



2019 Video-Text-Audio & Alternative CAT5 Testing

Collaborate | Innovate | Elevate

www.wurtec.com

wurtec



What's Changing

- ASME A17.1/B44-2019 & IBC-2018 3001.2
 - Ease of communicating with non-verbal passengers
 - Now requires Texting ability with simple “Yes” and “No” questions
 - Adding Video to see potential disabled passengers
- Technology
 - Addition of Text/Video requires data connectivity
 - Networking requirements to function
 - Networking vs Phone Lines, not the same and much more complex!



Why It's Changing

- Unfortunately, an accident or tragedy
- Preparing or designing for the “What if’s”
- Advances in Technology
 - Enables taller and more ADA accessible buildings
 - Safer operating conditions



How It's Changing

- A loud voice
- Alarm bell
- Inter-com systems (Executone)
- Telephones (single direction calling)
- Bi-directional calling (only if recipient knows origin of call)
- Pre-programed Push to Call Only (hand-sets no longer permitted)



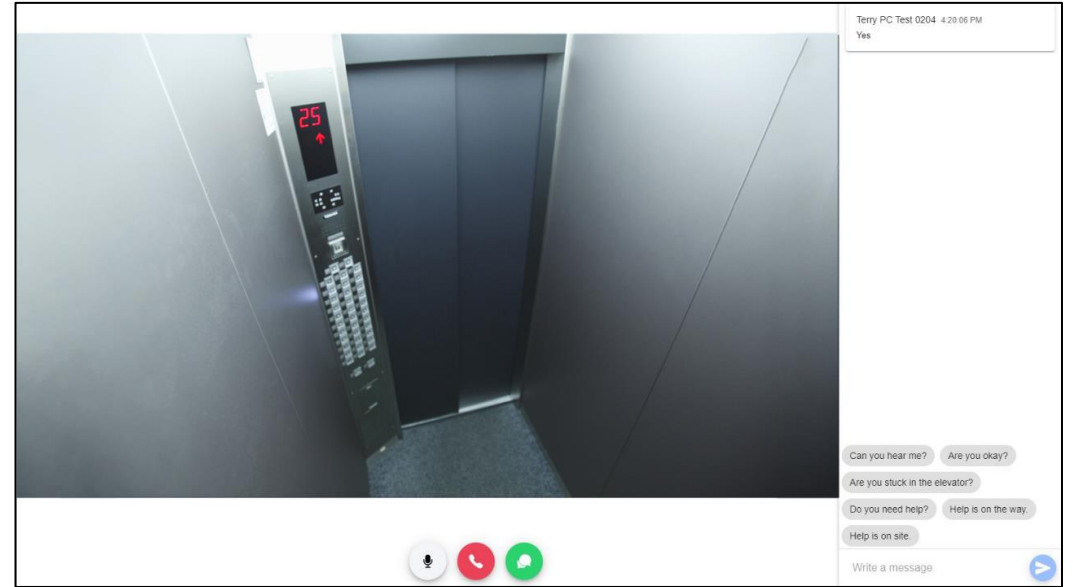
How It's Changing

- Two-way communication (Current)
 - Call directed to a line monitored 24/7
 - Location & Elevator information automatically communicated
 - Visual Call acknowledgement
 - Ability to communicate with multiple elevators from single location
 - Communication line verification and loss of signal alarm

How It's Changing

A17.1/B44-2019 / IBC 2018

- A means to visually communicate with speech and hearing impaired
- Visual Call indication on screen
- A non-verbal means for an entrapped passenger to communicate
- A means to display video to observe passengers in the elevator
- Basically, a secure “Zoom” call



The Code

IBC-2018 Section 3001

3001.2 Emergency elevator communication systems for the deaf, hard of hearing and speech impaired. An emergency two-way communication system shall be provided that:

1. Is a visual and text-based and a video-based 24/7 live interactive system.
2. Is fully accessible by the deaf, hard of hearing and speech impaired, and shall include voice-only options for hearing individuals.
3. Has the ability to communicate with emergency personnel utilizing existing video conferencing technology, chat/text software or other approved technology.

The Code

ASME A17.1/B44-2019 – 2.27.1 Car Emergency Signaling Devices

2.27.1.1 Emergency Communications

The two-way communications shall conform to 2.27.1.1.1 through 2.27.1.1.6.

2.27.1.1.1 A communications means between the car and a location staffed by authorized personnel who can take appropriate action, shall be provided.

2.27.1.1.2

If the call is not acknowledged [2.27.1.1.3(c)] within 45 s, the call shall be automatically directed to an alternate on- or off-site location.

2.27.1.1.3 The communications means within the car shall comply with the following requirements:

(a) In jurisdictions enforcing NBCC, Appendix E of ASME A17.1/CSA B44, or in jurisdictions not enforcing NBCC, ICC/ANSI A117.1.

(b) A push button to actuate the communications means shall be provided in or adjacent to a car operating panel. The push button shall be visible and permanently identified with the phone symbol (see 2.26.12.1). The identification shall be on or adjacent to the phone push button. The communications means shall be initiated when the push button is actuated.

(c) On the same panel as the phone push button, a message shall be displayed, that is activated by authorized personnel, to acknowledge that communications is established. The message shall be permitted to be extinguished where necessary to display a new message [see 2.27.1.1.3(d) and 2.27.1.1.3(e)] or when the communications are terminated.

(d) On the same panel as the phone push button, **messages shall be displayed** which permit authorized personnel **to communicate with** and obtain responses from a **trapped passenger(s)** including a passenger(s) **who cannot verbally communicate or cannot hear.**

(e) On the same panel as the phone push button **a message shall be displayed**, that is activated by authorized personnel, **to indicate when help is on the way**. The message shall continue to be displayed until the communication is terminated.

(f) The communications means shall provide on demand to authorized personnel, information that identifies the building location and elevator number.

(g) The communications, once established, shall be disconnected only when authorized personnel terminate the call or a timed termination occurs. A timed termination by the communications means in the elevator, with the ability to extend the call by authorized personnel, is permitted if voice notification is sent by the communications means to authorized personnel a minimum of 3 min after communication has been established. Upon notification, authorized personnel shall have the ability to extend the call; automatic disconnection shall be permitted if the means to extend are not enacted within 20 s of the voice notification.

(h) The communications means shall not use a handset in the car.

(i) The communications shall not be transmitted to an automated answering system. The call shall be answered by authorized personnel.

(j) Operating instructions shall be incorporated with or adjacent to the phone push button.

(k) **A means to display video to observe passengers** at any location on the car floor, to authorized personnel for entrapment assessment shall be provided.

Current Jurisdictions

A17.1-2019 AHJs

- Alabama
- Colorado
- Georgia
- Illinois
- Iowa
- Maryland
- Mississippi
- Montana
- Nevada
- New Hampshire
- North Carolina
- South Carolina
- South Dakota
- Utah
- Oklahoma
- Wyoming

IBC 2018 & IBC 2021 AHJs

- Arizona
- Alabama
- Alaska
- California
- Colorado
- Connecticut
- Georgia (exceptions)
- Hawaii (exceptions)
- Idaho
- Louisiana
- Montana
- Maryland
- Minnesota
- New Hampshire
- Nebraska
- Nevada
- New Jersey (exceptions)
- New York (exceptions)
- North Dakota
- Oklahoma
- Puerto Rico
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Utah
- Washington (exceptions)
- Wyoming

How Communications Work

Prior to A17.1/B44-2019 & IBC-2018

- POTS, Digital, or VOIP telephone lines
- Auto-dialing telephone
- Verbal communication only
- Bi-directional calling (location message)



How Communications Work

Prior to A17.1/B44-2019 & IBC-2018



- Analog Master Phone in the Lobby/Machine Room
- Communication alarm detects a Telephone line failure
- LED indicator for calling

How Communications Work

After A17.1/B44-2019 & IBC-2018

- Networked, like a computer
- Uses a camera and screen
- Uses the internet for video, text, and/or audio
- Works alongside or in place of a traditional emergency Telephone



How Communications Work

After A17.1/B44-2019 & IBC-2018



- Connects to the cloud portal/application
- Yes/No buttons
- Connects using onsite LAN or Cellular Network

How Communications Work

After A17.1/B44-2019 & IBC-2018

- Master/Lobby station uses Network to connect to Cars
- Communication alarm detects a Network failure
- Can reuse existing shielded pairs



The Wurtec Solution

How our Wur-Com 2019 System Functions

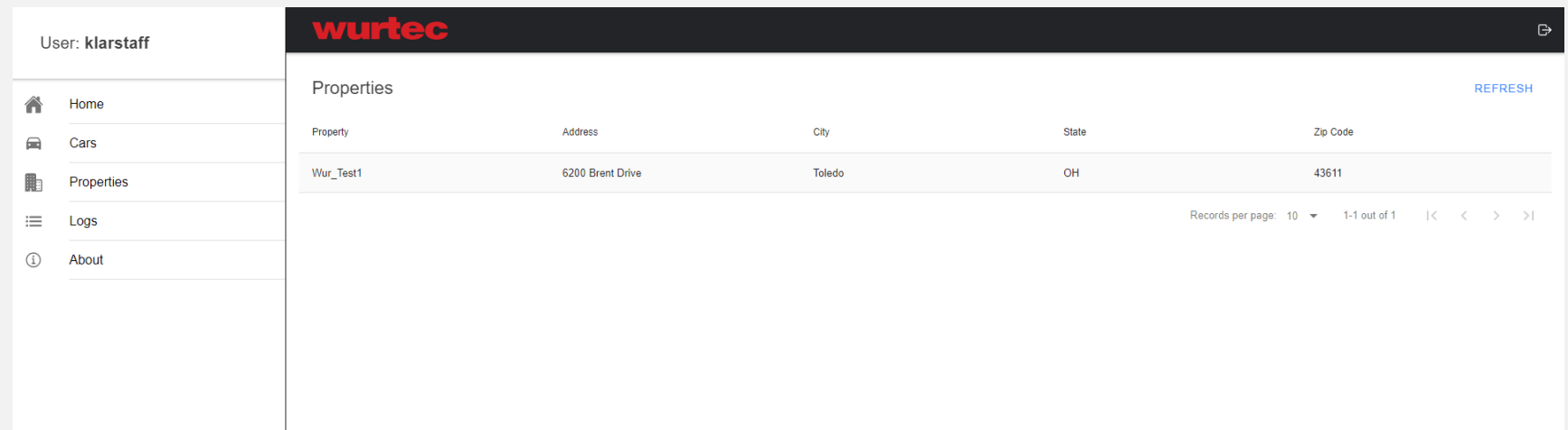


Operation

- a. Browser-based web application serves as the user interface for car stations, lobby stations and call centers.
- b. Calls a telephone and if no audio communication is possible, the video/text can be accessed through the web application at Wurcom.com.
- c. Once connected, call centers and lobby stations can ask yes/no questions and receive yes/no responses from the car stations if audio communication is impossible.

Administrative Environment

Properties: All the buildings assigned to the staff user.



The screenshot shows the wurtec administrative interface. The user is logged in as 'klarstaff'. The left sidebar contains navigation links: Home, Cars, Properties, Logs, and About. The main content area displays the 'Properties' page with a table of data. The table has columns for Property, Address, City, State, and Zip Code. A single record is shown: 'Wur_Test1' at '6200 Brent Drive' in 'Toledo', 'OH', with zip code '43611'. A 'REFRESH' button is located in the top right corner of the table area. At the bottom right of the table, there is a pagination control showing 'Records per page: 10', '1-1 out of 1', and navigation arrows.

Property	Address	City	State	Zip Code
Wur_Test1	6200 Brent Drive	Toledo	OH	43611

Administrative Environment

Cars: All the elevator cars assigned to the properties assigned to the staff user.

The screenshot displays the Wurtec administrative interface. At the top left, the user is identified as 'User: klarstaff'. A sidebar on the left contains navigation options: Home, Cars, Properties, Logs, and About. The main content area is titled 'Property Wur_Test1' and features three tabs: 'Property Detail', 'Cars', and 'Users'. The 'Cars' tab is active, showing a table of elevator cars. The table has columns for Car Name, User, Call Status, and Connection Status. Each row includes a 'CALL' button. The 'Connection Status' column shows 'Online' (green dot) for the first two cars and 'Offline' (red dot) for the last two, with the latter two also indicating when they went offline.

Car Name	User	Call Status	Connection Status	CALL
troffice7	wur-test-1-troffice-7	IDLE	● Online 0 min. ago	CALL
Kayla - test 6	wur-test-1-kayla-test-6	IDLE	● Online 1 min. ago	CALL
Klar Test 1	wur-test-1-klar-test-1	IDLE	● Offline 3 days ago	CALL
Rob Demo	wur-test-1-rob-demo	IDLE	● Offline 26 days ago	CALL

Records per page: 10 | 1-4 out of 4 | < >

Administrative Environment

Calling a car station from a call center or lobby station.

The screenshot displays the wurtec administrative interface. The user is logged in as 'klarstaff'. The main content area shows a table titled 'Cars' with the following columns: Car Name, User, Property, Call Status, and Connection Status. The first row, 'Kayla - test 6', is highlighted, and its 'CALL' button is circled in red. The other rows are 'troffice7', 'Klar Test 1', and 'Rob Demo'. The 'CALL' buttons for 'troffice7' and 'Rob Demo' are disabled (greyed out). The 'CALL' button for 'Klar Test 1' is also disabled, but the 'Connection Status' is 'Offline 3 days ago'. The 'CALL' button for 'Kayla - test 6' is active (green) and the 'Connection Status' is 'Online 0 min. ago'. The interface also shows a sidebar with navigation options: Home, Cars, Properties, Logs, and About. At the bottom right, there is a pagination control showing 'Records per page: 10' and '1-4 out of 4' records.

Car Name	User	Property	Call Status	Connection Status	CALL
Kayla - test 6	wur-test-1-kayla-test-6	Wur_Test1	IDLE	Online 0 min. ago	CALL
troffice7	wur-test-1-troffice-7	Wur_Test1	IDLE	Online 1 min. ago	CALL
Klar Test 1	wur-test-1-klar-test-1	Wur_Test1	IDLE	Offline 3 days ago	CALL
Rob Demo	wur-test-1-rob-demo	Wur_Test1	IDLE	Offline 26 days ago	CALL

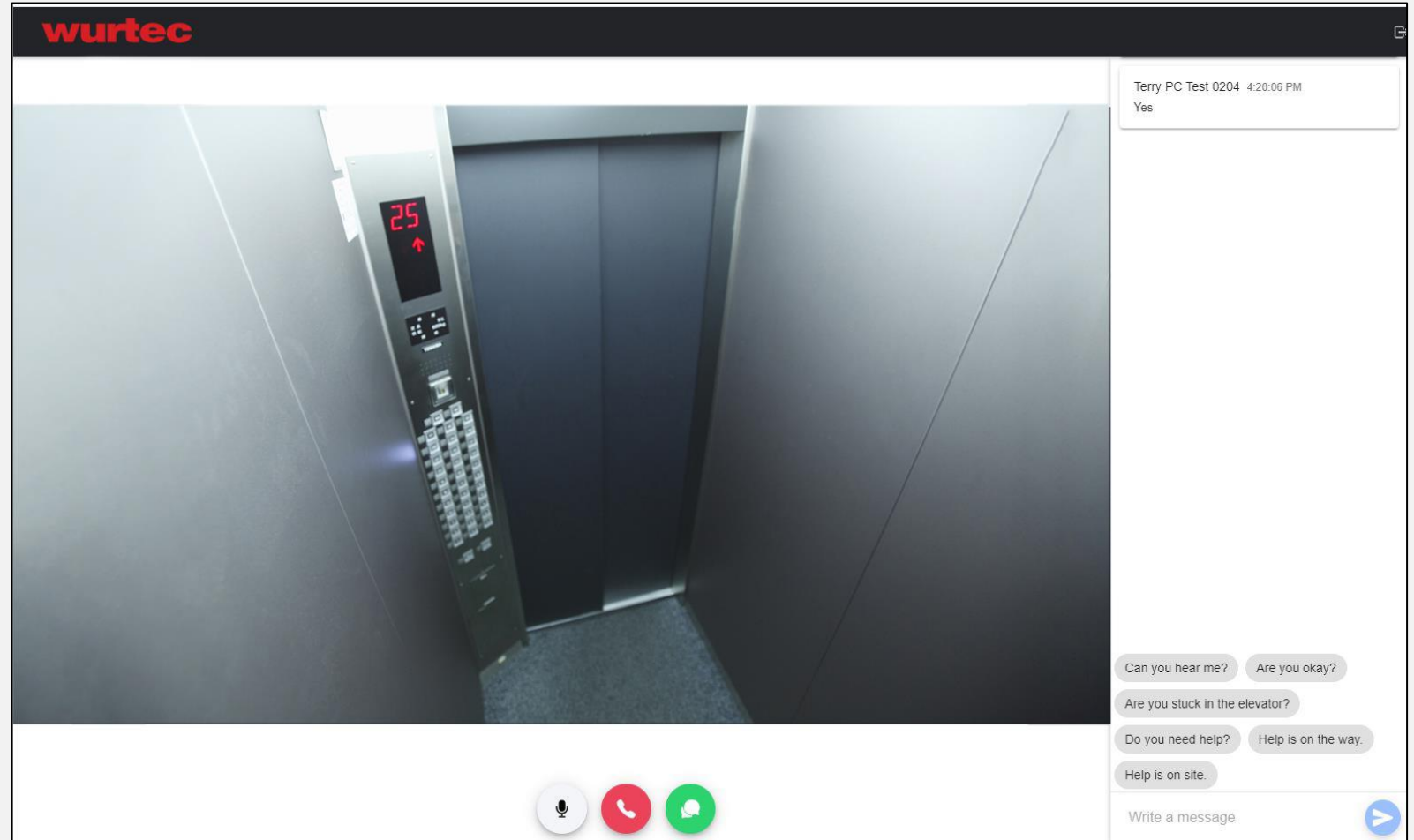
Administrative Environment

Answering a call

The screenshot displays the wurtec administrative interface. On the left is a sidebar menu with the following items: Home, Cars, Properties, Logs, and About. The main content area has a green background and features a white notification card for an incoming call. The card contains the following information: 'INCOMING CALL' at the top, 'Car Klar Test 1' in the middle, and 'Property Wur_Test1' below it. At the bottom of the card is a green 'ACCEPT' button with a telephone handset icon. The top of the interface shows the user 'klarstaff' and the wurtec logo.

