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INTRODUCTION

A. This COTI, Inc. load cell capacity selection guide is designed to help the scale user select the correct load cell type and capacity for various types of weighing applications.

There are seven types of scales covered in this load cell guide:

1. Single point, bench and floor scales
2. 4 load cell floor scales
3. Tank and hopper scales
4. S-beam mechanical conversion truck scales
5. Full load cell truck scales
6. Railroad axle scales
7. Full load cell railroad scales

B. When selecting the correct capacity load cell for a scale application, the following items need to be considered.

1. The rated capacity of the scale.
2. The possibility of an overload weight on the scale.
3. The scale dead load, the weight of the scale deck, weight of the empty hopper etc.
4. Shock loading weights or forces on the scale.
5. The output signal level of the load cells. The signal level calculated in microvolts per count will help determine if the load cell(s) are too small or too large in capacity. Section 3 of this guide discusses how to do microvolts per count calculations.

In a given scale application, if the load cell capacity is too small, the load cells are subject to overloading. If the load cell capacity is too large, the load cell signal level will be too low and the scale will have excessive zero drift and/or the weight reading will drift or be unstable.

C. In the load cell capacity selection process, it is often necessary to derate the load cells (use a higher capacity load cell). The following list covers some of the important factors for load cell derating:

1. Shock loading of the scale (the scale load is dropped on the scale).
2. Uneven scale loading, the scale load is off-center.
3. Uneven scale dead-load, the scale dead-load is not centered.

The scale may be over loaded if one or more of the above conditions are present. In most scale applications load cells are typically derated from 20% to 50% of their rated capacity.
The following guide will help select the load cell type needed for the various scale application discussed in this application.

A. Single Point Bench Scales

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI  FLS (N)</td>
<td>50 lb. – 625 lb.</td>
</tr>
<tr>
<td>CI  HPS</td>
<td>6 kg, 25 lb. - 100 lb.</td>
</tr>
<tr>
<td>CI  MK4</td>
<td>10 lb. – 100 lb.</td>
</tr>
<tr>
<td>CI  MK21</td>
<td>4.5 kg - 50 kg</td>
</tr>
<tr>
<td>CI  PWA</td>
<td>7 kg – 150 kg</td>
</tr>
<tr>
<td>CI  PWS</td>
<td>7 kg – 150 kg</td>
</tr>
<tr>
<td>CI  22 (N)</td>
<td>3 kg – 30 kg</td>
</tr>
<tr>
<td>CI  40 (N)</td>
<td>10 kg – 100 kg</td>
</tr>
<tr>
<td>CI  40 SS</td>
<td>10 kg – 150 kg</td>
</tr>
<tr>
<td>CI  42 (N)</td>
<td>10 kg – 100 kg</td>
</tr>
<tr>
<td>CI  50 (N)</td>
<td>50 kg – 500 kg</td>
</tr>
<tr>
<td>CI  50-1 (N)</td>
<td>50 kg - 635 kg</td>
</tr>
<tr>
<td>CI  51</td>
<td>10 lb. - 200 lb.</td>
</tr>
<tr>
<td>CI  1010</td>
<td>3 kg - 90 kg</td>
</tr>
<tr>
<td>CI  1130/MK 29</td>
<td>7.5 kg - 500 kg</td>
</tr>
<tr>
<td>CI  1240</td>
<td>200 kg - 250 kg</td>
</tr>
<tr>
<td>CI  1510</td>
<td>100 kg – 500 kg</td>
</tr>
<tr>
<td>CI  60048</td>
<td>25 lb. – 1000 lb.</td>
</tr>
<tr>
<td>CI  60060 (N)</td>
<td>100 lb. – 2000 lb.</td>
</tr>
</tbody>
</table>

B. Single Point Floor Scales (30 x 30 inch Max. Platform Size)

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI  50 (N)</td>
<td>50 kg – 1000 kg</td>
</tr>
<tr>
<td>CI  60048</td>
<td>25 lb. – 1000 lb.</td>
</tr>
<tr>
<td>CI  60060 (N)</td>
<td>100 lb. – 2000 lb.</td>
</tr>
</tbody>
</table>
C. **4 Load Cell Floor Scales**

