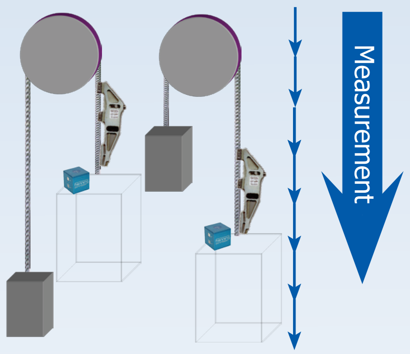
Measure Weights First is the weight of the counterweight (CWT), usually accessed at midpoint of the hoistway, where you reach over from top of car to affix sensors at the correct point just above the CWT. CWT is best done first. Then weight of the car is taken on ropes just above the car and right as the technician gets off the top of the car to conduct the downward drive (release) to conduct the safety gear test.

henning ELVI System

Elevator Inspection System

Quick Reference Guide

STEP 2 Safety Gear Test



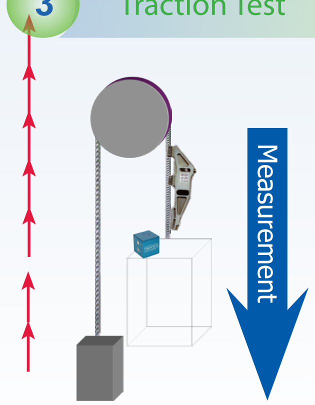
Conducting Test:

- Run on constant drive downward (start at top floor if possible); trip the governor manually (by hand)
- For elevators with rated operating speed less than 500 fpm (2.5 m/s)--run down at rated speed
- For all high speed elevators (above 500 fpm/2.5 m/s) it is possible to run down at reduced speed, as long as safeties engage and hold.

Data Evaluation:

- Open project, Click on Tests button, Click on Safety Gear (lettering turns from blue to red)
- Only set start time for this evaluation - time index to be set "just before" (within - 2 seconds) the elevator starts its down travel for the test
- Click on the "Bullseye" icon (far right on Project Properties Screen)
- Zoom into the graph (acceleration part) to identify relevant section of measurement (leave out extraneous data). Look for Down travel that ends with a high peak . Set time index in front of that - click enter.
- Jumping out of the safeties is not a problem for ELVI software; engage again by hand for next test

STEP 3 Traction Test



Conducting Test:

- Do while car is still set in safeties
- Run car down until:
  - Either the ropes are slipping over the drive sheave (run for at least 2 seconds),

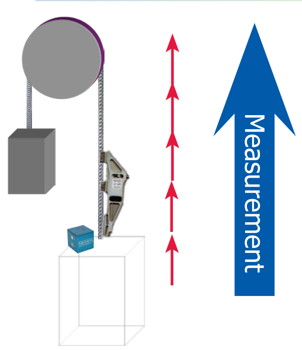
Or

  - Maximum torque of motor is reached (it stops turning driving sheave); no need for slipping in this case (more common with MRL's)
- Release car from the safeties for next test

Data Evaluation:

- Working again at Project Properties screen, get to Traction Force
  - Look into the Load Curve, using Zoom, look for something like a U -- __/ --
  - Set 1st index (left one of 2 Bullseyes within about 2 seconds before, and 2nd index (right Bullseye) within about 2 seconds after

STEP 4 Drive Break Test



Conducting Test:

- Do this test with each available brake system (separately)
  i. Machine Break (both sides together per A17/B44*)
  ii. Rope Gripper
  iii. Rail Brakes (sometimes used instead of Rope Gripper)
  iv. Drive car in the up direction at rated speed; make E stop, first with just the machine brake
- Repeat with each other brake available (no frequency inverter involvement); important that each brake is tested separately

Data Evaluation:

- Zoom into Acceleration Curve (similar to Safety Curve, but must be an up travel, that ends in higher peaks) -- the E stop(s)

i. Again, set indices within 2 seconds before and after

ii. Rope Gripper ...Identify these graphically, order tested must be known...

iii. Rail Brakes, if applicable

STEP 5 Buffer Test

- Buffer test (if needed) - run car down into buffers so they compress (about 5 seconds)
- 1st index set 2 seconds before starting down travel
- 2nd index set 2 seconds after car stops

Quick Reference Guide

CONDUCTING FIELD TESTS AND EVALUATING COLLECTED DATA ON YOUR ELVI SYSTEM

NOTE: When conducting ELVI tests (safety gear, traction, brakes, buffers) there should NEVER be anyone riding inside or the car or on top of the car.

