual documentation systems where time of testing is approximated or recorded after the fact, ELVI 2’s automatic capture ensures precision, eliminates the possibility of unintended errors and makes intentional misreporting difficult.

The Results presentation employs a redundant indication system, with pass/fail status communicated through both textual designation and color-coded visual indicators. This reduces the likelihood of misinterpretation and facilitates rapid

assessment by inspectors reviewing multiple reports. Green indicators with a thumbs up and a “Pass” denote passed tests, while red indicators with thumbs down marks and a “Fail” identify failed results. This is consistent across all test types, creating an intuitive interface for readers.

Each test result includes a comprehensive data table presenting all relevant measurements and calculated values. For brake and safety tests, this typically includes required static forces (calculations based on car weight, counterweight configuration and rated load), measured dynamic forces, deceleration values for various loading conditions and accurately derived performance under full rated-load conditions.

The format clearly distinguishes between measured values (derived directly from sensor data) and calculated values (derived from measured data using code-driven formulas). This distinction is important for technical review, as it allows qualified reviewers to verify calculation methodology and assess whether calculations are appropriate for the specific installation.

Graphical components of each test result permit critical insight into system behavior over time. Unlike a single numerical result that might obscure important transient behaviors, the time-series graphs reveal acceleration profiles, force application characteristics, oscillation patterns and settling behaviors.

For example, a machine brake test graph displays the complete deceleration profile from the moment brake force is actuated on through the full-stopping sequence. The graph reveals not just the final stopping distance, but also the rate of deceleration increase, the peak deceleration value and any oscillatory behavior as the elevator comes to rest. This comprehensive view allows experienced technicians to identify potential adjustment needs even in tests that technically pass code requirements.

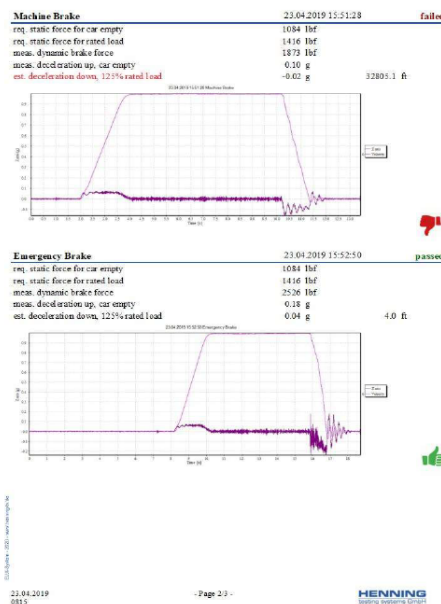
Graph axes are standardized to facilitate comparison across different tests and installations. Time is consistently displayed

on the horizontal axis, while force, acceleration or other measured parameters occupy the vertical axis. Units are clearly labeled, with force shown in pounds-force (lbf) or kilonewtons (kN), acceleration in g-forces (where 1 g equals 9.81 m/s²), and distance in feet, inches, meters or millimeters (for specific jurisdiction interests), whatever makes sense for evaluation. Measurements are fixed after a test and are easily adjusted by simply changing settings in the Henning Sensor Suite (HSS) and looking again at the report output.

This standardization extends to scale selection, where the system automatically adjusts vertical scale

REPORT INFORMATION:

1. Note date and time stamp for each test – system captured and generated
2. Passed or Failed result of each test designated twice
3. Results shown with data and graphically
4. Pass results MUST meet long-established Code requirements
5. Will look more at detail of data and graph scales



More information from the report

to accommodate the range of measured values while maintaining readability. The scale values are always displayed, preventing the misinterpretation that can occur when graphs are compared without attention to scale differences. Each test result explicitly references the applicable code requirements, showing both the measured value and the allowable limit. For deceleration-based tests (brake, safety and buffer stop tests), A17.2/CSA B44 Table 2.29.2(b) defines maximum allowable deceleration values based on full rated-load conditions. The ELVI 2 report calculates these values based on measured data and installation parameters, then clearly indicates whether results fall within the code-defined limits. These are accurately calculated results from directly measured stopping forces. They are not estimates or simulations! Some have suggested that the new electronic tests are “simulations,” when this is what is really happening when using the full-load “observational” testing. Another way to think of this is that simple-load testing is only trying to observe safety code set limits rather than knowing more – the limits AND the capabilities.