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI BLC (N)</td>
<td>1 k – 10 k lb.</td>
</tr>
<tr>
<td>CI LC 22</td>
<td>15 kg - 300 kg</td>
</tr>
<tr>
<td>CI WB (N)</td>
<td>1.25 k - 10 k lb.</td>
</tr>
<tr>
<td>CI WB SSW (N)</td>
<td>2.5 k - 10 k lb.</td>
</tr>
<tr>
<td>CI WBL</td>
<td>1.25 k - 2.5 k lb.</td>
</tr>
<tr>
<td>CI Z6</td>
<td>50 kg - 200 kg</td>
</tr>
<tr>
<td>CI 23 (N)</td>
<td>250 lb. – 20 k lb.</td>
</tr>
<tr>
<td>CI 23 LP (N)</td>
<td>1 k - 4 k lb.</td>
</tr>
<tr>
<td>CI 23 SSW</td>
<td>1 k - 10 k lb.</td>
</tr>
<tr>
<td>CI 743</td>
<td>1 k - 20 k lb.</td>
</tr>
<tr>
<td>CI 23SS (N)</td>
<td>250 lb. – 20 k lb.</td>
</tr>
<tr>
<td>CI 745</td>
<td>500 lb. – 10 k lb.</td>
</tr>
<tr>
<td>SB 2500</td>
<td>2.5 k - 20 k lb.</td>
</tr>
</tbody>
</table>

D. **Tank and Hopper Scales (Load Cells)**

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 16</td>
<td>1 k - 75 k lb.</td>
</tr>
<tr>
<td>CI 16SSW</td>
<td>1 k - 75 k lb.</td>
</tr>
<tr>
<td>CI 23</td>
<td>250 lb. - 20 k lb.</td>
</tr>
<tr>
<td>CI 23SS</td>
<td>250 lb. - 20 k lb.</td>
</tr>
<tr>
<td>CI 23SSW</td>
<td>1 k - 10 k lb.</td>
</tr>
<tr>
<td>CI 58</td>
<td>10 k - 125 k lb.</td>
</tr>
<tr>
<td>CI 94</td>
<td>50 k - 500 k lb.</td>
</tr>
<tr>
<td>CI 745</td>
<td>500 lb. - 10 k lb.</td>
</tr>
<tr>
<td>CI 5103</td>
<td>5 k - 200 k lb.</td>
</tr>
<tr>
<td>CI 60040</td>
<td>25 lb. - 5 k lb.</td>
</tr>
<tr>
<td>SP 9</td>
<td>1 k - 200 k lb.</td>
</tr>
</tbody>
</table>
E. **Tank and Hopper Scales** (Tank Mount with Load Cell)

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP9M</td>
<td>1 k - 200k lb.</td>
</tr>
<tr>
<td>CI RTM</td>
<td>500 lb. – 10k lb.</td>
</tr>
<tr>
<td>CI O3M-MS</td>
<td>5 k – 200k lb.</td>
</tr>
<tr>
<td>CI O3M-SSW</td>
<td>5 k – 60k lb.</td>
</tr>
<tr>
<td>CI 16M-SM</td>
<td>50 k - 500k lb.</td>
</tr>
<tr>
<td>CI 16M-MS</td>
<td>50 k - 500k lb.</td>
</tr>
<tr>
<td>CI 16M-SSW</td>
<td>50 k - 500k lb.</td>
</tr>
<tr>
<td>CI 23M-MS</td>
<td>250 lb. - 10k lb.</td>
</tr>
<tr>
<td>CI 23M-SS</td>
<td>250 lb. - 10k lb.</td>
</tr>
<tr>
<td>CI 23M-SSW</td>
<td>1 k - 10k lb.</td>
</tr>
<tr>
<td>CI 58MT-MS</td>
<td>10 k - 75k lb.</td>
</tr>
<tr>
<td>CI 58MT-SSW</td>
<td>10 k - 75k lb.</td>
</tr>
<tr>
<td>CI 59M</td>
<td>250 lb. - 5k lb.</td>
</tr>
<tr>
<td>CI 59M-SS</td>
<td>250 lb. - 5k lb.</td>
</tr>
<tr>
<td>CI 59M-SSW</td>
<td>1 k - 5k lb.</td>
</tr>
<tr>
<td>CI 82M-MS</td>
<td>250 lb. - 20k lb.</td>
</tr>
<tr>
<td>CI 82M-SS</td>
<td>250 lb. - 20k lb.</td>
</tr>
<tr>
<td>CI 82M-SSW</td>
<td>1 k - 10k lb.</td>
</tr>
<tr>
<td>CI 94M-MS</td>
<td>50 k - 500k lb.</td>
</tr>
<tr>
<td>CI 94M-SSM</td>
<td>50 k - 500k lb.</td>
</tr>
<tr>
<td>CI 94M-SS</td>
<td>50 k - 500k lb.</td>
</tr>
</tbody>
</table>

