



COST JUSTIFICATION GUIDE | GUARDIAN HYDRAULIC TRUCK SCALES

Questions to Consider Before Purchasing a Truck Scale

Why Cardinal's Guardian Hydraulic Truck Scale is Your Best Choice for a Secure, Long-term Investment

USA manufacturer Cardinal Scale is a single-source supplier, engineering and producing 100% of the components that go into the company's truck scales and high-capacity weighing products. The key to protecting your truck scale investment lies in Cardinal's high-quality stainless steel hydraulic load cells. Cardinal's Guardian load cells provide the best performance available on the market. As the name implies, they offer true protection from factors that normally affect load cells—and when installed with Guardian truck scales, the load cells carry a true lifetime warranty. Cardinal Scale provides you with a versatile selection of load cell technology so that it's easy to find the best solution for your installation requirements.

It is surprising how many truck scales are manufactured by one company and use load cells from another and a weight indicator from yet another. Where does responsibility for the scale begin and end with each manufacturer? Cardinal is one of the very few companies that manufactures not only the scale weigh-bridge structure but the load cells and instrumentation that go with it to complete the scale. With Cardinal you have single source responsibility and reliability.

As a true industry pioneer, Cardinal Scale was the first company to manufacture the revolutionary all-steel truck scale. While the company continues to produce globally recognized premium electronic truck scales, Cardinal Scale is also proud to offer a

superior truck scale that utilizes hydraulic load cell technology—the Guardian. Cardinal's Guardian truck scales are designed to withstand weighing applications in extreme weather and harsh environmental conditions. Durable Guardian hydraulic load cells operate on simple fluid pressure. They are waterproof, shock-proof, explosion-proof, and resistant to both caustic and corrosive environments. The Guardian load cell's lifetime warranty acts as Cardinal's promise and is a testament to its durability. There's no better protection than the hydraulic technology of the Guardian load cell.

All too often you can find yourself in a situation where you need to expand the capability of a piece of equipment only to find it isn't possible. The Cardinal Guardian load cell and truck scale can be modified at any point in the future by adding options. For example, an iCan system can be added to your hydraulic truck scale that will allow the automatic performance of system diagnostics, monitoring from a remote site with Internet access and one-step calibration. Other options to add filling or traffic control or security or any number of other features can be added now or later. You need not be concerned with obsolescence.

Consider the following questions before purchasing a truck scale—and see if Cardinal's Guardian scale is the solution for your long-term investment.



#1

Is Your Truck Scale Subject to Water Damage? Does It Need Frequent Wash-downs?

Guardian hydraulic load cells require absolutely no power in the scale—providing 100% protection from downtime caused by the environment.

- Modern truck scales are manufactured with analog strain gauge load cells, digital load cells or hydraulic load cells each with their own unique characteristics. Analog cells are quite common and available from a number of sources. Digital load cells, however, are unique to their manufacturer and cannot be interchanged with other digital cells. Both analog and digital cells can be affected by water and lightning; the two most common sources of load cell failure. Hydraulic load cells can offer all of the advantages of digital load cells while adding immunity to lightning and water damage. Cardinal's Guardian series of hydraulic load cells offer the industry's best combination of performance and durability.
- Carrying a lifetime warranty against rain, ice, snow, and other environmental conditions, Guardian hydraulic load cells will operate for an extended period of time even when submerged fully in water. Guardian load cells utilize a small amount of hydraulic fluid that is hermetically sealed for weighing. This keeps water out and prevents damage to the load cell—guaranteed.
- Whether your business is in aggregates, solid waste, agriculture, or any industry with harsh conditions, efficient maintenance procedures save time and money. With a Guardian truck scale, you can power-wash grime and dirt and steam-clean ice and snow without damaging any of the scale's weighing components.
- If your scale location may experience downtime due to water, flooding, ice, or snow, your investment in hydraulic load cells carries an immediate return.



The Guardian truck scale can operate fully submerged underwater. This Guardian installation pictured here functions as a low-water bridge in addition to being a truck scale.

#2

Do Lightning Strikes and Power Surges Affect Your Truck Scale? How Will the Scale Stand Up to Shock Loading?

Lightning strikes, power surges, and shock loading are some of the most common problems affecting electronic truck scales—and the Guardian’s resistance is a leading concern for buyers like you. Fortunately, Cardinal’s superior truck scale stands up to the test.