This direct Code reference eliminates ambiguity and reduces the technical burden on inspectors who might be reviewing reports for multiple installations with varying configurations. Rather than requiring the inspector to independently verify calculations and code applicability, the report presents results in a format that directly correlates to code requirements.

A failed machine brake test example illustrates how ELVI 2 reporting reveals inadequate performance. The data table shows required static forces based on car empty and rated load conditions, measured dynamic brake force and, critically, the estimated deceleration under downward travel with 125% rated load. A measured/calculated deceleration value of -0.02 g indicates that the brake does not have minimal retarding force (deceleration) under this worst-case loading condition, representing a clear safety deficiency. This graphical evidence is invaluable when discussing necessary repairs with building management; it provides clear documentary evidence of the safety issue.

In contrast, a passed emergency brake test demonstrates proper system performance. A measured deceleration value of 0.04 g under downward travel with 125% rated load exceeds the minimum required value, providing an appropriate (though on the low end) safety margin. The graphical representation shows prompt brake engagement with smooth deceleration and minimal oscillation, indicating proper adjustment and maintenance. The force profile rises quickly to an adequate level and maintains stability throughout the stopping sequence. This type of clean result gives confidence in system integrity and proper maintenance practices.

In standard practice, final reports distributed to safety officials, building owners and regulatory authorities typically include only those test results that have ultimately passed code requirements – in some cases passing tests achieved after maintenance/adjustment. Selective presentation serves practical purposes: It provides clear documentation of compliance, reduces report length and complexity and focuses attention on the successful completion of required testing.

With some extra and careful documentation management, a testing organization could choose to maintain complete records including failed tests and subsequent retests, even though these intermediate results may not appear in final distributed reports. The ELVI 2 system facilitates this capability through its project-based data management structure.

While failed results may not appear in final distributed reports, they may serve critical functions within the testing organization’s quality management system. Failed tests document conditions requiring correction, provide real baseline data for before-and-after comparison and create an audit trail demonstrating diligence in identifying and addressing deficiencies.

The ELVI 2 system permanently stores all test data within project files, regardless of pass/fail status. This comprehensive data retention ensures that complete documentation exists for internal review, quality assurance purposes and potential regulatory inquiries. If questions arise about testing thoroughness or proper procedure following, the complete test history provides definitive answers.

When initial testing reveals deficiencies requiring corrective action, the testing workflow follows a defined sequence: Initial testing identifies the problem, maintenance or adjustment addresses the issue and retesting verifies successful correction. The ELVI 2 reporting system accommodates this workflow through supplemental report generation.

A supplemental report may function as an addendum to the original project file, documenting the retest results while maintaining connection to initial findings. This approach preserves the complete history of testing and correction while providing the building owner and regulatory authorities with clear evidence of successful remediation. The supplemental report includes full technical documentation equivalent to the original test, ensuring that retest results receive the same scrutiny as initial testing.

The fundamental requirement driving CAT 5 testing is verification that safety-critical systems (brakes, safeties, traction and buffer stops) perform within specified deceleration limits when subjected to rated load conditions. ASME A17.1 and CSA B44 establish maximum allowable deceleration values based on the principle that excessive deceleration creates passenger discomfort and potential injury risk, while insufficient deceleration represents a safety hazard in emergency conditions.

For emergency brakes and safeties, code requirements specify that deceleration must fall within a defined range: sufficient to ensure safe stopping, but not so abrupt as to create injury risk to passengers. The ELVI 2 system evaluates measured performance against these criteria, accounting for the specific configuration of each installation.