Administrative Environment

Call in progress *Audio, Video, & Text Interface*



The screenshot displays a video call interface. The main video feed shows the interior of an elevator with a digital display showing the number 25 and an upward arrow. The interface includes a 'wurtec' logo in the top left corner. On the right side, there is a text chat window with the following content:

Terry PC Test 0204 4:20:06 PM
Yes

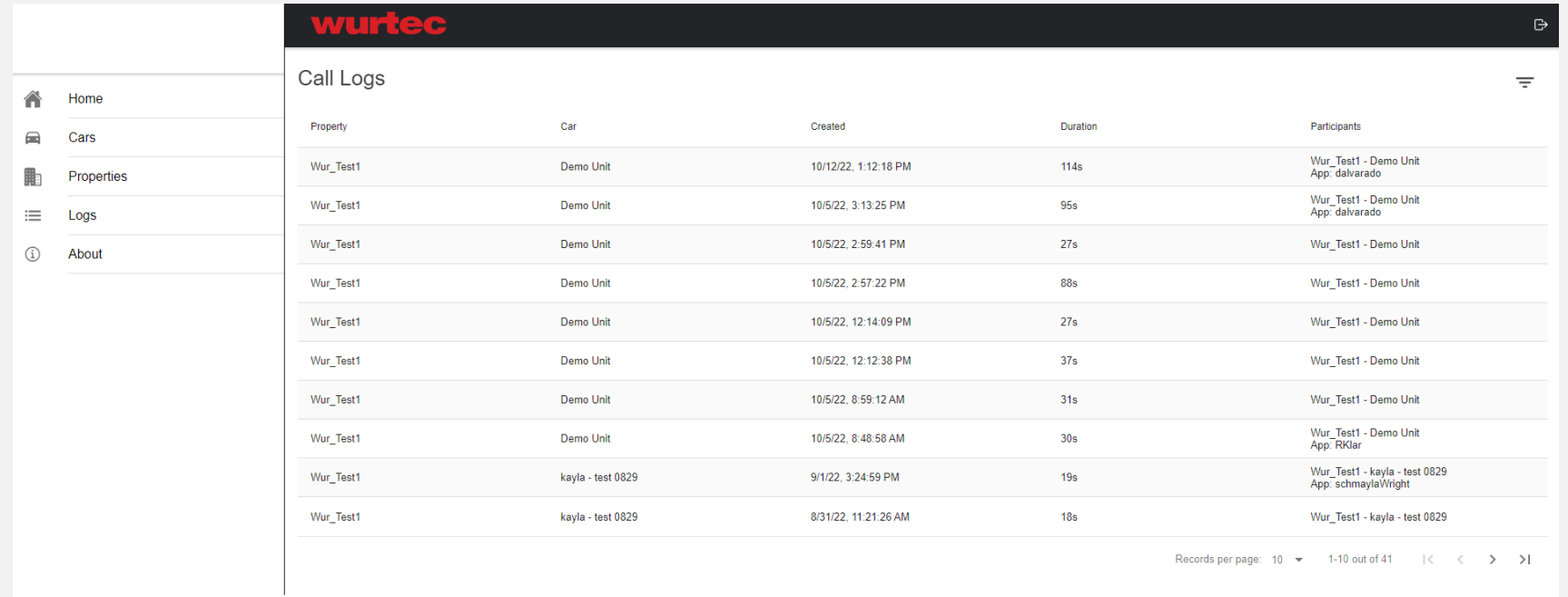
Can you hear me? Are you okay?
Are you stuck in the elevator?
Do you need help? Help is on the way.
Help is on site.

At the bottom of the interface, there are three icons: a microphone, a red phone handset, and a green speech bubble. A text input field at the bottom right contains the text 'Write a message' and a blue send button.

wurtec

Administrative Environment

Call Logs record all inbound and outbound calls



The screenshot displays the 'Call Logs' section of the Wurtec administrative interface. The interface includes a sidebar with navigation options: Home, Cars, Properties, Logs, and About. The main content area shows a table of call records with the following columns: Property, Car, Created, Duration, and Participants. The table contains 11 rows of data, with the last two rows showing calls to 'kayla - test 0829'. At the bottom right, there is a pagination control showing 'Records per page: 10' and '1-10 out of 41'.

Property	Car	Created	Duration	Participants
Wur_Test1	Demo Unit	10/12/22, 1:12:18 PM	114s	Wur_Test1 - Demo Unit App: dalvarado
Wur_Test1	Demo Unit	10/5/22, 3:13:25 PM	95s	Wur_Test1 - Demo Unit App: dalvarado
Wur_Test1	Demo Unit	10/5/22, 2:59:41 PM	27s	Wur_Test1 - Demo Unit
Wur_Test1	Demo Unit	10/5/22, 2:57:22 PM	88s	Wur_Test1 - Demo Unit
Wur_Test1	Demo Unit	10/5/22, 12:14:09 PM	27s	Wur_Test1 - Demo Unit
Wur_Test1	Demo Unit	10/5/22, 12:12:38 PM	37s	Wur_Test1 - Demo Unit
Wur_Test1	Demo Unit	10/5/22, 8:59:12 AM	31s	Wur_Test1 - Demo Unit
Wur_Test1	Demo Unit	10/5/22, 8:48:58 AM	30s	Wur_Test1 - Demo Unit App: RKlar
Wur_Test1	kayla - test 0829	9/1/22, 3:24:59 PM	19s	Wur_Test1 - kayla - test 0829 App: schmaylaWright
Wur_Test1	kayla - test 0829	8/31/22, 11:21:26 AM	18s	Wur_Test1 - kayla - test 0829

How to Set up the WUR-COM Multimedia Communicator | Wurtec



<https://www.youtube.com/watch?v=Q5-7NmjBpKs>

Q & A

ASME 2019/IBC 2018

The ELVI 2 System: A new (better*) alternative for CAT5 Testing

Alternative Testing included in
A17.1/b44 North America Elevator
standard
Since 2013

BASICS: ADVANTAGES/TECHNICAL FOUNDATION

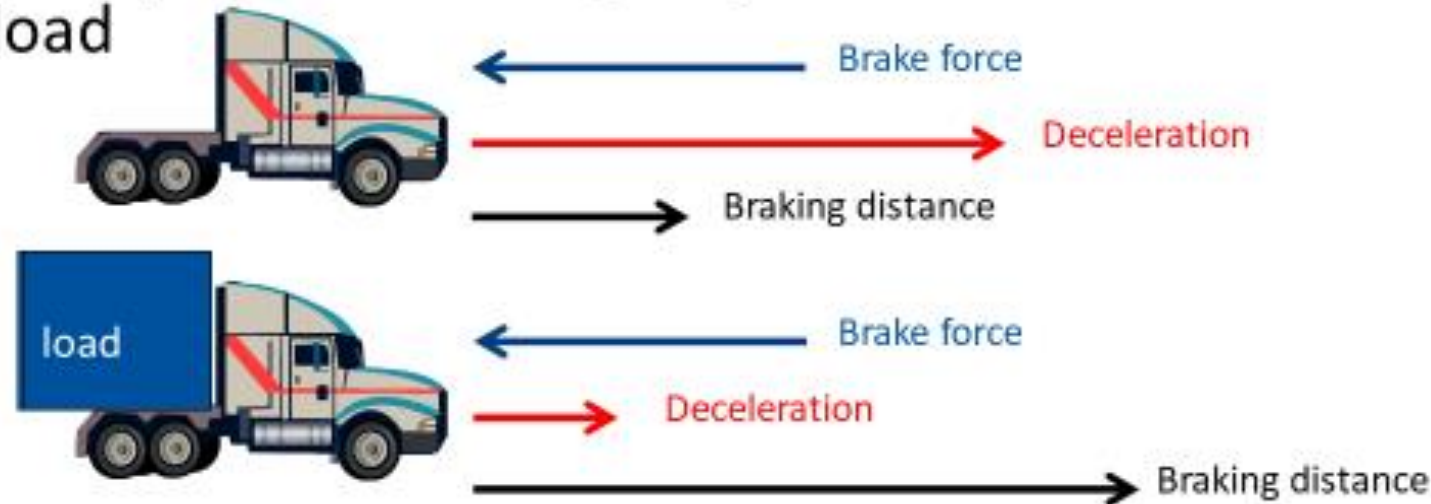


Electronic Testing: Alternative Testing System

Basic / primary principle for electronic testing

$F=MA$... fundamental principle of physics.

- Example: truck emergency brake with and without load



Brake force is identical, unaffected by initial speed and load!

If you know the brake force, you can calculate the braking distance and the deceleration referred to any load whatever. Also for any ELEVATOR BRAKES and SAFETY GEARS!



Testing with Weights --

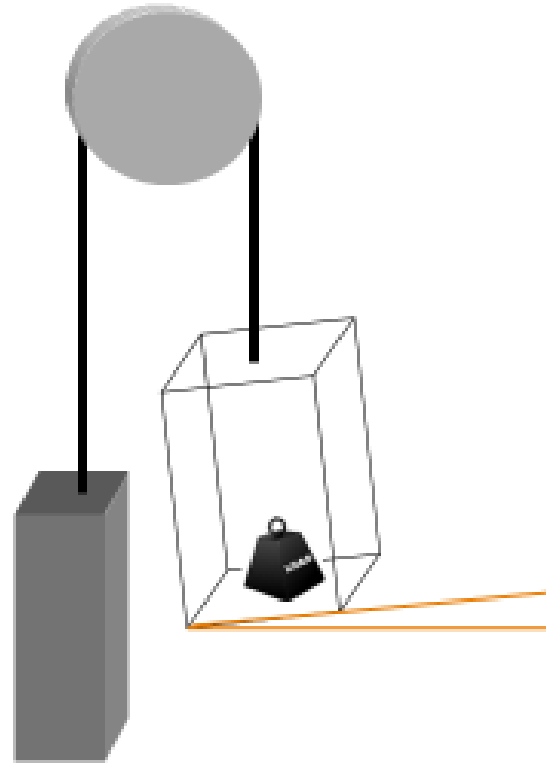
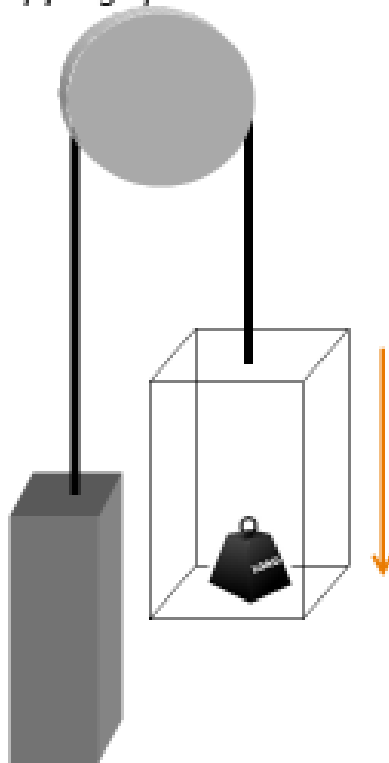
Technical explanation in following slides...

Category 5 test: Car Safeties A17.1 2013 (8.6.4.20.1)

Measuring stopping distance by decelerating a 100% loaded car by the safeties at governor tripping speed

The platform shall not be out of level more than 0.36 in./ft after stopping the car

By the Safeties!





Testing with an Electronic Testing System

Category 5 test: Car Safeties A17.1 2013 (8.6.4.20.1)

1. *Physically measuring the amount of braking force of the safeties; and alignment of the car after the car came to stop.*

Measured data...

2. *Verifies that the measured misalignment is smaller than 0.36 in./ft*

3. *Verifies that the measured amount of safeties-force is able to decelerate the 100% loaded car at governor tripping speed (for type A+C safeties) within the stopping distance given in table 2.17.3 for type B safeties*

4. *Verifies that the measured amount of force is also able to decelerate the 100% loaded car even in real emergency-case – complete loss of suspension means.*

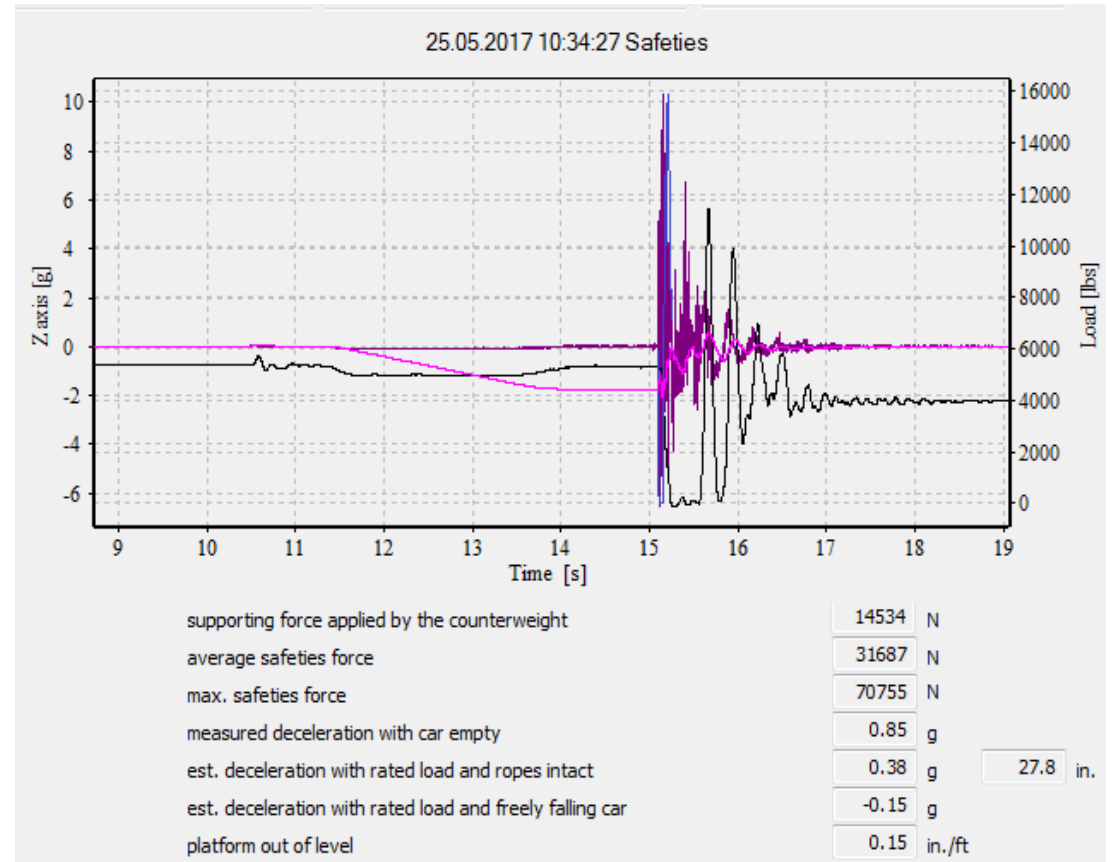
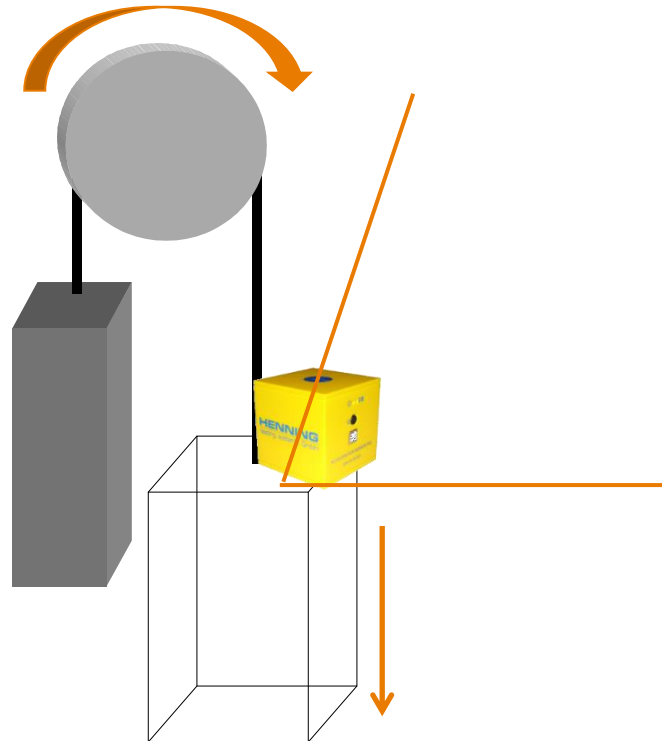


Testing with Electronic Testing System

Category 5 test: Car Safeties A17.1 2013 (8.6.4.20.1)

1. Physically measuring the amount of braking force of the safeties and the *alignment of the car* after the car stops

*Measuring the alignment **before and after** the safeties stop and output the difference*

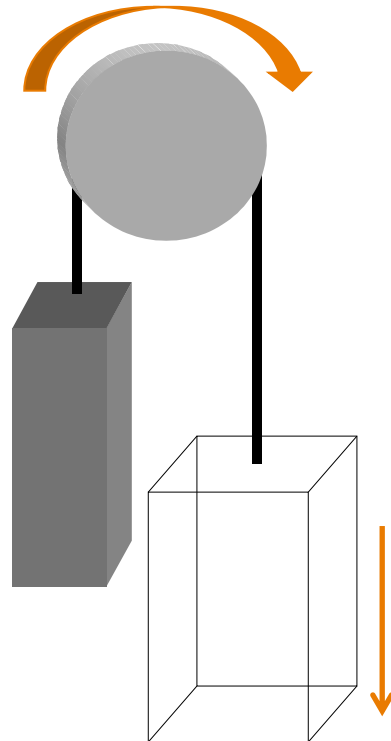




Testing with Electronic Testing System

Category 5 test: Car Safeties **A17.1 2013 (8.6.4.20.1)**

1. Physically *measure the amount of braking force of the safeties* **and** the alignment of the car after the car came to a halt.
 $F=MA$... fundamental of physics.



henning
MADE IN GERMANY

ELEVATOR
COMPONENTS

Basic principle for alternative testing systems

▶ Example: truck emergency brake with and without load

The diagram shows two trucks. The top truck is without a load. It has a blue arrow pointing left labeled 'Brake force', a red arrow pointing right labeled 'Deceleration', and a black arrow pointing right labeled 'Braking distance'. The bottom truck has a blue box labeled 'load' on its back. It also has a blue arrow pointing left labeled 'Brake force', a red arrow pointing right labeled 'Deceleration', and a black arrow pointing right labeled 'Braking distance'. The 'Deceleration' arrow for the loaded truck is shorter than for the unloaded truck, and the 'Braking distance' arrow for the loaded truck is longer.

Brake force is identical, unaffected by initial speed and load!