- As previously mentioned, lightning and water are the two most common sources of load cell failure. Often truck scales are placed in locations subject to flooding or are subjected to routine high-pressure washings. While digital and analog load cells are sealed against the entry of moisture, they often fail due to damage to a seal or abrasion of a cable jacket allowing entry of moisture. Analog and digital load cells are both subject to lightning damage. The extremely small strands on a strain gauge are especially sensitive to voltage surges. Hydraulic load cells have neither strain gauges nor electrical wire and are immune to damage from both water and lightning. If your scale will be in a location subject to spring time thunderstorms, you should give serious consideration to Cardinal’s Guardian hydraulic load cells.



- Guardian hydraulic load cells operate by sensing weight via fluid pressure, which means that they require no power within the scale itself. You won't lose any operational time when lightning or other power issues strike at the scale location. Guardian load cells carry a lifetime warranty against lightning and power surges.
- Hydraulic tubing from the load cells is terminated at the scale house by a non-conducting Goodyear rubber line. This creates an important barrier of protection, preventing lightning from traveling into the scale house where your load-sensing digital weight display is located.
- Unfortunately, it is a fact of life that if something can be overloaded, it will. Same goes for shock loading on a truck scale. Whether you're filling trucks with rock or ore, shock loading will take place. Both analog and digital load cells use a steel spring element to sense the load. Applying a shock load, even one less than the capacity of the load cell, can and will cause permanent damage to the load cell rendering it unusable. Cardinal's Guardian hydraulic load cells, on the other hand, act much like a shock absorber on your automobile dissipating the shock load in the hydraulic fluid.
- If you've ever experienced costly downtime and repairs due to lightning, a power surge, or shock loading, the Guardian hydraulic truck scale can help you save in the future.

#3

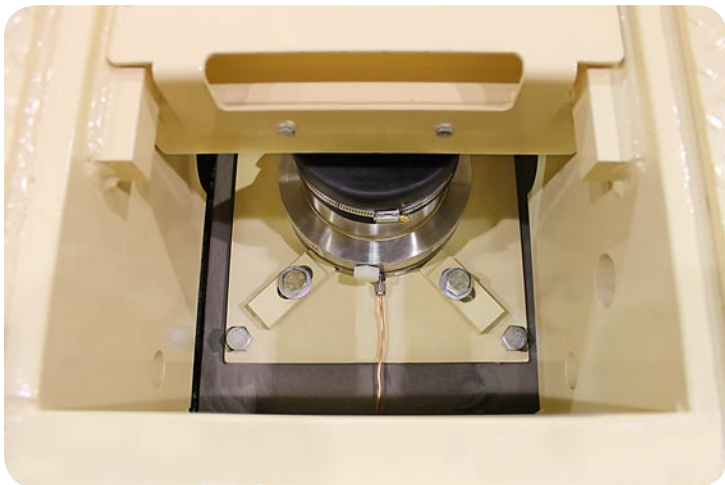
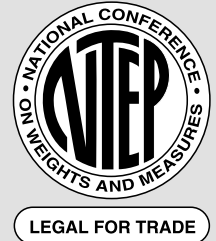
Is Your Truck Scale Location Subject to Extreme Heat or Cold?

Extreme temperatures cause problems for electronic load cells—but the Guardian’s hydraulic technology keeps your scale working in all conditions.

- Equipped with proprietary grades of aircraft hydraulic fluid, Guardian load cells can operate in extreme temperatures such as -60 degrees C (-76 degrees F). From the hottest heat to the coldest conditions, your truck scale will never stop working because of weather extremes.
- Extreme temperatures can affect a scale’s circuit boxes and cause problems with electronic load cells. Fortunately, there are no electronic components in the scale when you use Guardian hydraulic load cells. Your Guardian load cells offer a barrier of total protection against extreme temperatures.
- If your scale is located in an area with extreme temperatures, consider Cardinal’s Guardian truck scale for reliable protection and peace of mind.

Does The Scale Have An Active NTEP Certificate Of Conformance?

Scales used in commerce, where money is exchanged based on the scale weight, must have a National Type Evaluation Program (NTEP) Certificate to verify that they comply with the applicable requirements for use in trade. You can verify that the scale in question has a NTEP certificate by searching the NTEP database. That database can be accessed at www.ncwm.net by clicking on the NTEP tab. Cardinal’s Guardian hydraulic load cells are covered under NTEP Certificate Number 05-076.



Cardinal's Guardian hydraulic truck scales are not affected by climatic extremes like standard electronic load cells and operate on simple fluid pressure to read weight measurements.

#4

Will Your Truck Scale Necessitate a Pit Type Installation?

Truck scales with pit type installations require special care and maintenance. The Guardian keeps your scale protected even in areas where water accumulates at a rapid pace.

