

Response to claims made by Henry Oppermann regarding Cardinal Scale equipment submitted for an RFQ for truck scale installations in Oklahoma.

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This paper will address claims made by Henry Oppermann of Weights and Measures Consulting that the Cardinal Scale equipment which was part of a disputed bid for two truck scale installations in Oklahoma does not meet NTEP requirements. These claims were made by Mr. Oppermann in a "Comments in Opposition" paper as well as his original Form 15 Proposal to NTEP to amend Handbook 44. These papers were then distributed to the Oklahoma Department of Transportation, NTEP, NCWM and several other entities.

Since Mr. Oppermann did not seek to have a dialogue with Cardinal regarding his claims prior to authoring and releasing his position papers (a chance that Cardinal would have welcomed), our only avenue is to respond to his claims in this manner. Claims that were made in his latest comment paper dated December 15, 2015 are listed below, but the claims made in the original Form 15 have been excluded from this paper because that proposal failed to garner support from any NCWM region and was thus not moved forward for a vote at the NCWM Annual meeting.

Responses to Oppermann position paper "Comments in Opposition to S&T Item 320-2", dated December 15, 2015:

1. Mr. Oppermann's claim: "Weights and measures inspectors should not have to ask scale manufacturers how scales were designed..."

Cardinal response:

As a technical matter, HB44 recommends that the field inspectors do become familiar with the design of the scale. From HB44, Appendix A, Fundamental Considerations, Section 4.4 General Considerations:

"It is essential for the officials to familiarize themselves with the design *[emphasis added]* and operating characteristics of the devices that he inspects and tests. Such knowledge can be obtained from the catalogs and advertising literature of device manufacturers, from trained service persons and plant engineers, from observation of the operations performed by service persons when reconditioning equipment in the field, and from a study of the devices themselves."

From a practical point of view, however, it is noted that field inspectors with limited resources may not have the time to research how a particular scale is designed. In the matter of a field inspector approaching an installation that has three scales and wishing to verify if the scales operate independently, there are simple field tests that may be performed which can establish the operational configuration of the scales. Including a step-by-step breakdown of these tests is beyond the scope of this paper, but can be provided upon request to any interested party.

2. Mr. Oppermann's claim: "One company should not get favored treatment over other companies by virtue of special exemptions in Handbook 44."

Cardinal response:

The SMA proposal (S&T item 320-2) seeks to clarify how to properly interpret an existing relationship that is already outlined in HB44. Since this interpretation directly affects all scale manufacturers, it is appropriate that the SMA is the body that is seeking to have this issue resolved.

An informal "survey" conducted by two NTEP officials asked the following question to several state Weights and Measures officials: When you are conducting field inspections on multiple-platform installations, in order to calculate Vmin do you consider the installation as (1) scale and use the total of all of the loadcells present to calculate one value for Vmin, or do you treat each scale as an independent system and use the total of the cells in each scale to calculate a Vmin value for each? The answers were split virtually 50/50; this would indicate that there is a serious problem regarding how to interpret Vmin that needs to be clarified so that consistency is achieved.

No exemptions are being sought by Cardinal Scale in any manner. A special exemption for a single manufacturer would not be codified into HB44, and an organization such as the SMA would never stand in support of any exemption that would give an unfair advantage to any single manufacturer. The issue at hand is simply seeking a clarification on how to properly calculate Vmin for a given installation.

3. Mr. Oppermann's claim: "The SMA proposal is disguised as a broad "technical" argument, when it is a proposal to exempt a Cardinal three-platform, 385,000-lb capacity truck scale from one or more requirements of Handbook 44."

Cardinal response:

See Number 2 above regarding the claim of Cardinal Scale seeking an exemption.

As to the claim of the disputed installation being a "three-platform, 385,000-lb capacity truck scale", this is inaccurate. The installation consists of three independent scales sitting end-to-end (without touching); it is not a single scale. Additionally, there is not any scale with a capacity of 385,000lb at this installation. The 385,000lb figure that Mr. Oppermann refers to is actually generalized wording used in a bid summary for the installation. Mr. Oppermann's insistence on applying that generalized capacity to all three independent scales (thus treating them as a single scale) is not valid. For instance, if an installation has (2) completely independent scales (say, an "inbound" 100 ton scale and an "outbound" 100 ton scale) separated by hundreds of feet, it would be erroneous to add their capacities together and state that you have a single 200 ton scale, yet this is exactly what Mr. Oppermann is attempting to do in this situation.