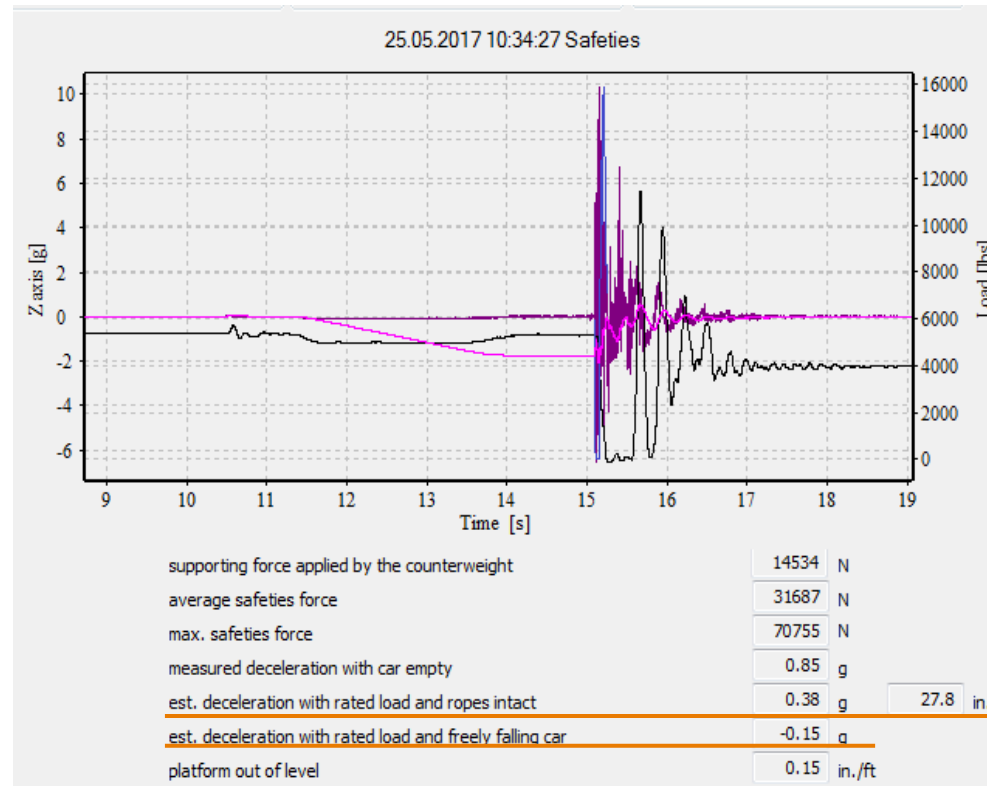
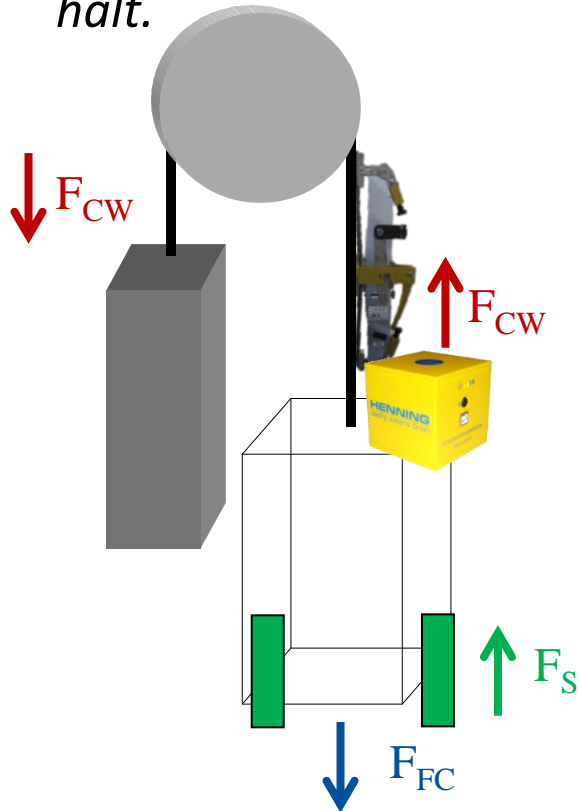
If you know the brake force, you can calculate the braking distance and the deceleration referred to any load whatever. Also for any ELEVATOR BRAKES and SAFETY GEARS!



Testing with Electronic Testing System

Category 5 test: Car Safeties A17.1 2013 (8.6.4.20.1)

1. Physically *measure the amount of braking force of the safeties* and the alignment of the car after the car came to a halt.



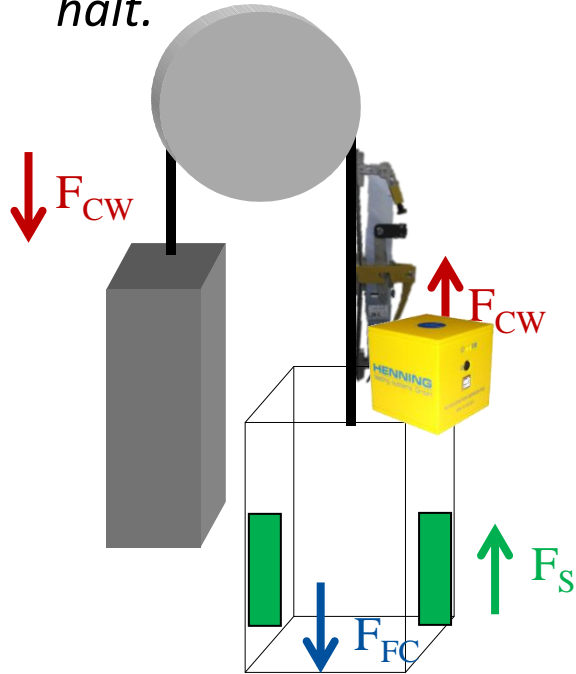


Testing with Electronic Testing System

there are a several more slides like this focusing on technical aspects of no load compared to the current load method...

Category 5 test: Car Safeties A17.1 2013 (8.6.4.20.1)

1. Physically *measure the amount of braking force of the safeties* and the alignment of the car after the car came to a halt.



In the moment of decelerating by the safeties there are just three forces acting on the car:

F_S : Shall be determined

F_{FC} : Measured with the acceleration sensor ($F=m*a$)

F_{CW} : Measured with rope-force sensors.



Relation between the forces

$$F_S = F_{FC} - F_{CW}$$

Formula for the safeties force



Testing with Electronic Testing System

Category 5 test: Braking system, Traction/Traction Limits **A17.1 2013 (8.6.4.20.10)**

1. Physically measures the max. amount of traction

Measurably better than a go/no go test.

2. Verifies that the measured braking system and amount of traction is large enough to decelerate the 125% overloaded car in down direction

3. Verifies that the measured amount of traction is small enough that the CWT cannot be raised with car blocked

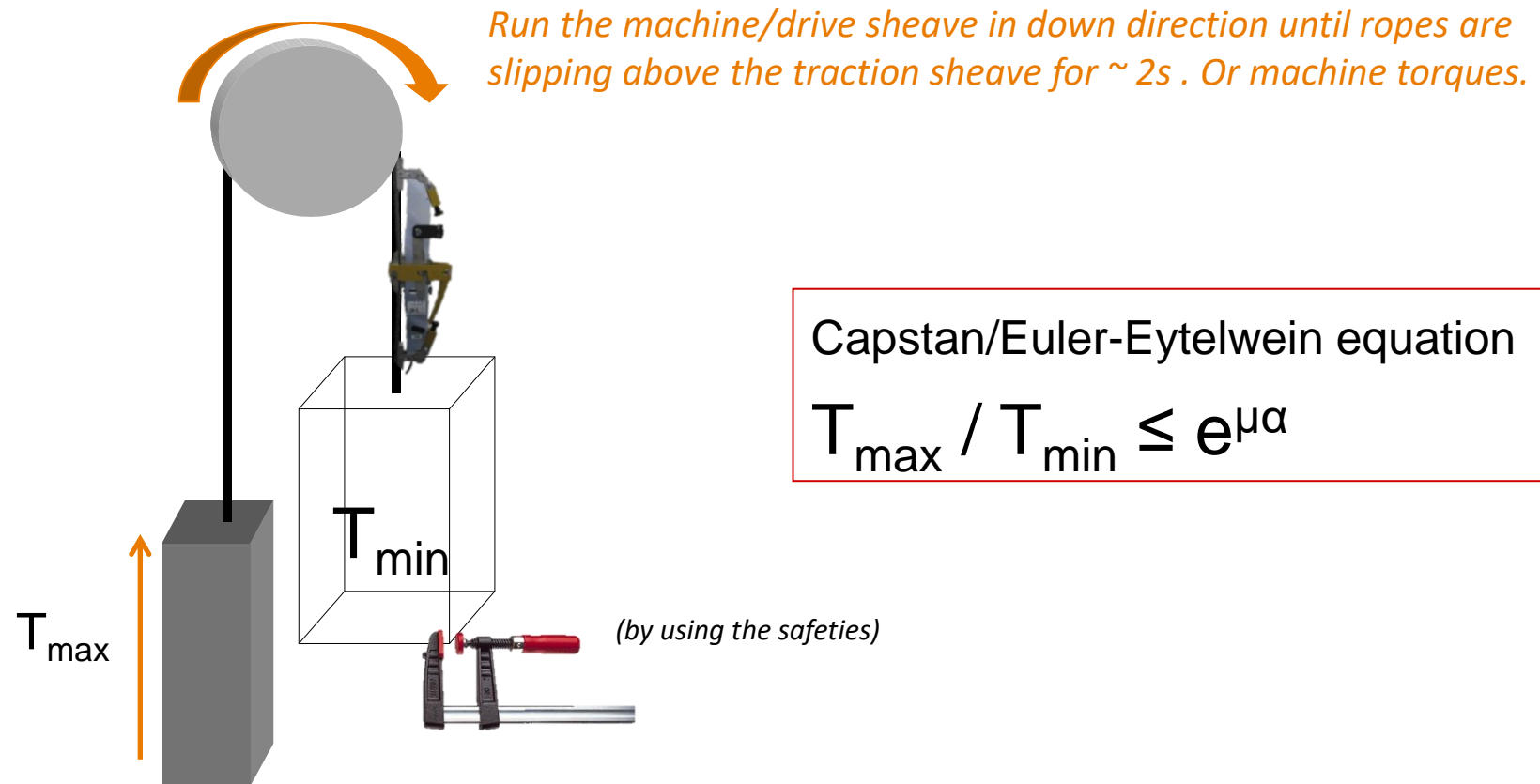
4. Verifies that the measured amount of traction is small enough that the car cannot be raised with CWT blocked



Testing with Electronic Testing System

Category 5 test: Braking system, Traction/Traction Limits **A17.1 2013 (8.6.4.20.10)**

1. Physically measuring the max. amount of traction



Run the machine/drive sheave in down direction until ropes are slipping above the traction sheave for ~ 2s . Or machine torques.

Capstan/Euler-Eytelwein equation

$$T_{max} / T_{min} \leq e^{\mu\alpha}$$

Along with Safeties Testing and Measurement of Traction, there are 4 other component tests in CAT5 Testing. They also use the same principles of physics and engineering and algorithms for measuring forces and data documentation.

- **Machine Brake Testing**
- **Emergency Brakes (including Rope Brakes)**
- **Buffer Function**
- **Unintended Movement (UIM/UCM)**

* Documentary reports show data collected; then able to compare results of stopping forces going forward.

Benefits: the RIDING public, the SAFETY of elevator industry workers and overall safety of elevators

Many advantages to electronic testing

benefits of using newer/available technology

Reports with numerical measurements/data (big advantage for AHJ's); compared to checklists.

Authors of this Code were forward-thinking. Alternative Testing idea to include weighing cars/CWT's – giving us a direct and periodic view of elevator load balancing and masses. A practical and real Engineering improvement.

ELVI 2 Testing is verified to be on the safe side (5%+). Third Party Certification of this system that it meets all Code Requirements for Alternative Testing. This system's subcomponents have added value in other important traction elevator maintenance.

Testing design able to consider stopping/braking capability at all loads (not just full load)

Electronic testing is less damaging to the equipment during conduct of tests (+ more upside in future Code)

Electronic Testing measures elevator system stopping ability if catastrophic complete loss of suspension means occurs



Further Advantages

- Reduced chances of physical injury to elevator employees (moving weights)
- Less weight cart use reduces potential damage to building-owners property, in addition to reducing logistics costs (moving weight carts)
- Elevator technician work aligns more toward technical and skilled work – in line with our important professional role and impact on **Safety**
- More discerning testing can create more work doing needed maintenance/repairs
- Time needed for training and learning new technology benefits elevator workers and our industry
- Finally, as allowed, this is optional (alternative) so it's phasing in by choice and readiness. Full load testing continues for acceptance. Consider this fact...

The ELVI 2 System: An alternative for CAT5 Testing

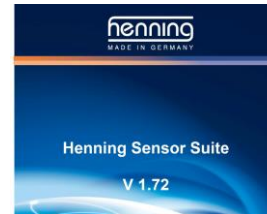
Training on using technology is VERY important.

ELVI 2 Process

Review set-up – and process requirements

Beginning Notes to ELVI 2 Testing

- Know that all Category 5 Testing requirements still apply.
- Electronic testing with this system does NOT replace other existing requirements of CAT 5 Testing -- PULL Through Testing done first! Critical.
- Including physical inspections of Safeties, rail fixings, etc. still to be done, as well as Governor Pull-Through, observing 90-second return of Buffer, etc.
- Full Details of ELVI 2 Testing instructions are included in the Henning Sensor Suite Manual
- Starting at Page 129...



- Link:

http://www.henning-gmbh.de/PublishedFiles/BA_HSS_ELVI_EN.pdf

Outline Key Parts ELVI 2 Testing

- Henning Sensor Suite downloaded (Link Below)
- Project Set up on UCD
- Testing Process – steps to follow and watch
- Train staff using/setting Sensors
- Weight accuracy, full discussion*
- Importance and value of weighing Car and CWT – known masses and load balancing
- Other installation benefits – rope/suspension means equalization
- **Be aware of overhead space**
- Link:

http://www.henning-gmbh.de/PublishedFiles/BA_HSS_ELVI_EN.pdf








Things to know:

- **FULL Charge of all Components, esp. 1st time, factory quick charge show full charge icon but not effective unless charged until Red LED light goes off -- ~14 hours.**
- **This is technical and detailed equipment and process; allow time and experience to learn; get training AND practice.**
- **Actual test results will open up new information – better and safer measurements**
- **Stiff crossheads, measuring peaks for micro short times – lesson learned, equipment adjusted to handle this situation... system has evolved and improved over the past 7 years.**

Documentation Reports:

- **Setting up a project**
 - **Load Balance Report**
 - **Continuous Measurement analysis**
 - **Final ELVI 2 Test Results**
- **Weights of installed Elevator Equipment**
- **Equalization Report**

ELVI 2.0 - Elevator Inspection System

	Language	english		
	Date	09	04	2016
	Time	17	00	
	Units	<input type="radio"/> metric	<input checked="" type="radio"/> imperial	
	Code	<input type="radio"/> EN 81	<input checked="" type="radio"/> A17 / B44	
				

On
Off

ELVI 2.0 - Elevator Inspection System

Project settings

Name

SAMPLE

Serial

1234567890

Rated load

2500 lbs

Rated speed

500 fpm

Suspension

1:1

No. of ropes

6

Compensation



none



Chain



Tie-down

Select tests to carry out



Weighing car & CW



Traction



Emergency Brake



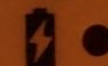
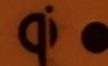
Oilhydraulic Buffer



Safeties



Machine Brake



ELVI 2.0 - Elevator Inspection System

Rope parameters



Type

rope

diameter

1 / 2 in.

belt

Otis 32 kN

Otis 43 kN

Otis 64 kN

Schindler PV30

Schindler PV40

Schindler PV50

Schindler PV60



ELVI 2.0 - Elevator Inspection System

Tie-down Compensation Parameters



No. of ropes

6

diameter

1/2


in.



Compensation Chain Parameters



Weight lbs/ft

Type **0.75 lbs/ft - 1.1 kg/m** 

Hoisting height ft

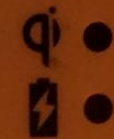


ELVI 2.0 - Elevator Inspection System

Emergency Brake Parameters

Type


- Additional engine brake
- Rope brake
- Rail brake
- other type



ELVI 2.0 - Elevator Inspection System

Safeties type ✖

- Type A
- Type B
- Type B, Speed \leq 200 fpm (SGB01|02|08)
car weight less or similar to rated load
- Type C
- Tiller

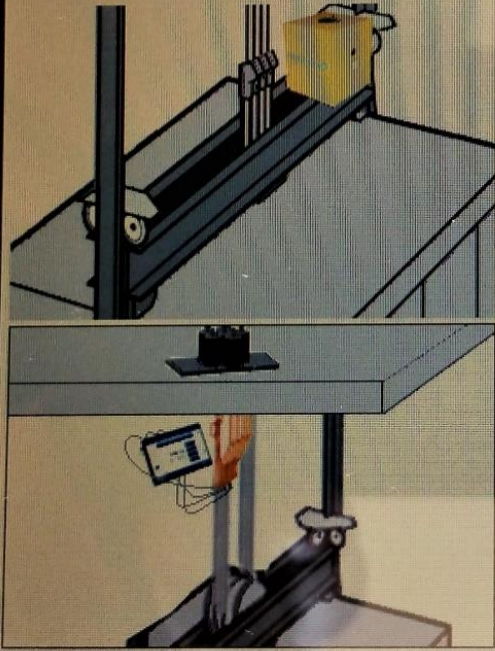




ELVI 2.0 - Elevator Inspection System

Test preparing

Please install the following units and switch them on.
Stay close to these units until all turn to green!

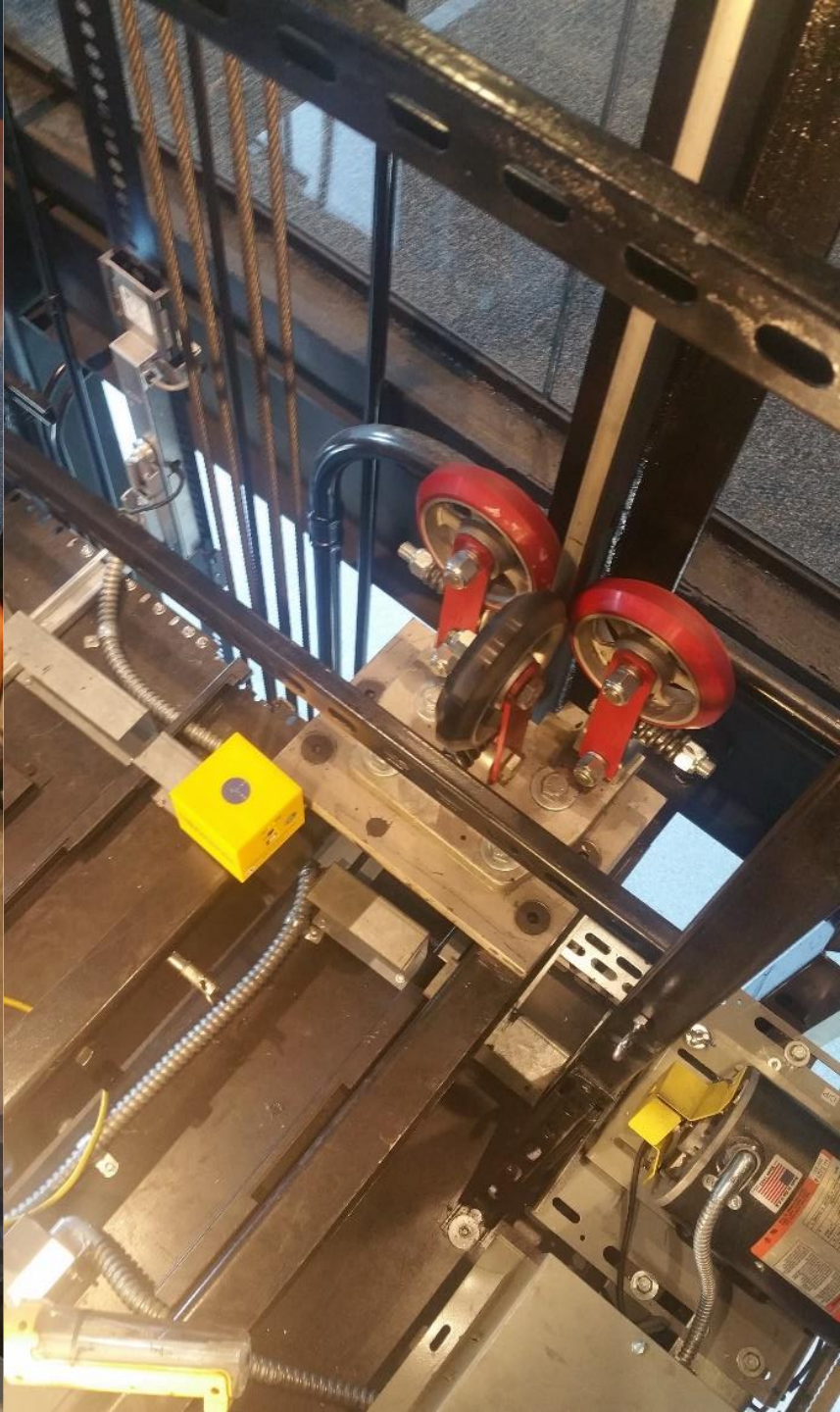


✓ 01530002



✓ 01202418

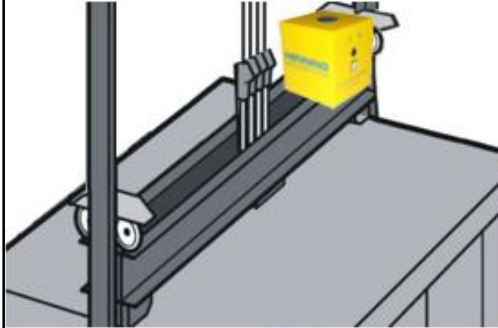




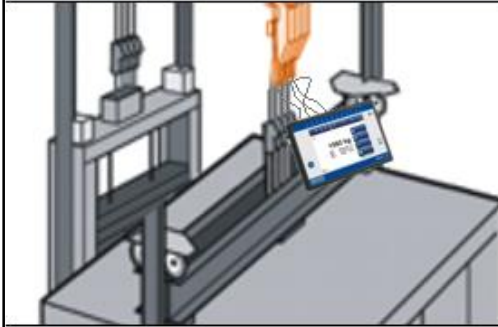
Test preparing



Please install the following units and switch them on.
Stay close to these units until all turn to green!