All deceleration measurements are referenced to Earth’s gravity, with 1 g equal to 9.81 m/s² (32.17 ft/s²). This standardized reference allows meaningful comparison across different installations and testing methodologies. When a test reports a deceleration of 0.5 g, this indicates a deceleration rate equal to half of gravitational acceleration – a value that would be

noticeable to passengers but generally within acceptable comfort limits.

The selection of g-force units rather than alternative acceleration measurements (such as feet per second squared) reflects both historical convention in elevator safety standards and practical advantages in interpretation. Expressing values as multiples of gravity provides practical and intuitive understanding of the forces passengers would experience during emergency stops.

Safety mechanism testing typically produces deceleration values in the range of 0.3 g to 1.0 g when applied on a fully loaded car, depending on safety type, car weight and rail engagement characteristics. Instantaneous safeties (which employ a direct mechanical wedge action) typically produce higher initial deceleration values, while progressive safeties (designed to provide more gradual engagement) show lower peak values with longer engagement distances.

A sample safety test example shows a measured deceleration of 1.27 g with the empty car, which calculates to 0.51 g under full rated-load conditions. This value falls comfortably within acceptable limits and indicates proper safety adjustment. For such an example elevator, a stopping distance of 7.7 in. demonstrates prompt engagement without excessive force application. The graphical representation reveals the characteristic sharp spike as safeties initially grip the rails, followed by moderation as the system settles – a normal and expected pattern for properly functioning Type B safeties.

While brake and safety tests focus on deceleration limits, traction testing addresses a different safety concern: the ability of drive sheaves or pulleys to maintain adequate grip on suspension ropes or belts under various loading conditions. Inadequate traction can result in rope or belt slippage, creating potentially dangerous situations where the car or counterweight might move unexpectedly.

The traction test measures static traction and calculates dynamic traction factors – ratios that express the relationship between available driving force and the force required to overcome system resistance at various load levels. Code requirements specify minimum traction factors (typically 2.0 for dynamic conditions), providing a safety margin that accounts for variables such as rope wear, environmental conditions and normal performance variations.

An example traction test shows a static factor of 3.07 and a dynamic factor of 2.76, both exceeding minimum requirements with comfortable margins. The graphical representation displays the characteristic descending curve as load is progressively applied, with the oscillations at the end indicating the transition through the slip threshold. This type of smooth, predictable behavior with adequate safety margins demonstrates proper sheave design, appropriate rope selection and satisfactory maintenance practices.

Understanding Graph Scales and Standardized Presentation

The ELVI 2 system employs consistent scale conventions across different test types, facilitating comparison and pattern

recognition. Time scales typically span the duration of the test event (usually a few seconds for brake and safety tests, longer for complete operational cycle tests). Force or acceleration scales automatically adjust to accommodate the range of measured values while maintaining resolution sufficient to identify key variations.

This standardization extends beyond individual reports to create consistency across different installations and testing sessions. An experienced technician reviewing multiple ELVI 2 reports can quickly assess results by recognizing characteristic curve shapes and comparing magnitudes, even when specific installation parameters vary. This pattern recognition capability represents a significant advancement over traditional weight-based testing, where each test produces only single-point data without the context afforded by time-series graphs.

The ELVI 2 hardware system interfaces with HSS software, which serves as the data collection, analysis and report generation platform. HSS provides a comprehensive environment for managing elevator testing projects, with capabilities extending well beyond simple report production.

HSS displays real-time sensor readings, allowing technicians to monitor test progression and identify immediate problems. This feedback capability reduces testing time by allowing prompt identification of setup errors, sensor malfunctions or clear test failures that warrant immediate attention.

Test data is stored in .cpf format, a proprietary but documented structure that preserves all sensor data, metadata and analysis results. The format serves multiple purposes within the testing workflow: It provides archival storage for historical data, enables data sharing between different users of HSS software and facilitates advanced analysis using the complete dataset rather than just summary results.