- Sump pumps can fail during flooding and severe weather, and debris can easily build up around the load cells. With a lifetime warranty against flooding and submerged load cells, Guardian hydraulic technology is the perfect choice for a pit type truck scale where water accumulates quickly.
- A service call to diagnose and replace load cells in a pit type truck scale can take up to two days—and could cost up to \$13,000 with replacement parts for load cells and electronic components. Repair costs for pit type installations greatly exceed those of above-ground, low-profile scales.
- When flooding occurs near your scale location, you could suffer costs related to downtime, maintenance, and replacement parts. However, these risks can easily be avoided simply by utilizing hydraulic load cells in your scale instead.
- If the area surrounding your scale is subject to flooding and extreme water conditions, hydraulic load cells are the best way to protect daily weighing operations.

Cardinal's Guardian hydraulic truck scale was installed at this Scottsdale, Arizona waste transfer station since the scale's pit location continually flooded during heavy rains and would have damaged electronic load cells.



#5

Is the Area Near Your Scale Subject to Flammable Materials Like Chemicals or Grain Dust?

The Guardian truck scale offers 100% protection in hazardous areas—and, most importantly, is environmentally safe.

- Truck scales used in grain elevators or chemical plants may be in a hazardous environment where a spark could potentially set off an explosion. Users of analog or digital load cells must take extra precautions and use barrier strips to limit the energy to the scale or explosion proof enclosures to contain the explosion. Those steps are not necessary when you use a hydraulic load cell like the Cardinal Guardian hydraulic load cell. Since there are no wires to the cell, there are no electrical currents and, therefore, no explosion-causing spark. This level of safety is inherent in every hydraulic load cell system.
- Utilizing only hydraulic fluid for the weighing elements in the scale, the Guardian truck scale is environmentally safe. There are no electronics located in the scale itself.
- The digital display and weight sensing components that require electricity are located in the scale house, which means that they are separated and protected from the truck scale area.
- If your scale location is in an area that requires total isolation of electronics at the scale, the Cardinal Guardian truck scale is the best choice. There is no extra cost for hazardous locations.



At the heart of all Guardian truck scales lies the Cardinal USA-made SST hydraulic load cell, which is unaffected by flammable material or grain dust.



GUARDIAN COST JUSTIFICATION FACTORS

If your truck scale location meets any of the conditions mentioned previously, you should consider a Cardinal Guardian truck scale.

The Guardian is a sound investment choice for operators with scales in harsh environments. Unnecessary maintenance costs can be diverted and eliminated with Cardinal's Guardian hydraulic load cell technologies.

Consider the simple cost analysis factors below:

1. If your current scale suffers lightning or flooding damage, the total cost for load cell replacement could be from \$15,000 to \$20,000. This is based on the cost of eight load cells and two service technicians working 32 hours to replace and calibrate the scale back into service.
 2. When you factor in the purchase of replacement parts and labor costs, a single electronic load cell replacement can cost around \$2,000. Regular damage related to weather and environmental conditions could have you replacing a load cell once a year.
 3. Damage from power surges and accidental incidents by staff and equipment can affect electronics like junction boxes, load cells, and cables—and could require additional costly repairs.
 4. Rodents, excessive loading of the scale, and routine cleaning of the scale can all cause additional damage and create further costs.
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CONCLUSION

While these repairs can be expensive, the most important factor to consider might be the costs you'll incur from the downtime of your scale. Truck scales have an average repair service time of one to three days, depending upon location and parts required. When you consider your annual service and maintenance costs over the past several years in comparison to the hourly cost of your operations, it's easy to determine whether or not the total protection of hydraulic load cells is the right choice for your company.

Over the last fifteen years or so, many manufacturers of load cells and weight instrumentation have moved their production facilities off shore in an attempt to save on costs. While Cardinal understands this, the company has taken the necessary steps to improve efficiencies and manage to keep production facilities for truck scales, load cells and weight indicators right here in the United States. Cardinal Scale is the only scale company today that can state this as fact.

Warranties are only as good as the company that stands behind them. Look for a warranty that is clearly written and has an

absence of fine print and is backed by a manufacturer that has a track record of not only longevity but integrity as well. Cardinal Guardian hydraulic load cells, when purchased with a Cardinal Guardian truck scale are covered under a simple life time warranty while the scale structure is covered under a five-year warranty.

Cardinal's Guardian truck scale provides the best protection for your long-term investment. With hydraulic load cells that carry Cardinal Scale's industry-leading quality and a true lifetime warranty against lightning, power surges, and water, the Guardian truck scale is the best choice for your future weighing operation needs.

In today's economy, companies come and go. Making a major investment with a company whose future is uncertain is not wise. Cardinal has been manufacturing scales for over 60 years. Cardinal is a privately-held, conservatively-operated company which will be here when you need us... today and tomorrow.



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