 88888888

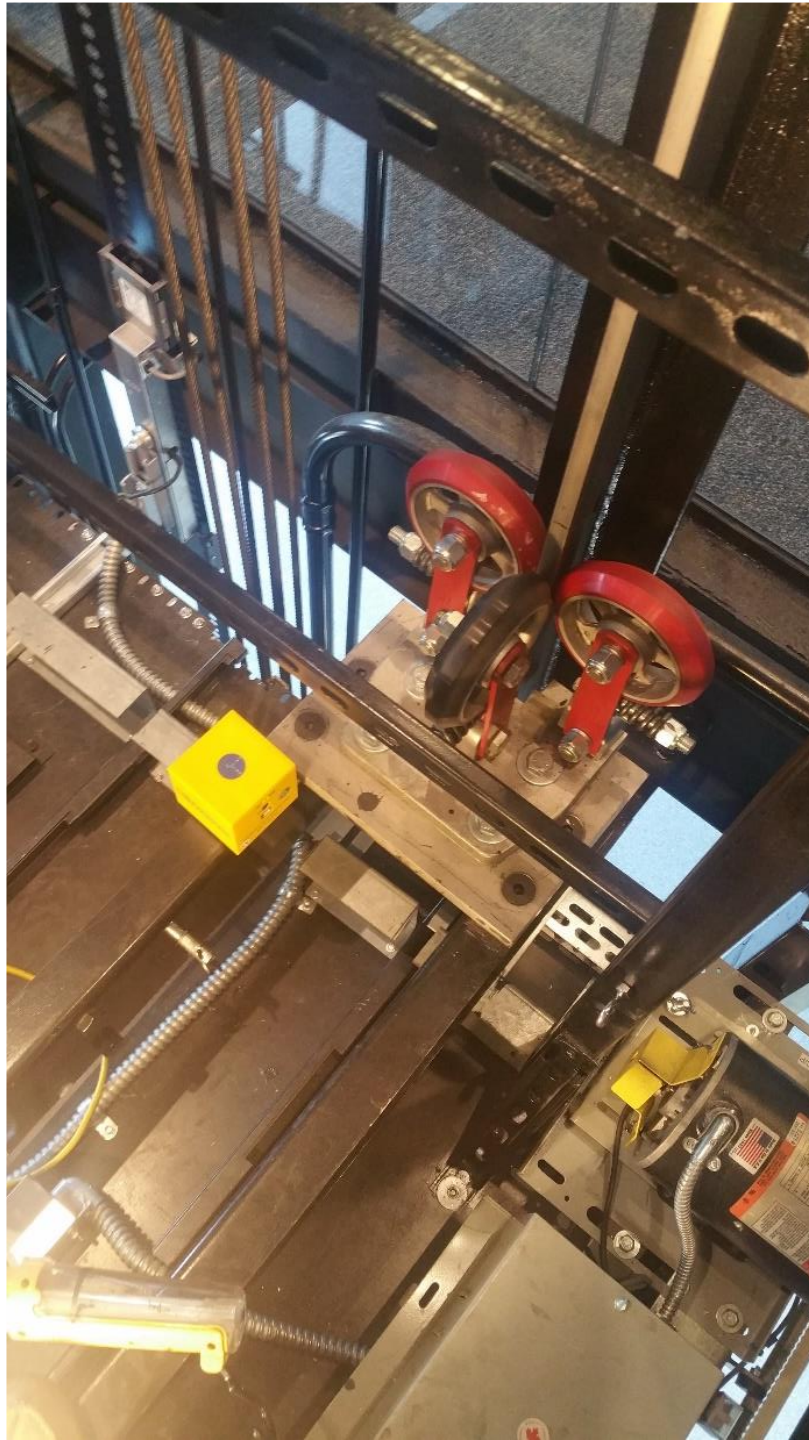


 88888888

Illustration 1: Synchronisation



Please do not turn off the equipment until the tests are fully completed and the UCD displays the home screen. Otherwise, all measurements will be irretrievably lost.

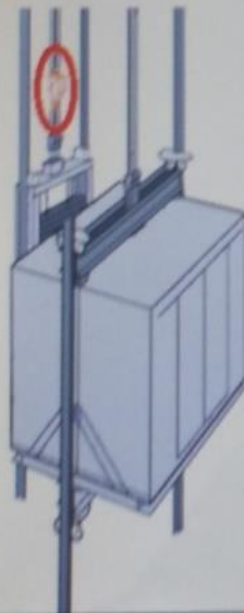


wurtec

ELVI 2.0 - Elevator Inspection System

Counterweight Weight Measurement

Install the sensors at this position:



Switch the MSM on



01202418

Connect the sensors



LSM1



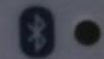
LSM2



LSM-XL



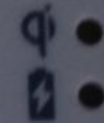
LSM-Belt



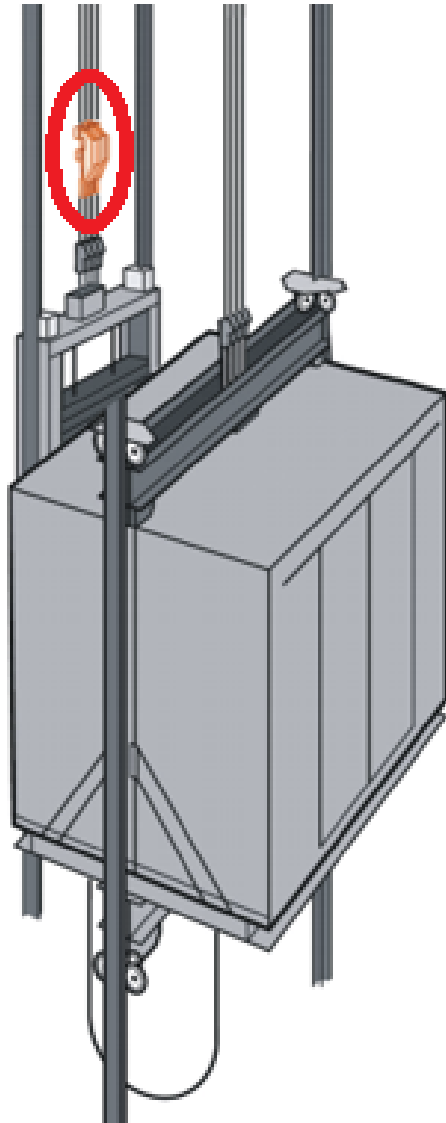
Measured weight:
lbs



Weighing



Install the sensors at
this position:



Switch the MSM on



S/N 888888888

Connect the sensors



LSM1



LSM2



LSM-XL



LSM-Belt



888888888



888888888



888888888



888888888



888888888

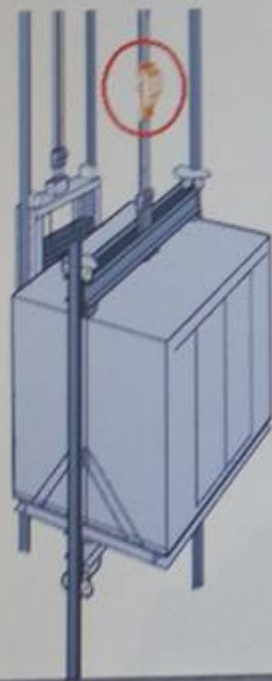
Measured weight:



ELVI 2.0 - Elevator Inspection System

Empty Car Weight Measurement

Install the sensors at this position:



Switch the MSM on



01202418

Connect the sensors



LSM1



LSM2



LSM-XL

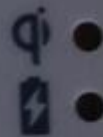


LSM-Belt

Measured weight:
lbs



Weighing



Depending on whether the installation features a 1:1 or a multiple suspension, the rope load sensors and the evaluation unit MSM12 have to be attached at different points.



Illustration 1: Positioning of MSM12 and Sensors for 1:1 Suspension

For 1:1 suspensions, the sensors and MSM12 can be mounted directly above the car (usually they are already there from the cabin weight determination).

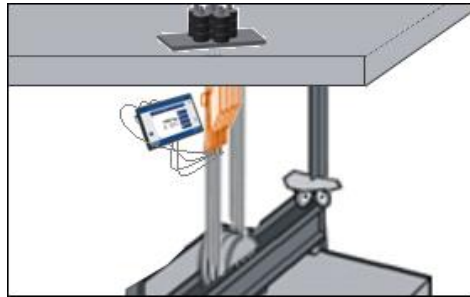
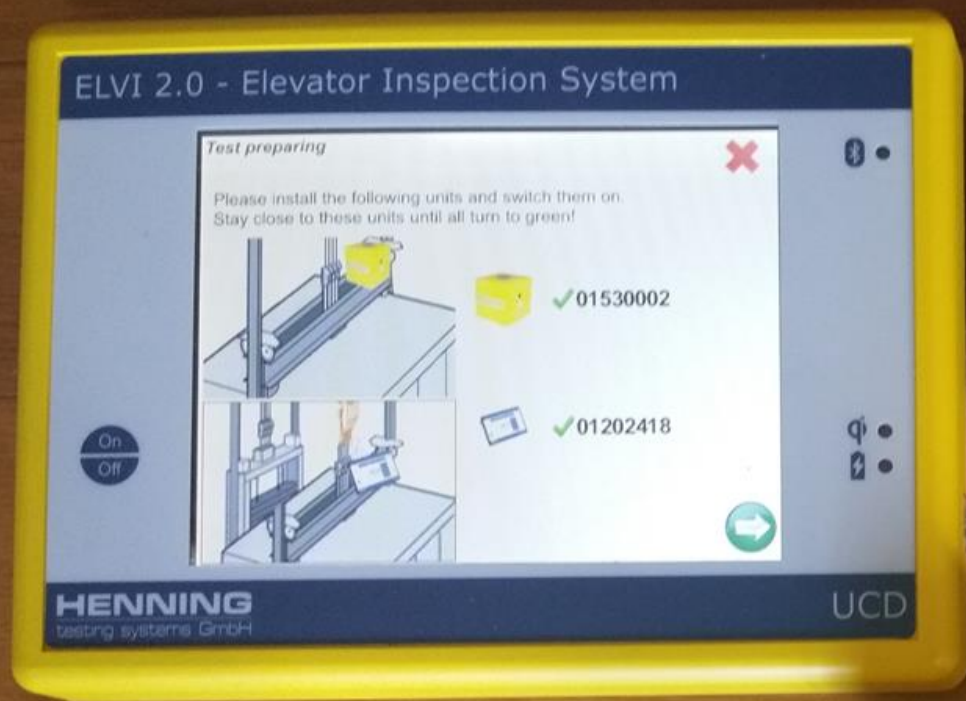


Illustration 2: Positioning of MSM12 and Sensors for multiple Suspension

For multiple suspensions, the sensors and MSM12 must be mounted near the fixing point of the ropes on the cabin side.



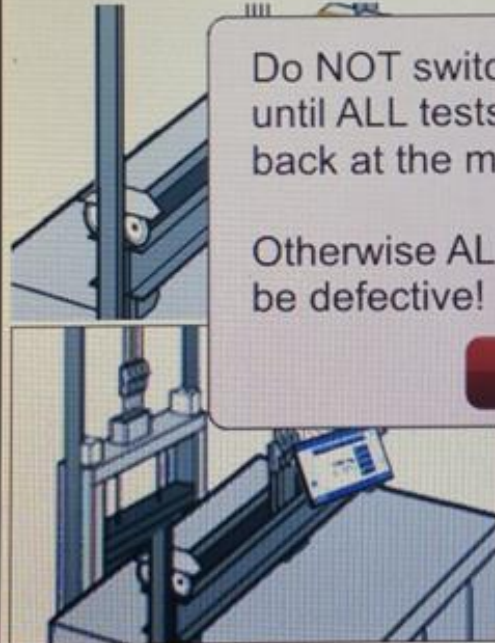
For multiple suspensions, please make sure that the sensors are positioned in such a way on the ropes above the diverter pulleys, that they are not damaged while performing the tests. The same applies to any subsequent procedures.



ELVI 2.0 - Elevator Inspection System

Test preparing

Please install the following units and switch them on.
Stay close to these units until all turn to green!



Do NOT switch one of the units off
until ALL tests are done and you are
back at the main screen.

Otherwise ALL measurements will
be defective!

OK



ELVI 2.0 - Elevator Inspection System



Machine Brake Test



Emergency Brake Test



Safeties Test



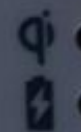
Traction Test



Buffer Test



Finish





ELVI 2.0 - Elevator Inspection System



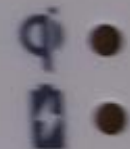
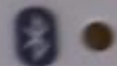
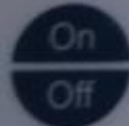
Safeties Test



1. Jump out the safety operated switch if present.
2. Press 
3. From the controller, start a down automatic run with the doors disabled.
4. Engage the safeties at rated speed by manually tripping the governor.
5. Press 





Be aware of a bouncing car, stay clear to close the engine brake!





Safeties Test



1. Jump out the safety operated switch if present.
2. Press  and wait at least 2 sec (but max. 20 sec)
3. From the controller, start a down automatic run with the doors disabled.
4. Engage the safeties at rated speed by manually tripping the governor.
5. Press 



Be aware of a bouncing car, stay clear to close the engine brake!





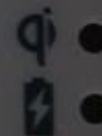
ELVI 2.0 - Elevator Inspection System



Traction Test



1. Leave the safeties activated (car cannot move)
2. Press 
3. Run the car down on inspection operation until the ropes slip over the sheave or the maximum torque of the machine is reached for a minimum of 2 seconds.
4. Press 



ELVI 2.0 - Elevator Inspection System



Machine Brake Test



Emergency Brake Test



Safeties Test



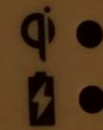
Traction Test



Buffer Test



Finish



HENNING
testing systems GmbH

UCD

ELVI 2.0 - Elevator Inspection System



Machine Brake Test



Emergency Brake Test



Safeties Test



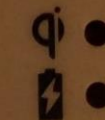
Traction Test



Buffer Test



Finish



HENNING
testing systems GmbH

UCD

ELVI 2.0 - Elevator Inspection System

Sensor Shut Down



Please wait until this dialog is closed,
DO NOT switch the units off!
Stay close to these units:



shutting down...



shutting down...



Sensor Shut Down



Please wait until this dialog is closed,
DO NOT switch the units off!.
Stay close to these units:

The illustration shows three sensor units arranged vertically. The top unit is a tablet displaying a software interface, with a green checkmark icon to its right and the text 'Ready!'. Below this is a horizontal progress bar that is completely filled with green segments. The middle unit is a yellow cube-shaped device with a blue hourglass icon to its right and the text 'shutting down...'. Below this is a horizontal progress bar that is approximately 25% filled with green segments. The bottom unit is another tablet displaying a software interface, with the text 'shutting down...' centered below it and an empty horizontal progress bar.

Illustration 1: Final Synchronization Dialog

At this point, the microcontrollers of the UCD, the PS2 and the MSM12 are again synchronized.

ELVI 2.0 - Elevator Inspection System

Sensor Shut Down



Please wait until this dialog is closed,
DO NOT switch the units off!
Stay close to these units:



shutting down...

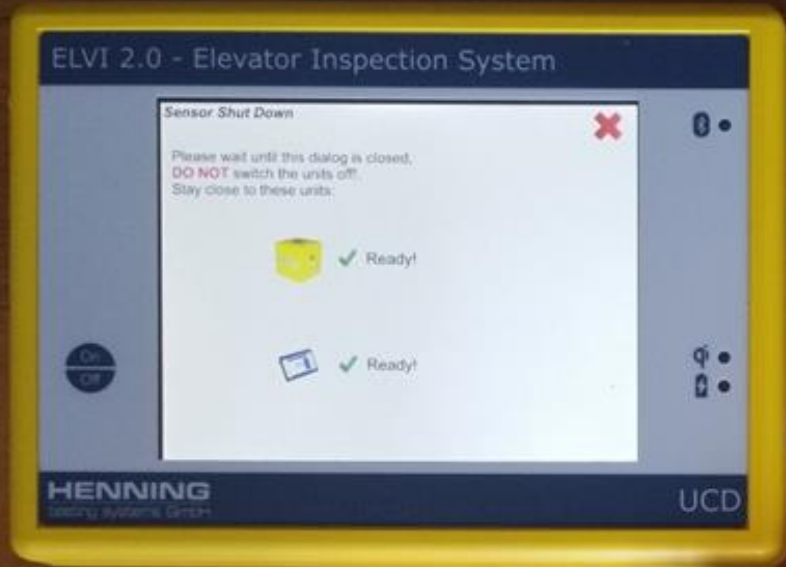


Ready!



HENNING
testing systems GmbH

UCD



ELVI 2.0 - Elevator Inspection System



Testing



Settings



Unit info



02/01/21 09:00

HENNING
testing systems GmbH

UCD



New project Import

- Project
- 1 Fannin
 - 1000 8th Ave
 - 1183 Finch Car 1 (Alternative 2020)
 - 123
 - 123
 - 1555 Finch Car 2 (Alternative 2020)
 - 1555 Finch Car 2 (Alternative 2020)
 - 160 CHARLOTTE
 - 161NelsonNorth
 - 188 CUMBERLAND
 - 20245310
 - 20245311

Installation: 1000 8th Ave

Serial no.: Stampede Training

Street:

ZIP/City: Calgary

Country:

Comment:

Rated speed: 0 ft/min 0.00 °

Rated load: 0 lbs

ISO 18738 limits:

Rope diameter: in.

Distance between guide rails: 0.0 in.