Portability of files is an advantage for organizations with multiple technicians, multiple offices or collaborative relationships with other testing companies. Data collected by one technician can be transferred to another for review, quality assurance or detailed analysis. Engineering consultants can receive .cpf files from testing companies and perform independent verification of results, providing an additional layer of quality assurance for critical installations. Import and export capabilities further enhance data utility. Historical test data can be imported into current projects for comparison, enabling trend analysis that reveals gradual performance degradation before it reaches critical levels. Test data can be exported to other formats for integration with building management systems, maintenance databases or safety management platforms.

HSS organizes testing data on a project basis, with each elevator installation constituting a separate project. This organizational approach provides several benefits: All tests performed on a specific installation are logically grouped, historical data for that installation is readily accessible and comparative analysis across multiple test dates is straightforward.

The project structure also facilitates supplemental report generation when retesting is required. Rather than creating an

entirely separate documentation set for retests, the supplemental report is added to the existing project, maintaining the connection between initial and subsequent tests. This approach ensures that the complete testing history for an installation is preserved in a single logical location.

A key feature of the HSS/ELVI 2 workflow is the ability to review test data before finalizing and distributing reports. After conducting tests, a trained technician can examine results, verify that sensor placement was correct, confirm that measured values are reasonable and assess whether any tests should be repeated before leaving the site.

This review capability contrasts with traditional weight-based testing, where data review typically occurs only after returning to the office and manually transcribing handwritten field notes. With ELVI 2, data quality issues can be identified and addressed while still on-site, when corrective action is simplest and least expensive.

The review process also provides opportunity for preliminary discussion with building maintenance personnel or property managers. If tests reveal deficiencies requiring correction, the graphical and numerical evidence can be shared immediately, facilitating informed decisions about maintenance priorities and corrective action timelines.

Once data review is complete and results are satisfactory, HSS generates a comprehensive PDF report suitable for distribution to all stakeholders. The PDF format ensures universal accessibility – virtually all recipients can open and review PDF documents regardless of their computer platform or software suite. The format also provides security features that prevent unauthorized modification while allowing standard annotation and commentary.

PDF reports generated by HSS maintain the professional appearance and comprehensive content detailed in earlier sections of this article. The report includes all passed tests, complete technical specifications, equipment documentation and the certification information required by regulatory authorities. The PDF document serves as a permanent record of testing conducted, providing evidence of code compliance and due diligence in safety management.

The Electronic Data-Based Testing Advantage: Documentation and Traceability

The comprehensive data management capabilities of ELVI 2 represent a transformative advancement in elevator safety testing practice. Traditional weight-based testing, while effective at verifying basic performance parameters, give only minimal pass/fail documentation and only occasionally some manually recorded stopping distances (if the person conducting the test chooses or remembers to write them into the test checklist). This almost never happens. The weight-based test itself leaves no permanent record – once weights are removed and the elevator returns to service, only handwritten notes may remain as evidence of testing conducted.

Formal reporting creates a rich, permanent and detailed record of every aspect of testing. The complete sensor data stream is preserved, allowing retrospective analysis if questions

arise. Graphical representations reveal system behavior characteristics that might indicate developing problems even when immediate test results are satisfactory. Equipment calibration status is documented, establishing the validity of measurements. The entire process is timestamped and organized in a manner facilitating regulatory review and quality (system) assurance.

This documentation advantage extends beyond immediate code compliance to support broader safety management objectives. Trend analysis using historical test data can identify gradual performance degradation, enabling proactive maintenance before failures occur. Comparative analysis across multiple similar installations can reveal common issues or best practices. Data-sharing capabilities enable collaborative problem-solving when unusual conditions are encountered.

The structured, digital nature of collected and stored electronic data facilitates integration with broader safety management and maintenance management systems. Building owners with comprehensive computerized maintenance management systems (CMMS) can incorporate test results into their databases, creating complete equipment histories that span routine maintenance, repairs, modifications and safety testing. This integrated approach to information management supports more sophisticated analysis of maintenance effectiveness, safety trends and lifecycle costs.