4. Mr. Oppermann's claim: "Scales Code S.5.4.: The Vmin requirement for the 14 load cells in the three-platform, truck weighing system does not meet the relationship for the 20-lb scale division."

Cardinal response:

This is the crux of the issue that led to the SMA bringing forth the proposal to amend HB44 to clearly define the relationship between Vmin and division size "d" with multiple independent load receivers. Since there is a separate proposal (and supporting information that accompanies it) that directly addresses this issue (S&T item 320-2), it will not be discussed in this paper any further other than stating that Mr. Oppermann's analysis of how many loadcells to use in the formula to calculate Vmin for the weighing/load receiving element is incorrect and does not have technical merit to stand on once properly analyzed.

5. Mr. Oppermann's claim: "General Code G-S.5.1., G-S.5.2.2. and sections 15, 31 and 32 in the DES checklist: There is a lack of mathematical agreement of the axle-load weight indications to the summed weight indication when the summed load exceeds 200,000 lb. Cardinal admits that there are times when the weighing system does not have mathematical agreement."

Cardinal response:

It is common practice in this type of weighing system to automatically change the division value of the total weight display from 20 pounds to 50 pounds when it reaches 10,000 divisions, the maximum number of divisions for a Class III device. The reason there is not always mathematical agreement for the total weight when the gross weight exceeds 200,000 pounds is that we are adding weights in 20 pound increments - meaning the last two digits of the total will be 00, 20, 40, 60, or 80. The only time there is mathematical agreement between the "total" display and the individual scale displays is when the last two digits of each are both zero ("00"). NTEP is aware of this; the Cardinal 825 indicator that was proposed for the disputed scale installation was checked for this summing function capability and was found to be compliant and absolutely suitable for use in this scenario. This is listed on the 825 NTEP certificate CC 08-046A2 in the Standard Features and Options box in the following categories:

- Multi-Interval
- Multi-scale Select (for multiple scale interface with Summing Capability up to 10 scales).

6. Mr. Oppermann's claim: "General Code G-S.5.3. and the Digital Electronic Scale (DES) checklist [11.4]: The 50-lb scale divisions for the summed weight values when the load exceeds 200,000 lb are not uniform in width."

Cardinal response:

See response to Number 5 above.

7. Mr. Oppermann's claim: "NTEP CC for the load cells (05-076) requires that the indicator must have a linearity correction algorithm to correct the load cell output for the **individual** load cells, but the Cardinal configuration sums the analog signals from load cells before the indicator; hence, the indicator cannot apply the correction algorithm to the output of the **individual** load cells."

Cardinal response:

Looking over the NTEP CC 05-076 for the hydraulic SST load cell, there is no stipulation that says that the output for any individual loadcell must have the correction algorithm applied to it. The reference to the correction algorithm is made in two locations:

- a. In the Standard Features and Options box: "The SST Series loadcell is to be used only with a Cardinal Pressure transducer (Model PTG-3K) **and Cardinal weight indicator containing the appropriate linearity compensation algorithm**. The complete system consists of one or more hydraulic loadcell/Cardinal pressure transducer pairs connected to a Cardinal indicator. The outputs of the pressure transducers are summed at the junction box and connected to the input of the indicating element."
- b. "Configuration: The SST series hydraulic compression load cell is fluidly coupled via a tube to the PTG-3K pressure transducer. The outputs from the pressure transducers are electrically summed in a junction box **and connected to an appropriate Cardinal indicating element containing a fixed linearity compensation algorithm**. The indicating element will bear a mark stating that it is for use only with SST series load cells."

Several things may be noted after reviewing this information from the NTEP CC 05-076:

- There is no requirement, either explicitly listed or implied, that the correction algorithm must be applied to each individual loadcell/pressure transducer.
- The CC clearly states that the outputs *[emphasis added]* (plural) from the pressure transducers *[emphasis added]* (plural) are summed and then are sent to an indicator that contains the algorithm. The NTEP CC is laying out in no uncertain terms the fact that the signals from all of the loadcells in the scale are first summed together, and then that single summed value is then sent to the indicator that contains the linearization algorithm. It does not state that the signals from each loadcell must have the algorithm applied to them individually before being summed and sent to the indicator.