Save

Read all-in-once (All 3 units connected by USB) | Read individually (Just one unit connected per USB at a time)

Sensor configuration

Sensor connection state

Connect | Bluetooth | QI power transmission | Synchronisation module | Release special functions | Firmware update

Unit serial no. | Version | Internal memory | Battery capacity | Date of service check

Sensor connection state

Connect | Version | Unit serial no. | Date of calibration | Release special functions | Firmware update

Sensor connection state

Connect | Version | Unit serial no. | Date of calibration | Firmware update

Date	Project	Lift serial no.	Weighing...	Synchron...	Measure...	Tests

Close

Information



The already stored project data differ from the device data.

Please select the desired data.

	Device data	Already stored project data
Project	<input type="radio"/> NNO	<input checked="" type="radio"/> ACCTEST
Lift serial no.	<input checked="" type="radio"/>	<input type="radio"/>
Rated speed	<input checked="" type="radio"/> 1.00 m/s	<input type="radio"/> 5.00 m/s
Suspension (in:out)	<input checked="" type="radio"/> 10 : 1	<input type="radio"/> 1 : 1
Rated load	<input checked="" type="radio"/> 1000 kg	<input type="radio"/> 5 kg

Apply



Electronic Testing Report

Category 5 test Summary/Report

Elevator Testing Report

Elevator installation	US216679_3	Measurement-ID	US
Lift serial no.	BBG344	Trigger time	25.05.2017
Street		Version	1.68
ZIP/City		Code	A17.1/B44
Country			
Rated speed	350 fpm		
Rated load	3000 lbs		

Company performing the tests Southern Elevator Co. **Comments / Special explanatory notes**

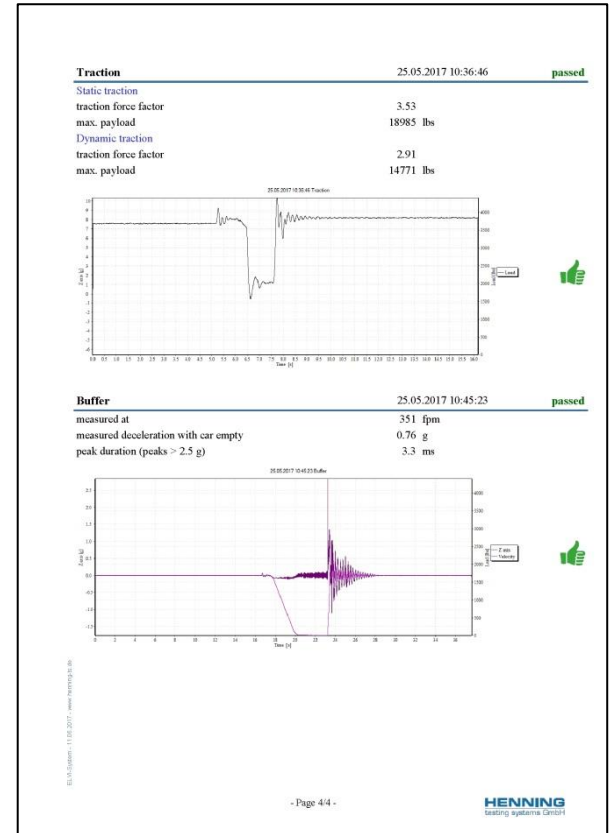
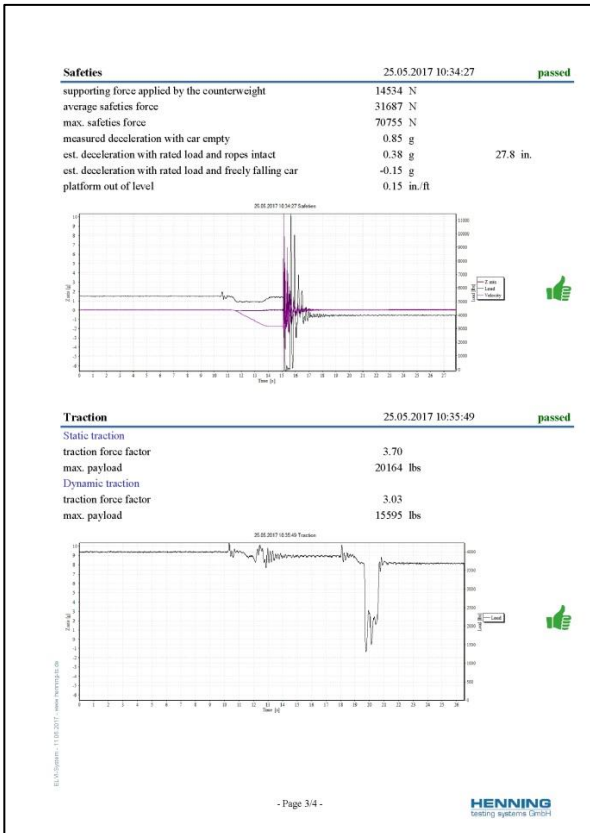
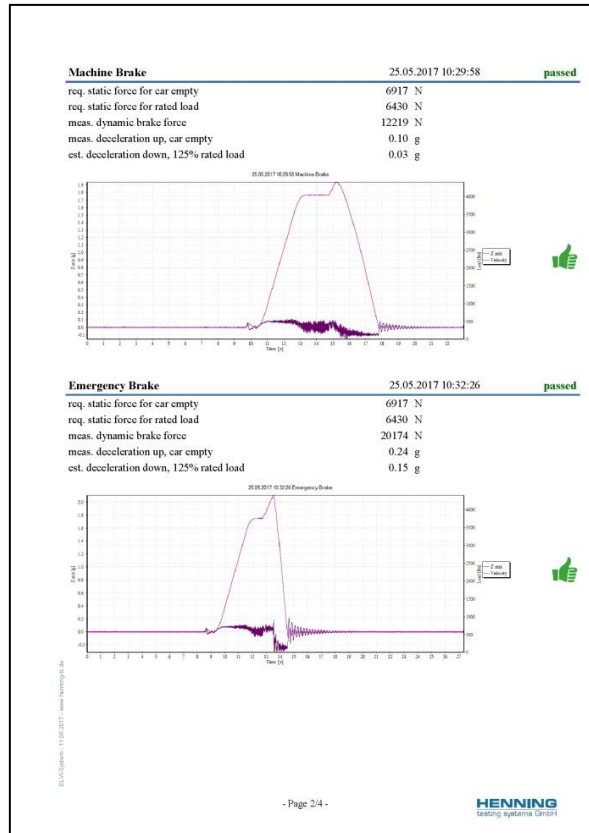
Personell conducting the tests **People witnessing the tests**

Suspension Means		Weights	
Suspension	1:1	Car weight	5348 lbs
Suspension means type	Rope	Counterweight	6903 lbs
Diameter	5/8 in.	Counterweight Balancing	52 %
Quantity	5		

Safety Components		Compensation	
Safeties type	Type B	Compensation type	none
Emergency brake	Rope Brake	Compensation weight	
Distance between guide rails	0.0 in.		

Evaluation Components			
Model	Serial no.	Version	Last calibration
PS2	01530011	2.37	09.05.2017
MSM12 V3	01202372	3.47	09.05.2017
LSM-XL	00500467		24.03.2017
LSM1	00647637		24.03.2017
LSM-XL	00500232		31.10.2016
LSM1	00653291		24.03.2017
LSM-XL	00500631		01.02.2017
UCD	01500012	1.30	09.05.2017

HENNING
testing systems GmbH



Elevator technicians can become certified users of the ELVI 2 system

HENNING
testing systems GmbH



ELEVATOR INSPECTION SYSTEM ELVI 2.0 QUALIFICATION CERTIFICATE

This certifies that

J.R. Freeman


has satisfactorily completed the necessary requirements prescribed by the ELVI training program and is awarded this certificate upon completion of the course entitled

Elevator CAT5 testing acc. ASME A17.1/CSA B44 by the use of the alternative testing system ELVI 2.0

Certificate No.: 2019088

March 12th 2019


Kevin Heling
Specialty Products Director
WURTEC Inc.


Tim Ebeling
Managing Director
Henning testing systems GmbH

HENNING
testing systems GmbH



Course	CAT5 Testing acc. ASME A17.1/CSA B44 using the alternative, electronic testing system ELVI 2.0
Scope	This 10-hour practical training course has been designed to train elevator technicians for the successful use of the ELVI2.0 system for CAT5 test with alternative test systems according to ASME A17.1 / CSA B44.
Objective	After successful completion of the course, trainee will be able: <ul style="list-style-type: none">• to use the ELVI 2.0 system for determining the weight of the car and counterweight, determining the counterweight-balancing; testing the safeties; testing the elevator machine brake; accurately measuring the system's traction ability; testing oil-hydraulic buffers and testing of additional safety brakes on elevators.• to interpret the results and to document the tests according to the requirements of ASME A17.1 / CSA B44.
Course content	ELVI system components <ul style="list-style-type: none">• Introduction to the electronic components, sensors and PC software• Introduction to the manual, training videos and additional information sources• Use and correct application of the load sensors• Process system set up and test preparation Alternative CAT5 test procedures <ul style="list-style-type: none">• Practical procedure of weighing car and counterweight• Practical test procedure of a safeties test• Practical test procedure of a traction test• Practical test procedure of a machine brake test• Practical test procedure of an emergency brake test• Practical test procedure of an oil-hydraulic buffer test Alternative CAT5 test evaluation and documentation <ul style="list-style-type: none">• Download sensor and component data to the evaluation software• Process a data evaluation for a Project• Compiling the required report data acc. ASME A17.1/CSA B44• Secure archiving of the test report
Proficiency	Successful, complete and independent execution of all CAT5 tests belonging to alternative testing acc. ASME A17.1/CSA B44 under supervision of the training instructor

The ELVI 2 System: an alternative for CAT5 Testing

Viewing and understanding results and Reports from this system

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 (now with Training Cert. #)
- Witness(es), if any required

Elevator Testing Report

Elevator installation Category 5 Tests
 Lift serial no. 0815
 Street 1111 SomeStreet
 ZIP/City 1111 SomeCity
 Country SomeCountry
 Rated speed 200 fpm
 Rated load 2500 lbs



Measurement-ID Cat5 Test
 Trigger time 23.04.2019
 Version 1.90
 Code A17.1/B44

Company performing the tests

Downwards Elevators
 2222 Elm Street
 SomeCity 1111
 Canada

Comments / Special explanatory notes

Machine Brake -- focus

Personnel conducting the tests

John Doe

People witnessing the tests

Bob Witness

Suspension Means

Suspension 1:1
 Suspension means type Rope
 Diameter 1/2 in.
 Quantity 4

Weights

Car weight 3452 lbs
 Counterweight 4536 lbs
 Counterweight Balancing 43 %

Safety Components

Safeties type Type B
 Emergency brake Rope Brake
 Distance between guide rails 0.0 in.

Compensation

Compensation type none
 Compensation weight

Evaluation Components

Model	Serial no.	Version	Last calibration	
PS2	01530052	2.41	26.10.2017	Calibration expired
MSM12 V3	01202590	3.64	18.12.2018	
LSM-XL	00501010		18.12.2018	
LSM-XL	00501025		18.12.2018	
LSM-XL	00501011		18.12.2018	
LSM-XL	00501008		18.12.2018	
UCD	01500093	1.36	22.10.2018	

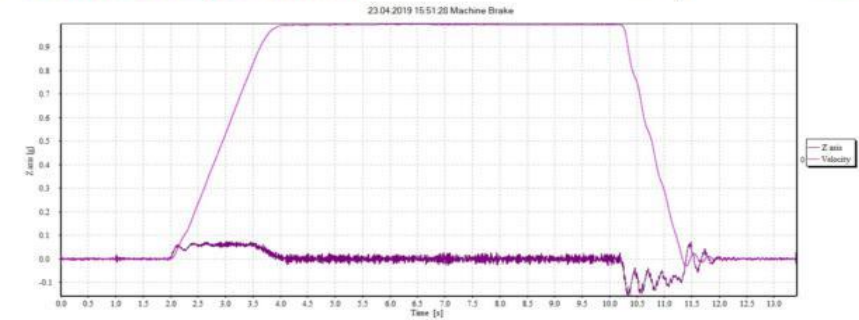
BASIC & VITAL STATISTICS...

- 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

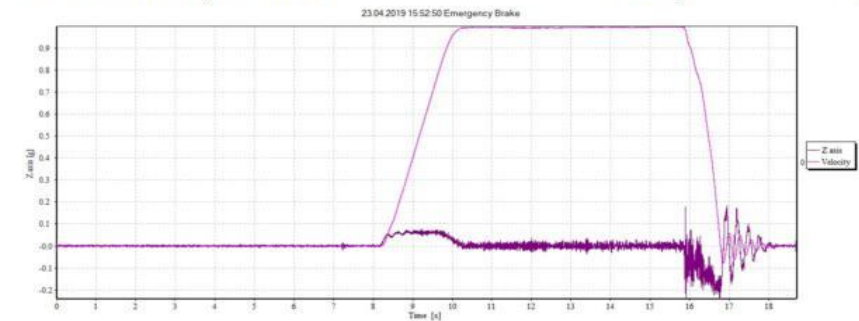
REPORT INFORMATION:

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. Passed results measured to long-established Code requirements
5. Will look more at detail of data and graph scales

Machine Brake		23.04.2019 15:51:28	failed
req. static force for car empty		1084 lbf	
req. static force for rated load		1416 lbf	
meas. dynamic brake force		1873 lbf	
meas. deceleration up, car empty		0.10 g	
est. deceleration down, 125% rated load		-0.02 g	32805.1 ft

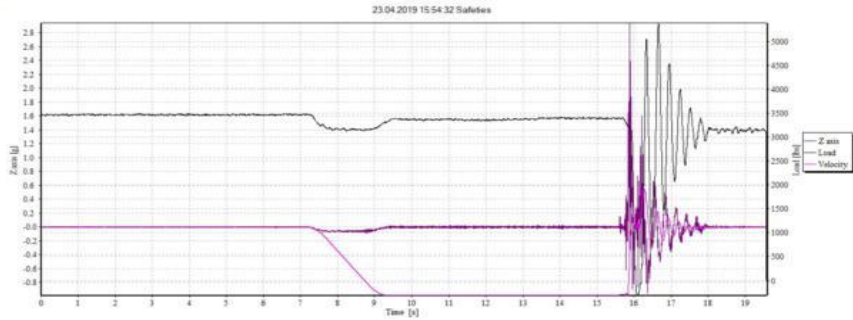


Emergency Brake		23.04.2019 15:52:50	passed
req. static force for car empty		1084 lbf	
req. static force for rated load		1416 lbf	
meas. dynamic brake force		2526 lbf	
meas. deceleration up, car empty		0.18 g	
est. deceleration down, 125% rated load		0.04 g	4.0 ft



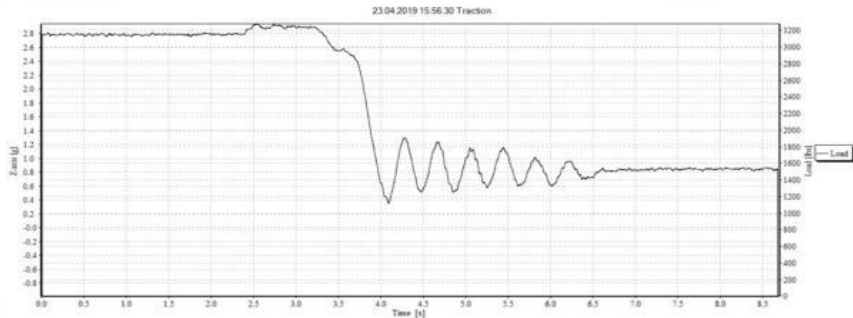
Safeties 23.04.2019 15:54:32 **passed**

supporting force applied by the counterweight	3209 lbf	
average safeties force	4500 lbf	
max. safeties force	5207 lbf	
measured deceleration with car empty	1.27 g	
est. deceleration with rated load and ropes intact	0.51 g	7.7 in.
est. deceleration with rated load and freely falling car	-0.24 g	
platform out of level	0.07 in./ft	



Traction 23.04.2019 15:56:30 **passed**

Static traction		
traction force factor	3.07	
max. payload	10455 lbs	
Dynamic traction		
traction force factor	2.76	
max. payload	9090 lbs	



MORE REPORT INFORMATION:

1. Final reports saved and shown to safety officials and building owners may typically show only results that "Passed"
2. Failed results normally not included, showing here examples.
3. Individual tests are repeated; after adjustments, maintenance/repair. A second (supplement) report is added to project file, in this event.
4. In general, (and according to the A17/B44 Code), brake, safety and buffer stops are tested (based on Full Load) must **be within certain limits in deceleration.**

* Note that earth gravity is
1 g = 9.81 m/s²

+ 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, aka 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.

Elevator Testing Report



Elevator installation	Gulf CAR 17	Measurement-ID	CAR 17 Brakes
Lift serial no.	0815	Trigger time	18.01.2019
Street	333 Gulf Street	Version	1.90
ZIP/City	12345 Gulfcity	Code	A17.1/B44
Country	Gulfland		
Rated speed	1000 fpm		
Rated load	4000 lbs		

Company performing the tests	Comments / Special explanatory notes
Downwards Elevators 2222 Elm Street SomeCity 1111 Canada	

Personnel conducting the tests	People witnessing the tests
John Doe	Bob Witness

Suspension Means	Weights
Suspension	1:1
Suspension means type	Rope
Diameter	5/8 in.
Quantity	8
	Car weight 8877 lbs
	Counterweight 10792 lbs
	Counterweight Balancing 48 %

Safety Components	Compensation
Safeties type	Type B
Emergency brake	Additional Engine Brake
Distance between guide rails	0.0 in.
	Compensation type Tie-Down
	Compensation weight 3450 lbs

Evaluation Components			
Model	Serial no.	Version	Last calibration
PS2	01530070	2.41	24.09.2018
MSM12 V3	01203337	3.60	03.09.2018
LSM-XL	00500477		02.05.2018
LSM-XL	00501365		31.08.2018
LSM-XL	00501366		31.08.2018
LSM-XL	00501361		31.08.2018
LSM-XL	00501364		31.08.2018
LSM-XL	00500474		02.05.2018
LSM-XL	00501362		31.08.2018
LSM-XL	00501363		31.08.2018
UCD	01500057	1.36	14.11.2017

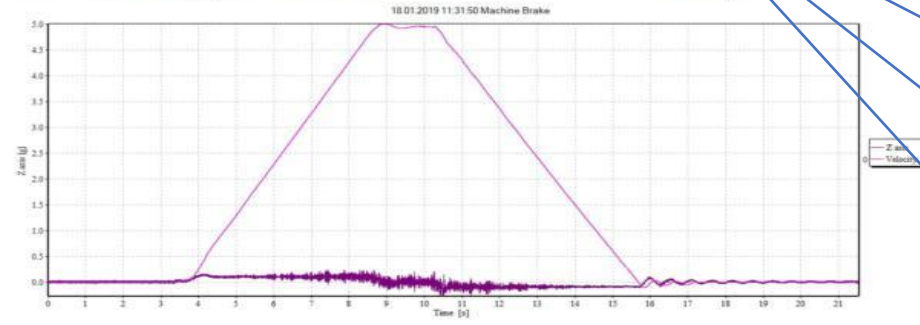
E.V.M System - 2020 - www.henning.de

This is an immediate, added and important result of testing, not just information like all the other items at this page.