Data Collection Notes and Suggestions, before you conduct tests.

- ***During field testing, technician should keep/write notes of actions taken during testing***
- ***Note the order that tests were taken (follow a sequence). Note any "other' travels of the elevator car taken between tests.***
- ***Weigh the car, save to MSM12 and assure entry on the laptop. Data for half load test (car balancing) is complete when this required basic data is entered.***

STEP 1 Weight Measurement Test

***!IMPORTANT!** The most important part of the measurement process is the attachment and setting of the rope sensors (Diagrams and Troubleshooting)*

Ideal goal is to achieve a setting on, but not covering, the green line, in the middle, with no visible black area.

1. Each sensor should be fitted over the rope and adjusted first to the rope size with the **clamp open (DO NOT adjust when closed)**.
2. Dial the knob to appropriate size on the sensor scale (1/2" (12.7 mm) for 1/2" rope).
3. Close the sensor clamp into place and check your settings.
   ***Note**: If this does not result in acceptable alignment to the green line, open the sensor clamp holding sensor position on the rope, and make small knob adjustments as needed. (DO NOT adjust when closed)*

*****If clamp does not close relatively easy, something is wrong, DO NOT FORCE IT CLOSED.*****

1 2 3

Dial knob to appropriate size on sensor scale

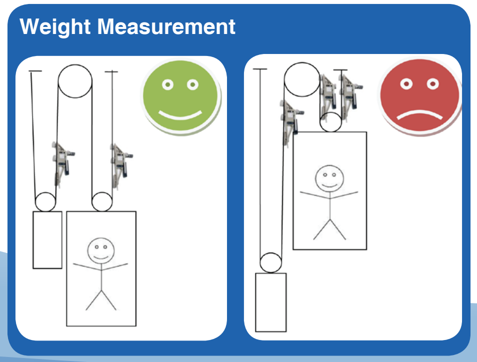
Incorrect - Too Tight! No green showing

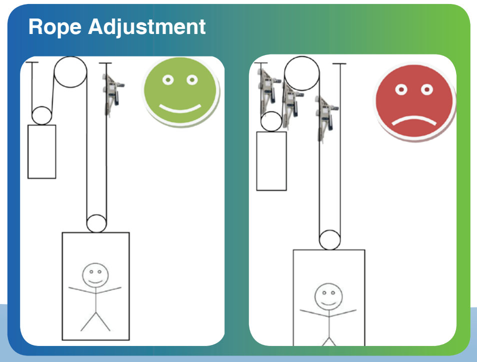
Incorrect - Too Loose! All green & some black showing

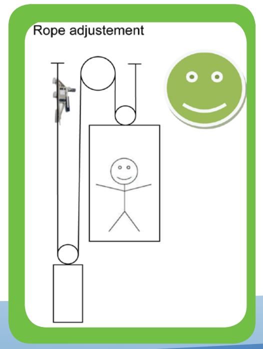
Correct!

NOTE : When using the LSM 1 sensors, 2.5% of 1,100 lbs. is 28 lbs. and with a 4 rope system, the total possible deviation could be 112 lbs. (Not a common occurrence with the normal expectation of combined plus and minus impacts, however, it may occur). When exceeding 1,100 lbs. cannot be avoided, use LSM-XL sensors. Load ranges of LSM-XL is 200 kg (400 lbs.) to 2000 kg (4400 lbs.) Some sacrifice in resolution (i.e. 2.5% of 4400 =110 lbs. per sensor). Again, plus and minus impacts combine statistically.

!IMPORTANT! Set the sensors at least 8 inches away from the rope hitch point (shackles) - be sure that the sensors are not attached in a section that has any curvature associated with the shackle. Even re-clamping sensors, where you have made a curvature, effects measured weight due to residual tension.







NOTE:
Similar principles apply to the 1:1 Roping Systems.