Mr. Oppermann's technical knowledge of the Cardinal loadcell system used on the disputed scale is not sufficient to make his analysis. The system works the same regardless if it is an analog system or a digital system (Cardinal's model designation for a digital system is called "ICAN"); the only difference being the type of signal that is ultimately sent to the weight indicator (analog or digital). The disputed installation proposed using hydraulic loadcells, but this particular installation was also designed to use Cardinal's digital ICAN system.

This information is not proprietary and would have been provided to, and discussed with, Mr. Oppermann if he would have simply inquired.

8. Mr. Oppermann's claim: "General Code G-S.1.: The model numbers that Cardinal uses for the multiple-platform truck scale (which Cardinal says are catalog numbers) are not covered by NTEP CC, 95-162A2. CC 95-162A2 does not cover a weighing system with a capacity of 385,000 lb."

Cardinal response:

See response to Number 3 above regarding the 385,000lb scale claim.

As to the model number claim, Mr. Oppermann is again trying to create a fourth scale where none exists. The installation consists of three independent scales. Each scale has its own model number and is covered under NTEP CC 95-162A2. There is an NTEP ID plate on each independent scale that lists that scale's model number along with the other information that NTEP requires be labelled on a legal for trade scale, including a unique serial number for each independent scale. The (3) scales that were proposed for this installation are as follows:

- QTY (1) H4512SRC12-I: This is a 12' long, 12' wide, 45Ton scale.
- QTY (1) H4524SRC12-I: This is a 24' long, 12' wide, 45Ton scale.
- QTY (1) H6044SRC12-I: This is a 44' long, 12' wide, 60Ton scale.

These numbers are the "official" model numbers for each independent scale, and as such are the only valid numbers as recognized by NTEP. The complete installation, consisting of these three independent scales, was sold under one Cardinal "catalog" number of H122444SRC12-MP45. This catalog number is Cardinal's own internal designation. It serves only to produce final installation drawings and is used by our ERP/MRP system to drive production and inventory for the items sold. NTEP does not recognize this catalog number and it is not valid to identify any of the independent scales; it also does not appear on any NTEP CC and is not used to identify a scale as being legal for trade. To insinuate that this catalog number is being portrayed by Cardinal as the number that NTEP certified the scales under for legal for trade applications is wholly inaccurate and portrays a gross misunderstanding of Cardinal's model and catalog numbers.

This information is not proprietary and would have been provided to, and discussed with, Mr. Oppermann if he would have simply inquired.

9. Mr. Oppermann's claim: "Cardinal has argued that the summed weight indication for the three platforms with separate weight indications is 'nothing more than a mathematical summation.'"

Cardinal response:

This statement is absolutely true; the summed weight total that is displayed is nothing more than a mathematical sum. All of the system errors have already been accounted for in the individual scale displays, and there is no further data manipulation that occurs after the system has digitized the signals from each independent scale and displayed the weights on their respective displays. The result being displayed on the total line may be arrived at by having a person with a handheld calculator standing in front of the weight displays for each independent scale and simply adding all three numbers together.

10. Mr. Oppermann's claim: "Sum Only Indication." (Mr. Oppermann sites DES checklist paragraph 34.3.4)

Cardinal response:

Cardinal is not claiming that the individual platform weights can be used commercially. In fact, in Mr. Oppermann's comments paper, he states that "Someone else *[emphasis added]* has argued that the weight indications for the individual (axle-load) scales are the commercial weight indications..." Mr. Oppermann is trying to use DES 34.3.4 to discredit a statement made by somebody other than Cardinal. As such, it is not Cardinal's responsibility to stand behind a statement we did not make, regardless of the fact that Mr. Oppermann is trying to use that statement to make a case against Cardinal.

In closing, we hope that by providing this information to the S&T Committee it clears up some lingering issues and accusations regarding Cardinal Scale and S&T item 320-2, the SMA proposal to clarify how to calculate  $V_{min}$ . These accusations have unfortunately clouded the SMA proposal since they are not relevant to that issue, yet they were included in Mr. Oppermann's comment papers against item 320-2 and presented as if they were relevant.