Machine Brake

req. static force for car empty
req. static force for rated load
meas. dynamic brake force
meas. deceleration up, car empty
est. deceleration down, 125% rated load

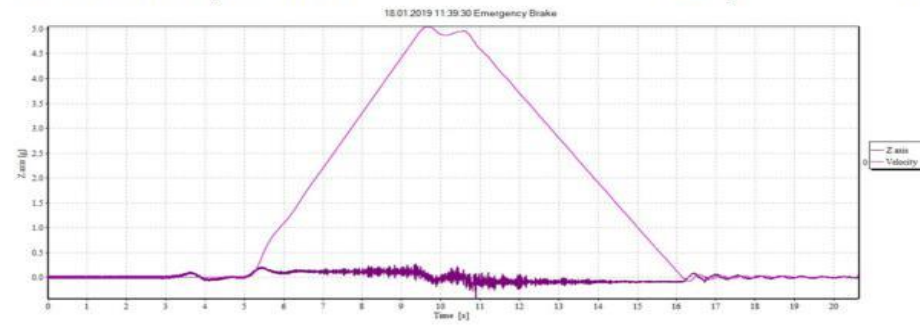
18.01.2019 11:31:50 **passed**
1915 lbf
2085 lbf
4215 lbf
0.10 g
0.04 g



Emergency Brake

req. static force for car empty
req. static force for rated load
meas. dynamic brake force
meas. deceleration up, car empty
est. deceleration down, 125% rated load

18.01.2019 11:39:30 **passed**
1915 lbf
2085 lbf
4154 lbf
0.10 g
0.04 g



Value is the force needed to be applied by the brake to hold the empty car static (in place).

Value is the force needed to be applied by the brake to maintain the car loaded with rated load static (in place).

Minimum braking force measured by ELVI-system.

Average deceleration that occurred during braking. Measured during test car traveling in the up direction (empty car).

Average deceleration, this car would have, if braking during a down travel with 125% rated load. The “meas. Dynamic brake force” above decelerating the car.

The braking distance from rated speed to zero with the overloaded car, if the “established deceleration” were applied to this car.

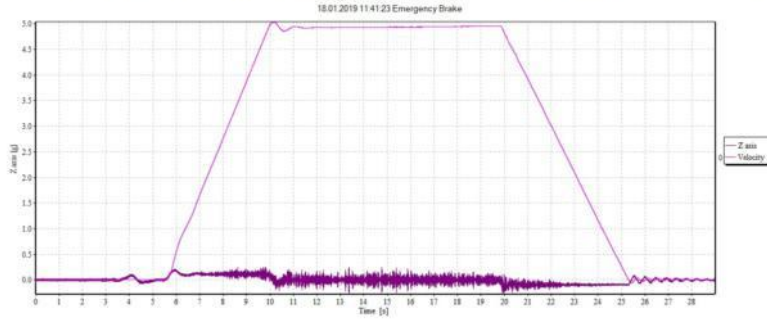
Emergency Brake

18.01.2019 11:41:23

passed

req. static force for car empty 1915 lbf
 req. static force for rated load 2085 lbf
 meas. dynamic brake force 4124 lbf
 meas. deceleration up, car empty 0.10 g
 est. deceleration down, 125% rated load 0.04 g

116.9 ft

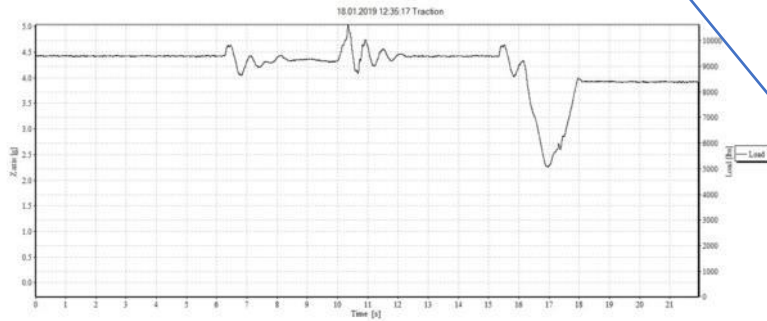


Traction

18.01.2019 12:35:17

passed

Static traction
 traction force factor 2.01
 max. payload 12814 lbs
 Dynamic traction
 traction force factor 1.59
 max. payload 8269 lbs



Static Traction

- a) The car should hold in tested location with 0% of the rated load.
- b) The car should hold in tested location with 125% of the rated load.

c) It should not be possible to lift the empty car, if counterweight rested on the buffers and the motor turns in the up direction.

Dynamic Traction

- a) Traction measured at emergency Stop (on safeties) with empty car at rated speed.

- b) Traction measured is established for emergency stop with 125% of rated load at the speed.

Measured traction defined as the ratio of two masses (counterweight/car), greater mass in the numerator of the ratio. Result is measured ratio of the masses, that the system can Drive.

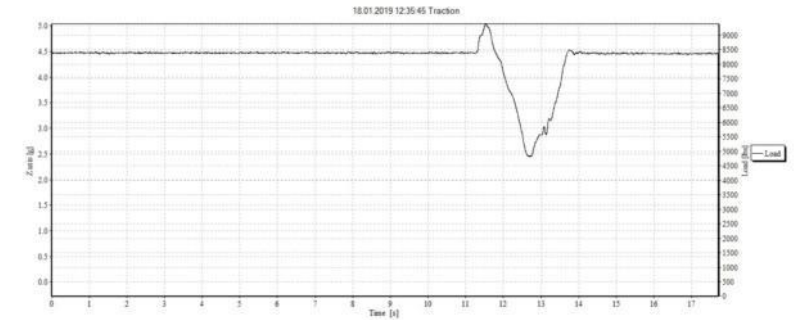
Maximum load capacity calculated from the nominal load, the car weight, the counterweight and the above measured traction. This is maximum load that may be in the car without it slipping, or the motor losing its ability to drive.

Traction

18.01.2019 12:35:45

passed

Static traction
 traction force factor 2.09
 max. payload 13724 lbs
 Dynamic traction
 traction force factor 1.63
 max. payload 8742 lbs

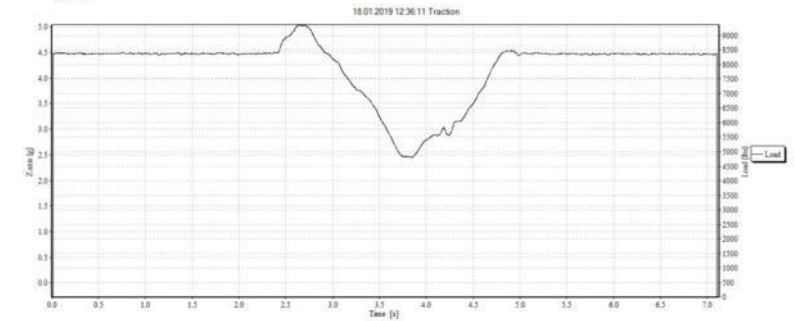


Traction

18.01.2019 12:36:11

passed

Static traction
 traction force factor 2.10
 max. payload 13750 lbs
 Dynamic traction
 traction force factor 1.63
 max. payload 8756 lbs



Elevator Testing Report

Elevator installation Miracleland
 Lift serial no. 0815
 Street 2222 Wonder Avenue
 ZIP/City 2222 SomeCity
 Country SomeCountry
 Rated speed 150 fpm
 Rated load 2000 lbs



Measurement-ID 955 WONDERLAND
 Trigger time 27.11.2018
 Version 1.90
 Code A17.1/B44

Company performing the tests

Downwards Elevators
 2222 Elm Street
 SomeCity 1111
 Canada

Comments / Special explanatory notes

Personnel conducting the tests

John Doe

People witnessing the tests

Bob Witness

Suspension Means

Suspension 1:1
 Suspension means type Rope
 Diameter 1/2 in.
 Quantity 4

Weights

Car weight 3577 lbs
 Counterweight 4400 lbs
 Counterweight Balancing 41 %

Safety Components

Safeties type Type A
 Emergency brake Rope Brake
 Distance between guide rails 0.0 in.

Compensation

Compensation type none
 Compensation weight

Evaluation Components

Model	Serial no.	Version	Last calibration
PS2	01530011	2.41	28.06.2018
MSM12 V3	01202418	3.58	28.06.2018
LSM-XL	00500878		09.11.2018
LSM-XL	00500881		09.11.2018
LSM-XL	00500879		09.11.2018
LSM-XL	00500814		09.11.2018
UCD	01500014	1.35	02.03.2016

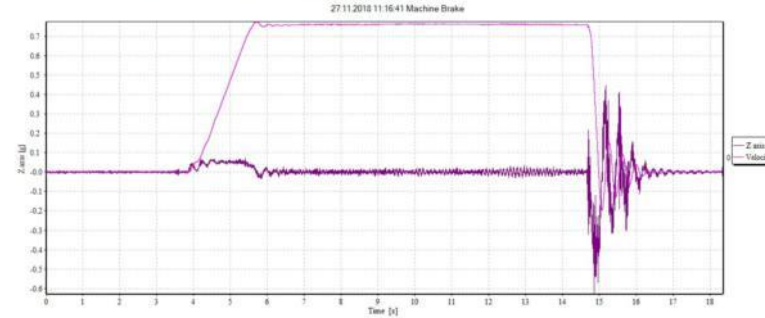
Machine Brake

27.11.2018 11:16:41

passed

req. static force for car empty 823 lbf
 req. static force for rated load 1177 lbf
 meas. dynamic brake force 3718 lbf
 meas. deceleration up, car empty 0.36 g
 est. deceleration down, 125% rated load 0.19 g

0.5 ft



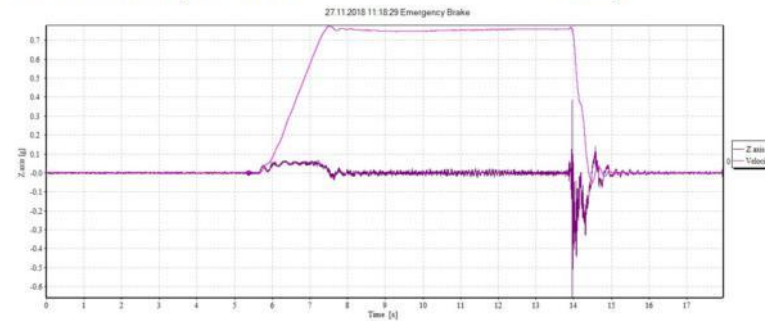
Emergency Brake

27.11.2018 11:18:29

passed

req. static force for car empty 823 lbf
 req. static force for rated load 1177 lbf
 meas. dynamic brake force 2594 lbf
 meas. deceleration up, car empty 0.22 g
 est. deceleration down, 125% rated load 0.09 g

1.1 ft

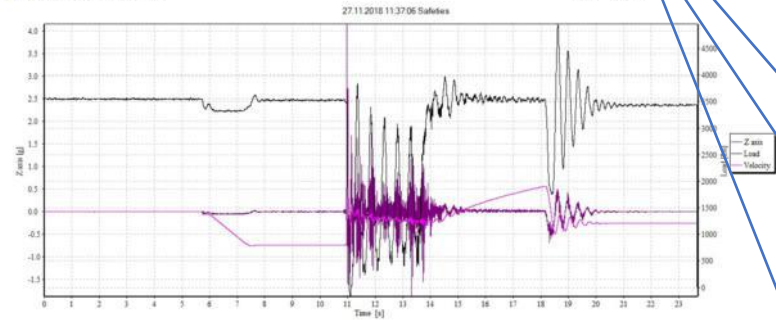


Safeties

supporting force applied by the counterweight	3393 lbf
average safeties force	5425 lbf
max. safeties force	7096 lbf
measured deceleration with car empty	2.04 g
est. deceleration with rated load and ropes intact	0.91 g
est. deceleration with rated load and freely falling car	-0.03 g
platform out of level	0.04 in./ft

27.11.2018 11:37:06

passed

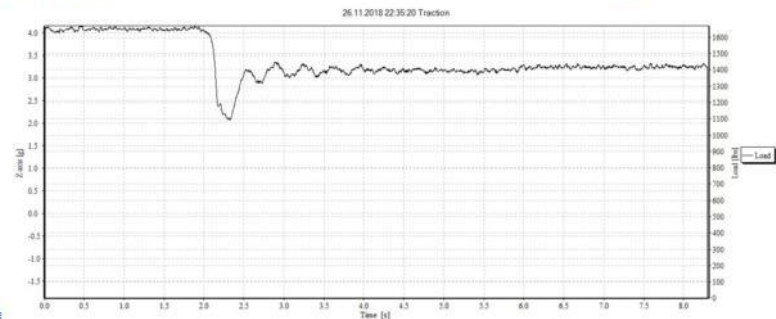


Traction

Static traction	
traction force factor	3.35
max. payload	11147 lbs
Dynamic traction	
traction force factor	3.07
max. payload	9940 lbs

26.11.2018 22:35:20

passed



Average amount of force exerted by the counterweight during the safeties test, additionally supporting the safeties by decelerating the car.

Average safety braking force is the arithmetic average of the force, applied throughout braking until the car finally came to a full stop.

Maximum braking force that occurred during braking.

Value is the average deceleration that occurred during braking, empty car measurement.

The deceleration a fully loaded car with intact ropes (counterweight contributing effect) would experience when stopped on the safeties. Along with deceleration, the calculated sliding distance is given.

The deceleration a fully loaded car without suspension/ropes (counterweight not a factor) would experience if stopping on the safeties. If value is negative, the safeties would not be able to stop the car, which would accelerate further (with calculated delay). If a negative value is reported, the safeties either have not deployed its full potential (because car speed was too slow or safety engagement too light) or the safeties are not sufficient for the installation.

Measuring additional acceleration in the horizontal (or Y axis) direction, ELVI system measure angle the car shifted during the safeties test relative to its initial position. Value given in vertical deflection per horizontal distance unit. If project data includes the shaft gauge on-the-gauge (? DBG?), the absolute vertical deflection is also shown.

Projects Administration Settings

New project Import

Project

- 1555 Finch Car 2 (Alternative 2020)
- 1555 Finch Car 2 (Alternative 2020)
- 160 CHARLOTTE
- 161NelsonNorth
- 188 CUMBERLAND
 - Load Measurements
 - Acceleration Measurement
 - Sound Level Measurement
 - ELVI System
 - 1/31/2020 9:53:21 AM 188 CUMBERLAND
 - LiftInspector
 - WEARwatcher

Installation: 188 CUMBERLAND

Serial no.: 64792307

Street:

ZIP/City:

Country:

Comment:

Rated speed: 500 ft/min 0.00 °

Rated load: 2500 lbs

ISO 18738 limits:

Rope diameter: 5/8 in.

Distance between guide rails: 0.0 in.

Save

MSM12 unit Acc. Sensor ELVI System AE12 Controller My Sensors 1/31/2020 9:53:21 AM 188 CUMBERLAND | 188 CUMBERLAND

Suspension Means

Suspension means type: Rope

Diameter: 5/8 in.