For testing companies managing large portfolios of customer installations, the project-based organization and data portability features support efficient business practices. Technicians can be assigned to specific installations with confidence that they have access to complete historical data. Quality system management personnel may review test data without requiring physical transfer of equipment or documents. Customer service representatives can access test history when responding to inquiries or scheduling follow-up services.

The ability to share electronic files without loss of data fidelity enables rigorous peer review and quality system processes. Testing organizations committed to high-quality work can implement internal review procedures where experienced technicians examine data collected by less experienced personnel, verifying correct procedures and appropriate interpretation. When unusual results are encountered, data can be shared with equipment manufacturers, consultants or other experts for additional analysis.

This peer review capability represents a significant advancement over traditional testing methods, where review is limited to examining handwritten notes and maybe some calculated results. With complete access to raw sensor data, reviewers can verify that calculations are correct, that test conditions were appropriate and that conclusions are justified by evidence. This level of scrutiny enhances quality while providing valuable learning opportunities for developing technicians.

The ELVI 2 reporting system represents far more than simply a different format for presenting test results. It embodies a fundamental transformation in how elevator safety testing is

documented, reviewed and integrated into broader safety management practices. The combination of comprehensive data capture, sophisticated analysis capabilities, standardized presentation formats and flexible data management creates a testing ecosystem that serves the needs of technicians, elevator and building owners, regulatory authorities and the riding public.

As the elevator industry is employing more testing methodologies, the documentation and traceability advantages of systems like ELVI 2 will become increasingly recognized as essential components of effective safety management. The ability to verify not just that testing was performed, but precisely how it was performed and what results were obtained, strengthens confidence in both the testing process and the equipment being tested. This enhanced transparency and accountability represents the future of elevator safety verification.

Next, in Part Three, with an understanding of this electronic measurement process, we can look at actual measurements as examples, and understand what results mean and see what actions should be taken. 🌐

Learning-Reinforcement Questions

Use the below learning-reinforcement questions to study for the Continuing Education Assessment Exam available online at elevatorbooks.com or on p. 134 of this issue.

- ◆ Are some in the industry not informed, willfully ignoring or really slow to accept the advantages of data-focused, instrumentation based electronic testing of elevators?
- ◆ Does the choice of terms of reference (titles) influence what someone being presented with new technology thinks about the function and appropriateness of that technology?
- ◆ How well have checklists (used in various places in the Safety Code) worked with respect to assuring that Code-required tests and measurements are completed and whether they are done properly?
- ◆ What are some advantages of an electronic data-based measurement and testing system? How does it help with knowing an elevator will be operating safely after testing? Are there disadvantages?
- ◆ What considerations related to documentation (specifically, traceability in measurement and testing) support maintenance and safe operation of traction elevators?



ELEVATOR WORLD Continuing Education Assessment Examination Questions

Read the article “A Tale of Two Testing Methods, Part Two” (EW, March 2026, p. 84) and study the learning-reinforcement questions at the end of the article.

- ◆ To receive **one hour (0.1 CEU)** of continuing-education credit, answer the assessment examination questions found below online at elevatorbooks.com or fill out the ELEVATOR WORLD Continuing Education reporting form found overleaf and submit by mail with payment.
- ◆ Approved for Continuing Education by **NAEC for CET®, CAT® and QEI.**