MUST READ INFORMATION

Consistent, reliable and repeatable tool for weighing installed elevator equipment AND equalizing loads on all suspension means (ropes and belts). Correct use of the tool ensures accuracy:

IMPORTANT THINGS TO KNOW AND DO AND A FEW NOT TO DO:

1. Ensure all users of this equipment are instructed on how to use the system; how to attach and care for the sensors. They are electronic measuring devices and must be handled with appropriate care. We provide manuals, quick guides (like this) and video tutorial guidance.

2. Never force Sensors onto rope or belt. If clamping is tight and you are risking bending or breakage, do NOT force. Adjust knob setting to more open. Goal is to have a firm clamp (rope/belt deflection). Setting tape affixed to new sensors is just a guide (and used only when the main clamp is in the full open position). Good practice to open the sensor enough to fit over the rope, turn knob to tighten so it gently holds, then try closing the clamp. This method gets very close to the firm clamp needed - confirmed by correct green ring position (see Manual MSM12 or Quick Reference).

3. ALWAYS use correct sensor size (measuring range and type). Consider rope as well as suspension. Measuring a load outside of the sensor's range will invalidate your measured and total weight and may damage or distort your sensor. An LSM1 sensor attached to any rope with load as high as 2,000 lbs will likely need to be recalibrated. Typically in North America, LSM1 and LSM-XL sensors cover the range of normally installed ropes. LSM1's measure loads between 0 and 1,100 lbs.Remember that 2:1 reduces actual loads to one-half, LSM1 sensors are good to use on relatively lighter systems and ropes 5/8" or smaller.
Knowing an estimate of total load you will measure (Car or CWT--which we know is heavier), divide that weight by number of ropes to get expected average load on your ropes. Keep in mind that un-equalized ropes and worn and unequal sheave groove depths can put a rope load outside of measuring range. LSM-XL sensors have measuring range between 400 lbs and 4400 lbs. Top end is almost never a factor, but having a load under 400 lbs. happens. For belt systems, be aware there is a completely different sensor for currently existing Otis belts and for Schindler belts.

4. Always attach one (and only one) sensor on each and every rope or belt. It does not work to try to weigh with less sensors than ropes and then extrapolate; as each sensor deflection affects balancing and total measurement. Also, mixing sensor types in one measurement does not work, for the same reason.

5. Be sure sensors are not attached in or too near (within ~ 8 inches/150mm) to any curvature of rope or belt (i.e. too close to hitch-point). It's also very important that sensors do not make contact with each other. Any contact will distort measurement. In tight hitch-plate arrangements, it's OK to stagger height attachment and go around side and backside of ropes. Whatever needs to be done to avoid touching.

6. Be aware that comparison to other methods of weighing can be misleading. Experience has shown other methods can be wrong. See article and other presented examples. When sensors are in good working condition, in calibration, and usage procedures are followed, you will measure weights within +/- 2.5% of Full Scale of these devices.

TROUBLESHOOTING

False measurement may also be caused by friction on sliding guides and can change the weight by up to 20% of the rated car load. If an elevator has slide shoes, tension can remain in the guides and can change +/- the weight in the ropes displaying a false measurement. Check the accuracy of the measurement by a firm jump or shake of the car and observe whether the measured weight changes noticeably.

The Weight Watcher User Manual describes how to account for this impact-travel up (or down) at inspection speed for a few feet (enough to reach speed and not just a jolt movement) and observe the total weight displayed. Then do the same in the opposite direction (down) and observe the displayed weight. Add the two weights together and divide by two and you will get the accurate weight with the friction effect eliminated.

Pay attention to the measured weight displayed for each individual sensor. Measurement range of the sensors is very important - maximum measurable load for LSM 1 sensors is 1,100 lbs. If the individual sensor weight reaches or exceeds 1,100 lbs., the total measured weight of the car **will not be accurate**. This can occur with a relatively heavier car and the apportioned weight for each rope is high and approaching the 1,100 lb. maximum. This is not a common occurrence in many systems, however, ending up outside the range is possible; if rope loads are not equalized. In some cases, where the average load on each rope should be about 700-800 lbs,, but without equal tensioning there is one rope with less than 500 lbs. and one rope is outside of the measurement range, you can expect the measured total weight to NOT be accurate.