Quantity: 7

Compensation

Compensation type: Compensation chain

Compensation weight: 2.0 lbs/ft

Company performing the tests

SomeCity 1111

Canada

Personnel conducting the tests

aa cert. #

bb cert. #

People witnessing the tests

Kevin Heling

Hugh Hunter

Safety Components

Safeties type: Type B

Emergency brake: Rope Brake

Weights - Counterweight Balancing: 26 %

Car weight: 7915 lbs

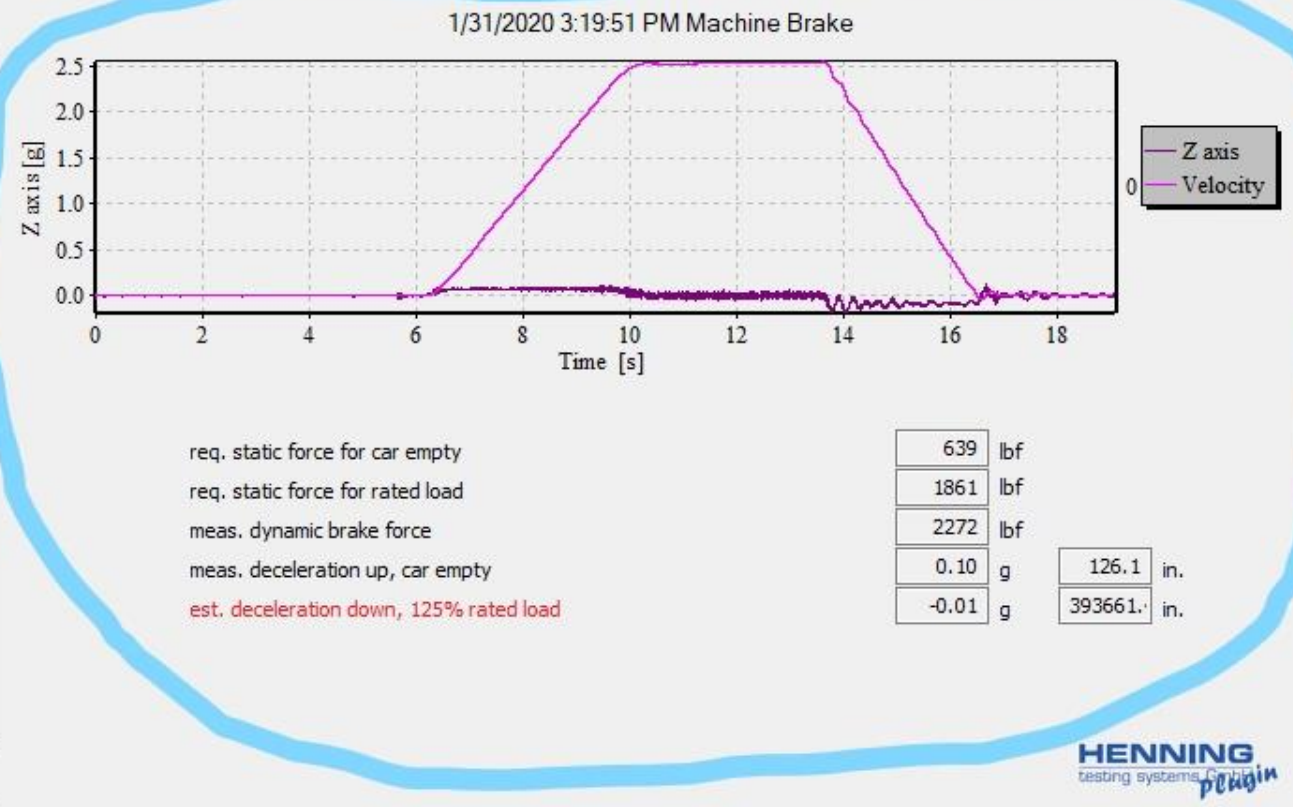
Counterweight: 8555 lbs

Comments / Special explanatory notes

Some mechanical adjustment needed regarding machine brake

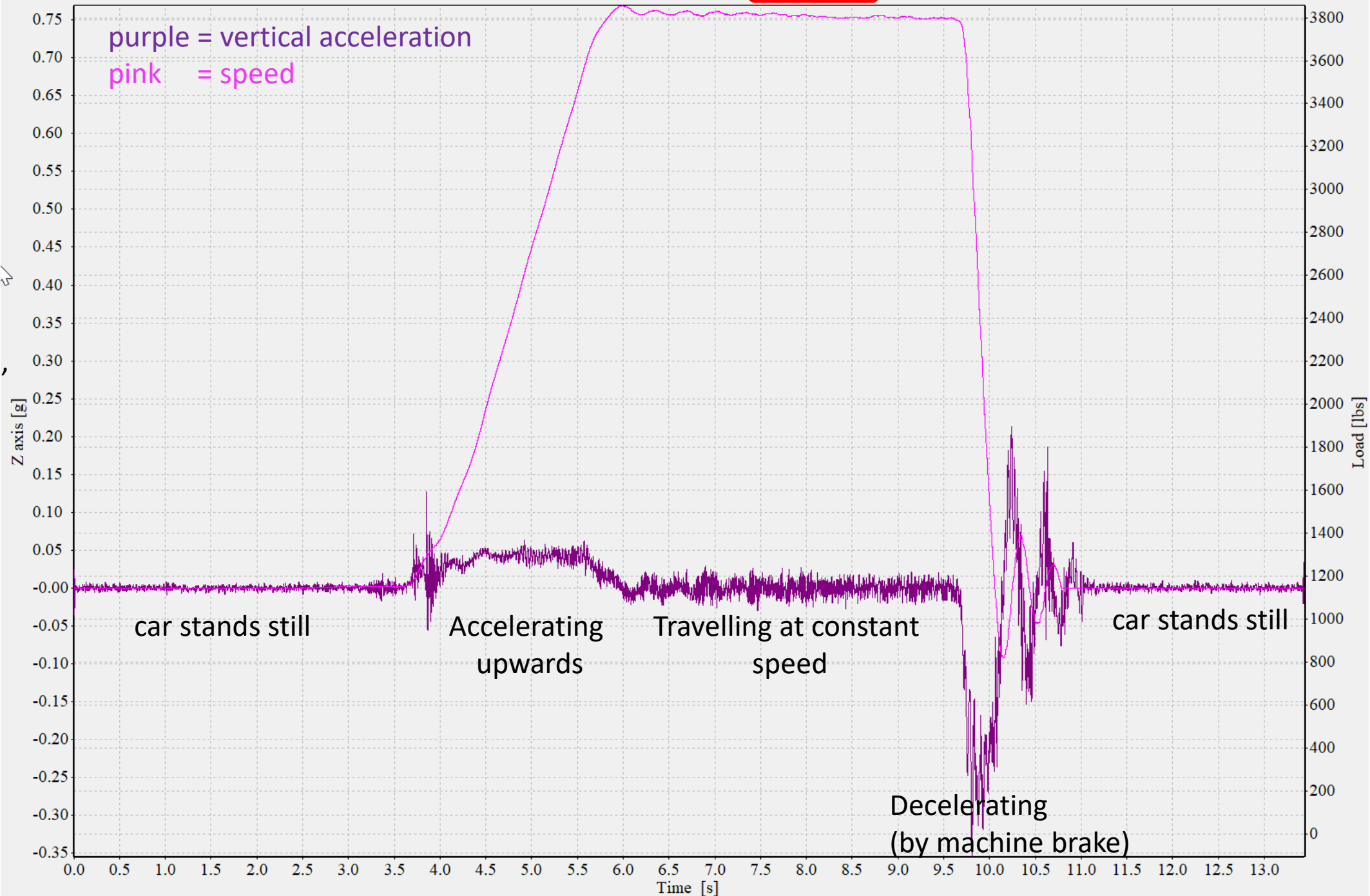
EN81 A17/B44 SS 550

Date	Evaluation	Results A17
Machine Brake Select complete group		
<input type="checkbox"/> 1/31/2020 3:19:15 PM	Error	
<input checked="" type="checkbox"/> 1/31/2020 3:19:51 PM	100 %	failed
Emergency Brake Select complete group		
<input type="checkbox"/> 1/31/2020 3:23:03 PM	Error	
<input checked="" type="checkbox"/> 1/31/2020 3:23:16 PM	100 %	passed
Safeties Select complete group		
<input checked="" type="checkbox"/> 1/31/2020 3:27:10 PM	100 %	passed
Traction Select complete group		
<input type="checkbox"/> 1/31/2020 9:27:53 AM	100 %	failed
<input checked="" type="checkbox"/> 1/31/2020 9:31:36 AM	100 %	passed
Buffer Select complete group		
<input checked="" type="checkbox"/> 1/31/2020 3:39:34 PM	100 %	passed
<input type="checkbox"/> 1/31/2020 3:40:18 PM	Error	

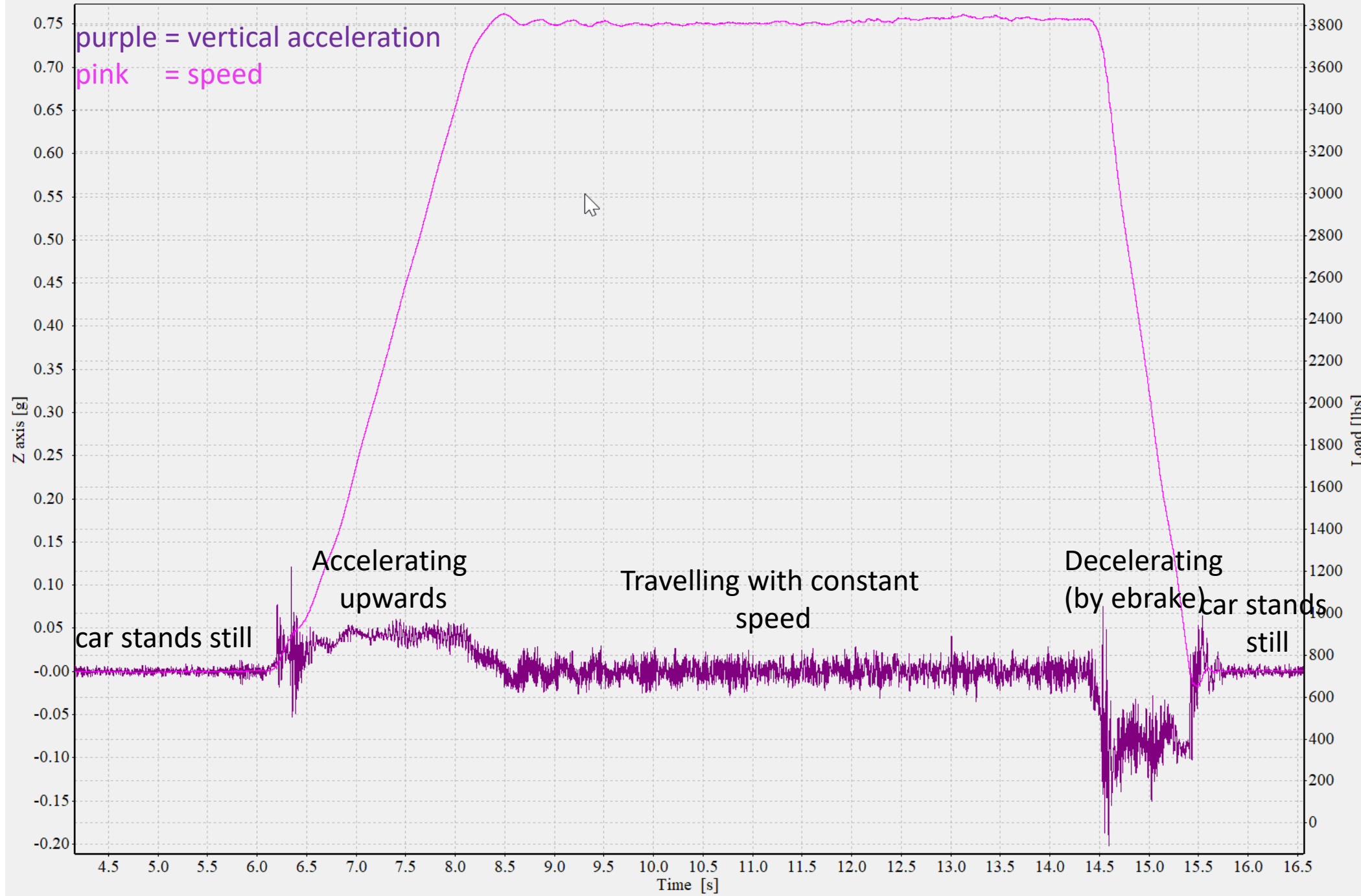


Evaluation done

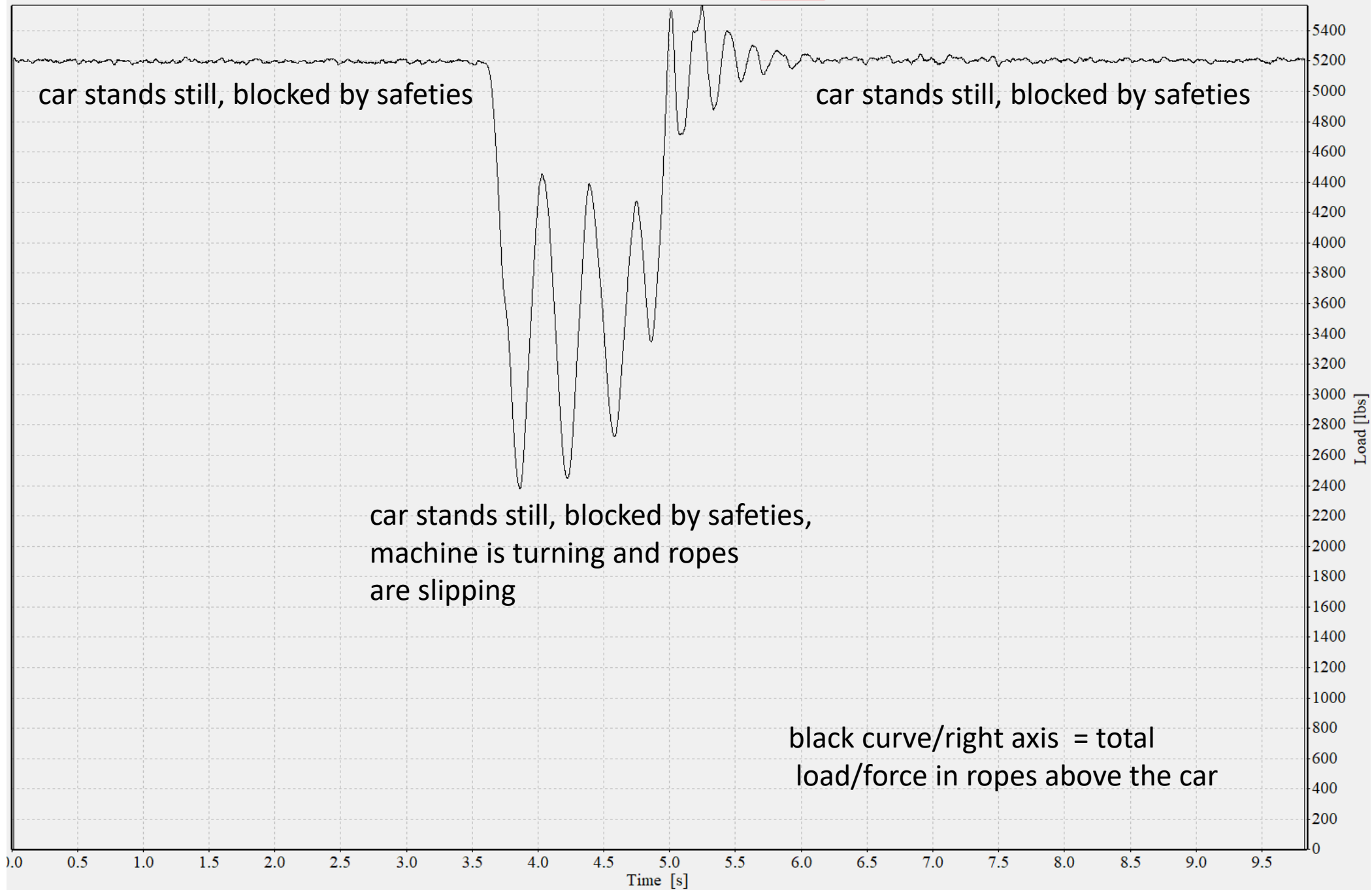
Close

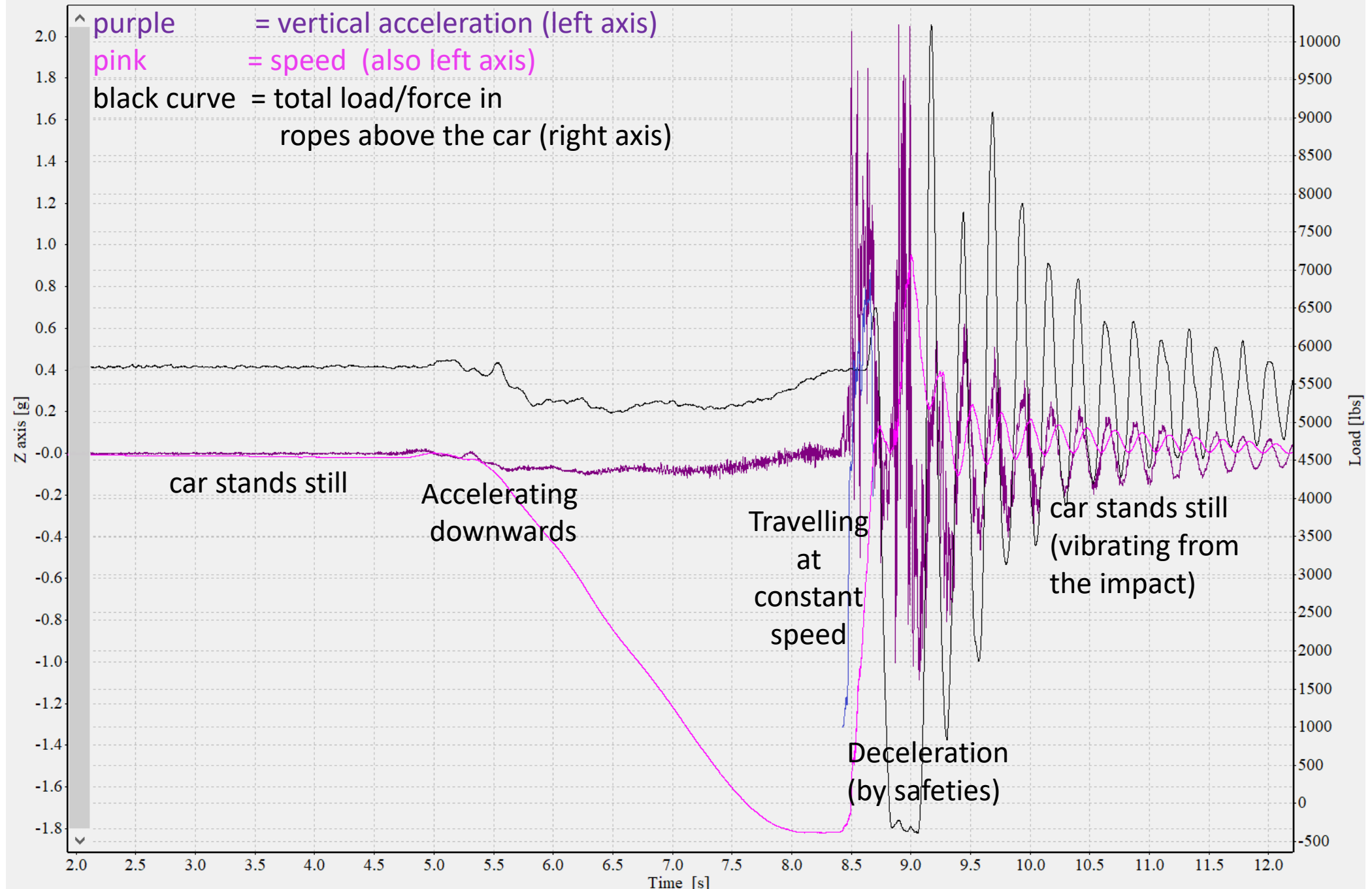


Scale shows accelerations in [g] (as an extra feature, values are also speed in [m/s])

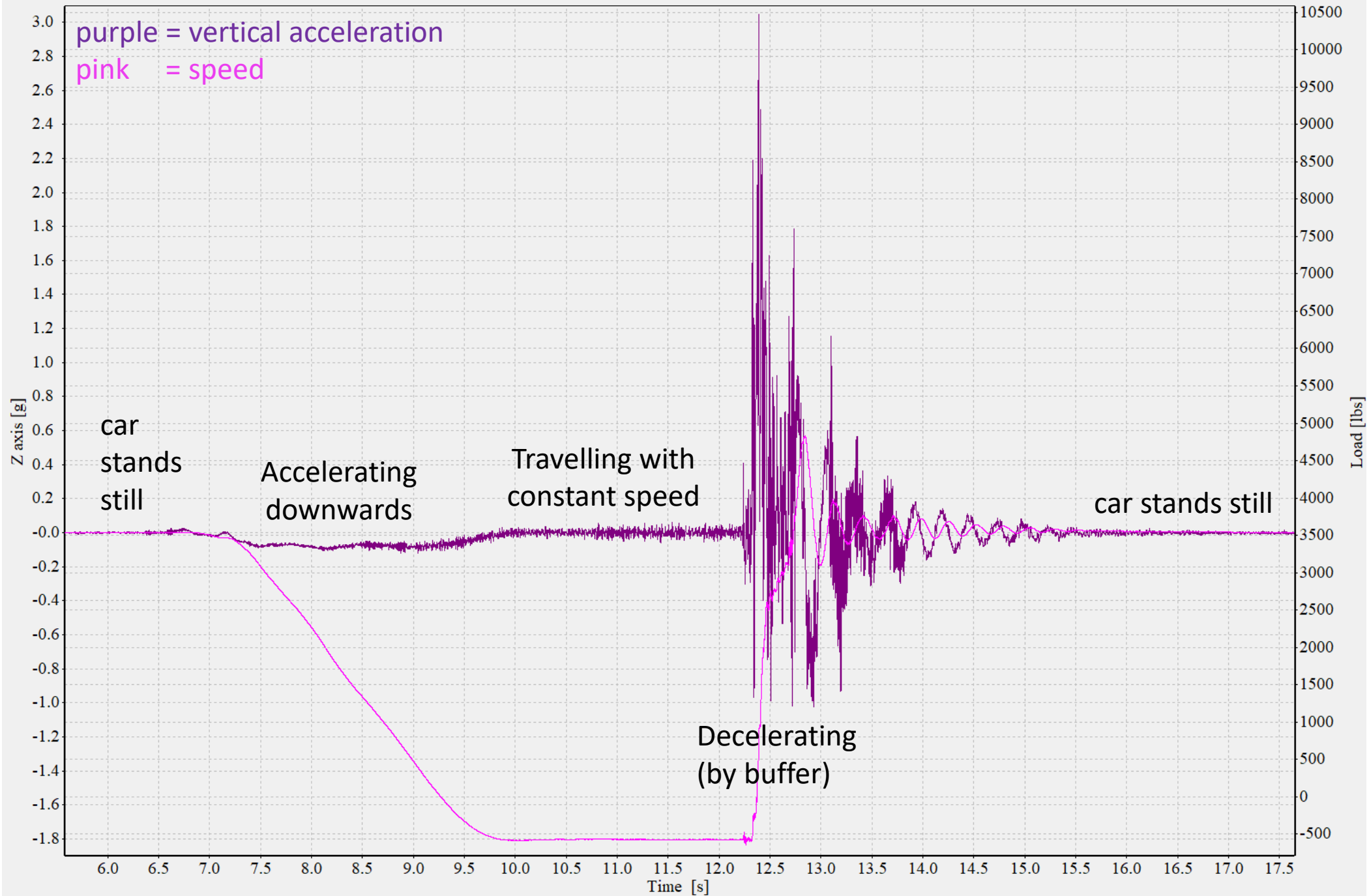


Scale shows accelerations in [g]
(as a hidden feature, values are also speed in [m/s])