1. Which of the following is integral to data-referenced testing of an elevator’s stopping forces?
 - a. A visually measured slide so stopping distance is seen
 - b. A current/accurate measurement of the system’s mass (used in physics: $f=m*a$)
 - c. Weight carts
 - d. The guiderails have been cleaned.
2. The testing system reviewed has several key aspects of its effectiveness. Choose the best of the following:
 - a. Standardized graphs and relative scale selection
 - b. All measurements (fail and pass) must always be included in the Final Report.
 - c. Traction testing results
 - d. A very comprehensive reporting structure and capability
3. Which of the following covers ALL of the measures and tests that can be done with ELVI 2?
 - a. Making a good current measurement of system masses; machine brake testing; traction testing and safeties testing
 - b. Emergency brake test; unintended movement/unintended car movement test
 - c. Buffer test, if the elevator has a hydraulic/oil buffer
 - d. All of the above, according to the components of the operating elevator. In general, all elevators will have items in a. tested.
4. Advanced, data collecting, instrumentation-based systems like ELVI 2 have advantages beyond generating a documented report. Which of the following are most significant?
 - a. Ability to quantitatively show the test was performed
 - b. It’s a transformation in how Category 5 testing is documented – meaning it can be reviewed and integrated into broader safety and quality management practices.
 - c. a. + b. above are both significant.
 - d. The system and data do not lend themselves to sharing or peer review.
5. What physical parts/components need to be included when the “mass” is measured?
 - a. Weight of the drive machine and related sheave/shaft capacity
 - b. Passenger capacity, weight of the car and weight of the ropes
 - c. Car weight, counterweight, weight of ropes (or belts) and weight of any compensation, if included
 - d. Weight of the technician doing the testing
6. What does a data-driven system reveal about the common, long-standing method of CAT 5 testing?
 - a. That the weight-method has no inherent/measurable proof that testing was physically done
 - b. We should hold on to past ways of doing things; we did them for so long they must be good.
 - c. Stopping force and safety testing is maybe not that important, as we all know there is extra redundancy in elevator systems.
 - d. In general, people like change and the elevator industry makes changes quickly.
7. We know that an elevator will stop when we use the right weight to test it.
 - a. This is logical. We can do the test and see that it stops. Seeing is believing.
 - b. Stopping distances based on capacity and speed were developed and accepted many years ago by very experienced and smart engineers. They made a table we use that documents this.
 - c. We need weights for other tests of elevator installations. Therefore, this follows.
 - d. All of the above are ideas from the past that are proven to be wrong or less than reliable.
8. Brake testing was used describing graphical displays. What do the graphs tell us?
 - a. They can be used for comparison and give us insight into system behavior/changes over time.
 - b. Graphs show us that stops follow an even and linear pattern.
 - c. Graphs reveal the final stopping distance, the rate of deceleration increase, peak acceleration and oscillatory behavior as the elevator comes to rest.
 - d. a. and c. are correct.
9. Traction testing is different from measuring stopping forces in what ways?
 - a. Too much traction is never an issue or concern.
 - b. It can show us that the drive sheave grooves are in good condition.
 - c. It measures the ability of drive sheaves to maintain adequate grip on ropes (or belts) under various loading conditions. Dynamic traction needs to be measured at least as 2.0.
 - d. a. + b. are correct.
10. In CAT 5 test reports by ELVI 2, what is an intuitive interface for readers?
 - a. Those who performed the test can be listed on the report.
 - b. Green thumbs up and the word PASS for a passing test; red thumbs down and the word FAIL for a failed test
 - c. Final reports must always include all tests performed versus only the final PASS test.
 - d. These tests are just a simulation of what stopping forces could be.

Continued



ELEVATOR WORLD Continuing Education Reporting Form

Article title: "A Tale of Two Testing Methods, Part Two" (EW, March 2026, p. 84)

Continuing-education credit: This article will earn you one contact hour (0.1 CEU) of elevator-industry continuing-education credit.

Directions: Select one answer for each question in the exam. Completely circle the appropriate letter. A minimum score of 80% is required to earn credit.

Last name: _____
First name: _____ Middle initial: _____
CET, CAT or QEI number: _____
State License number: _____
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This article is rated for one contact hour of continuing-education credit. Certification regulations require that we verify actual study time with all program participants. Please answer the below question.

How many hours did you spend reading the article and studying the learning-reinforcement questions?

- 1. a b c d 6. a b c d
2. a b c d 7. a b c d
3. a b c d 8. a b c d
4. a b c d 9. a b c d
5. a b c d 10. a b c d

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