Scale shows accelerations in [g]
(as a hidden feature, values are also speed in [m/s])

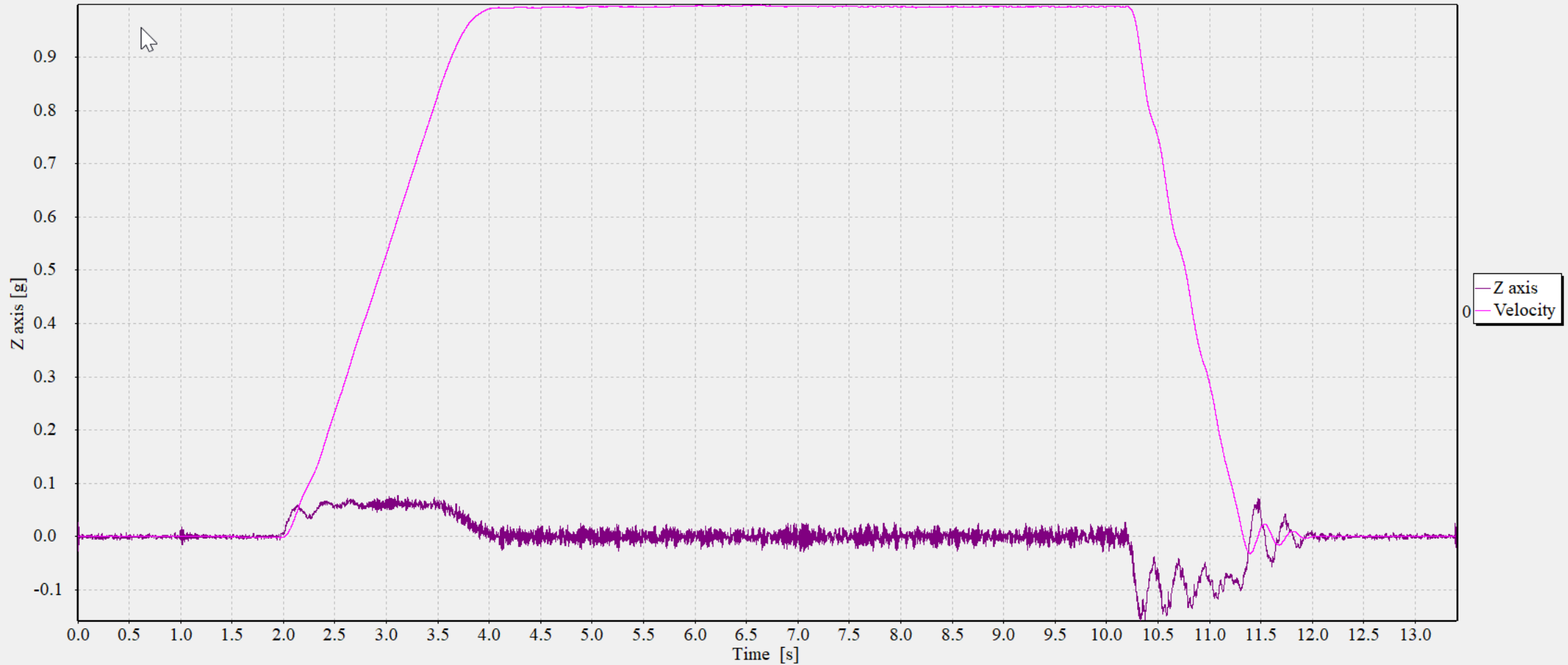


purple = vertical acceleration
pink = speed

Scale shows accelerations in [g]
(as a hidden feature, values are also speed in [m/s])

Right axis is showing Measured weight of Car taken at set up

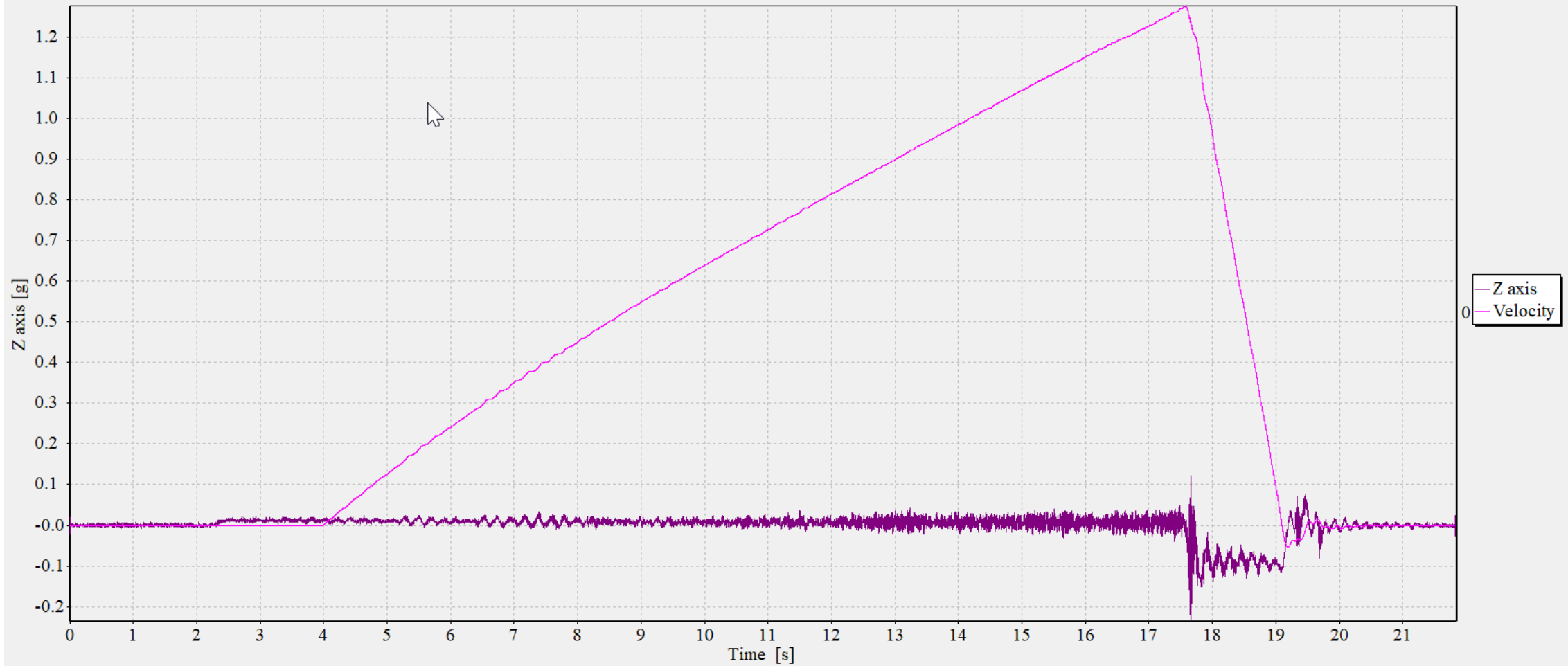
car stands still Accelerating downwards Travelling with constant speed Decelerating (by buffer) car stands still



req. static force for car empty
 req. static force for rated load
 meas. dynamic brake force
 meas. deceleration up, car empty
 est. deceleration down, 125% rated load

1084	lbf		
1416	lbf		
1873	lbf		
0.10	g	1.5	ft
-0.02	g	32805.1	ft

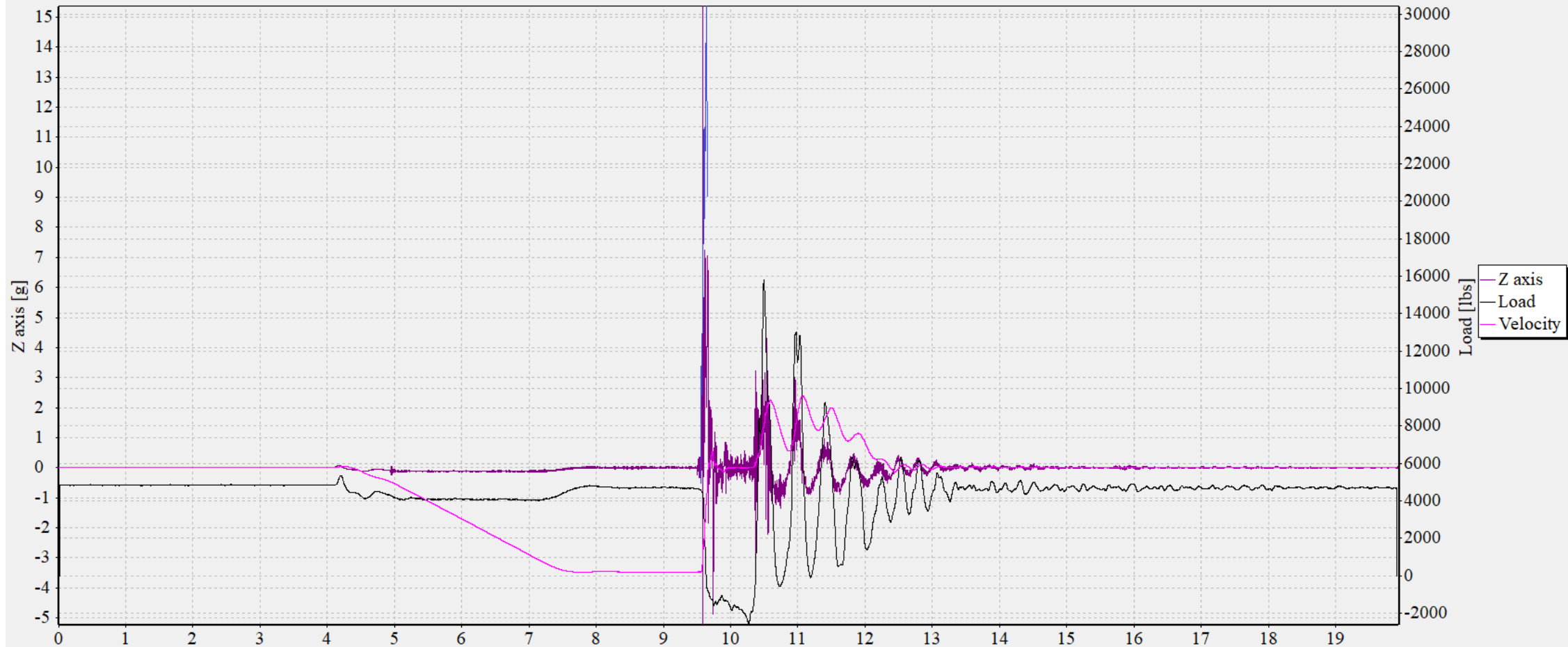
Close to passing, but failed brake test. Some adjustment to machine brake needed (adjust/tighten?)



req. static force for car empty
 req. static force for rated load
 meas. dynamic brake force
 meas. deceleration up, car empty
 est. deceleration down, 125% rated load

2002	lbf		
2998	lbf		
3310	lbf		
0.09	g	2.8	ft
-0.05	g	32805.1	ft

Failed emergency brake test...if rope brake, repair may involve changing brake pads.

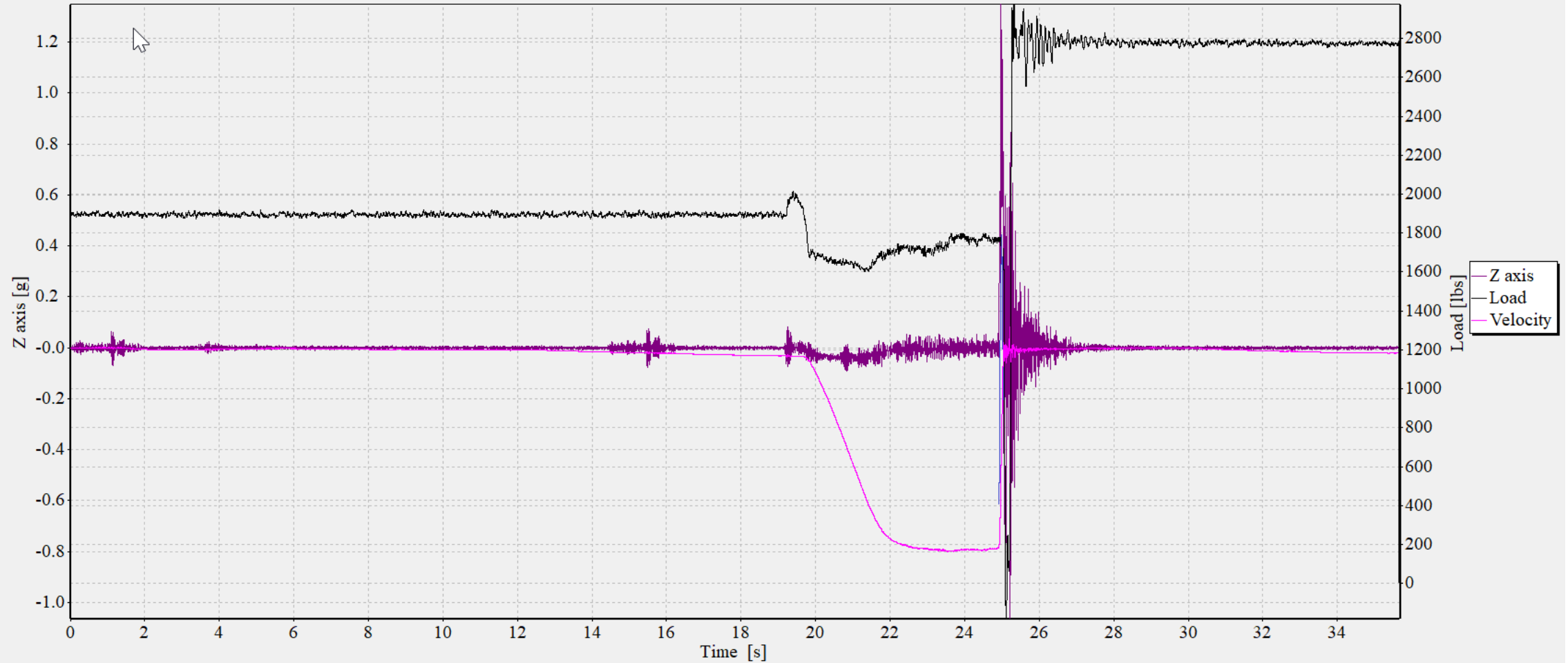


supporting force applied by the counterweight
 average safeties force
 max. safeties force
 measured deceleration with car empty
 est. deceleration with rated load and ropes intact
 est. deceleration with rated load and freely falling car
 platform out of level

Time [s]	
1793	lbf
20004	lbf
30409	lbf
3.40	g
2.34	g
1.23	g
0.10	in./ft

8.5	in.
15.9	in.

Safeties, stopping far too harshly, need to be adjusted to provide a lower decel rate



supporting force applied by the counterweight

average safeties force

max. safeties force

measured deceleration with car empty

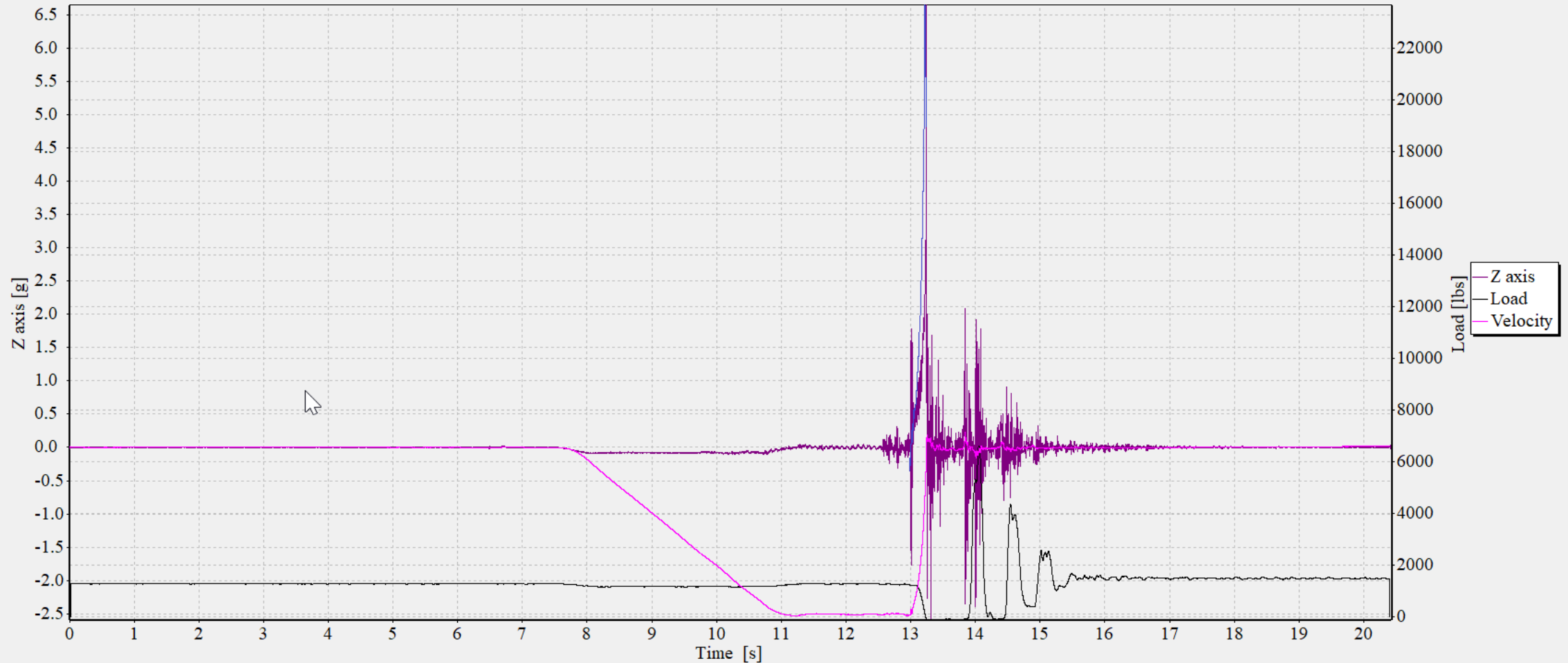
est. deceleration with rated load and ropes intact

est. deceleration with rated load and freely falling car

platform out of level

1716	lbf		
1691	lbf		
1791	lbf		
0.86	g	2.0	in.
-0.51	g	-4.4	in.
-0.61	g		
0.03	in./ft	0.14	in.

Failed Safeties test, need to be adjusted to provide a higher decel rate



supporting force applied by the counterweight

647 lbf

average safeties force

12084 lbf

max. safeties force

23673 lbf

measured deceleration with car empty

1.31 g

18.3 in.

est. deceleration with rated load and ropes intact

0.42 g

47.4 in.

est. deceleration with rated load and freely falling car

0.21 g

platform out of level

0.50 in./ft

Passed Safeties test, with respect to decel rate. However platform is out of level after the stop by safeties => failed

Henning | How It Works



<https://www.youtube.com/watch?v=f8NPolyIy8w&list=PLb-W-vD7f18cLkj2eROF6MvXituH347qE>

**Questions
&
Thank you!**