F. **Tank and Hopper Scales** (Suspended)

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI SB (N)</td>
<td>25 lb. – 40 k lb.</td>
</tr>
<tr>
<td>CI SBWW (N)</td>
<td>100 lb. – 20 k lb.</td>
</tr>
<tr>
<td>CI SB SSW</td>
<td>1 k - 20 k lb.</td>
</tr>
<tr>
<td>TC 21</td>
<td>500 lb. – 100k lb.</td>
</tr>
<tr>
<td>TC 31</td>
<td>500 lb. – 100k lb.</td>
</tr>
<tr>
<td>TC 33</td>
<td>250 lb. – 100k lb.</td>
</tr>
<tr>
<td>TC 42</td>
<td>5 k – 200 k lb.</td>
</tr>
<tr>
<td>TC 43</td>
<td>5 k – 200 k lb.</td>
</tr>
<tr>
<td>TC 62</td>
<td>200 lb. – 3 k lb.</td>
</tr>
<tr>
<td>TC 63</td>
<td>200 lb. – 3 k lb.</td>
</tr>
</tbody>
</table>
F. **Tank and Hopper Scales (continued)**

**ITCM Suspension Mount**

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITCM</td>
<td>50 lb. – 20 k lb.</td>
</tr>
<tr>
<td>ITCM SS</td>
<td>100 k – 20 k lb.</td>
</tr>
<tr>
<td>ITCM SSW</td>
<td>1 k – 20 k lb.</td>
</tr>
</tbody>
</table>

G. **S-Beam Conversion Truck Scales**

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI   SB (N)</td>
<td>100 lb. – 5 k lb.</td>
</tr>
<tr>
<td>CI   SB SS (N)</td>
<td>100 lb. – 5 k lb.</td>
</tr>
<tr>
<td>CI   SB SSW</td>
<td>1000 lb. – 5000 lb.</td>
</tr>
</tbody>
</table>

H. **Portable Axel Truck Scales**

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI   LODEC</td>
<td>12.5 k lb.</td>
</tr>
<tr>
<td>CI   SLS/ML</td>
<td>25 k – 40 k lb.</td>
</tr>
</tbody>
</table>

(N) = NTEP RATED

LC-CAP.Guide
## I. Full Load Cell Truck Scales

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE 40 (N)</td>
<td>25 k – 125k lb.</td>
</tr>
<tr>
<td>BE SSW</td>
<td>25 k – 125k lb.</td>
</tr>
<tr>
<td>CI JRT</td>
<td>50 k, 100 k lb.</td>
</tr>
<tr>
<td>CI BLC - 2</td>
<td>30 k – 100 k lb.</td>
</tr>
<tr>
<td>CI SB2 L</td>
<td>45 k lb.</td>
</tr>
<tr>
<td>CI SB2 M</td>
<td>35k, 45 k lb.</td>
</tr>
<tr>
<td>CI STR (N)</td>
<td>40 k – 50 k lb.</td>
</tr>
<tr>
<td>CI STR 1 (N)</td>
<td>40 k – 50 k lb.</td>
</tr>
<tr>
<td>CI STR 1 SSW (N)</td>
<td>40 k – 50 k lb.</td>
</tr>
<tr>
<td>CI STR SSW (N)</td>
<td>40k – 50 k lb.</td>
</tr>
<tr>
<td>CI 58 (N)</td>
<td>20k – 125 k lb.</td>
</tr>
<tr>
<td>CI 58 SSW</td>
<td>20k – 125 k lb.</td>
</tr>
<tr>
<td>CI 94</td>
<td>50 k – 500 k lb.</td>
</tr>
<tr>
<td>CI 5103 (N)</td>
<td>5 k – 200 k lb.</td>
</tr>
<tr>
<td>CI 5103 SSW</td>
<td>5 k – 200 k lb.</td>
</tr>
<tr>
<td>CP 5223 (N)</td>
<td>50 k – 100 k lb.</td>
</tr>
<tr>
<td>CP 26 S (N)</td>
<td>50 k lb.</td>
</tr>
<tr>
<td>CP 26 S1 (N)</td>
<td>50 k – 100 k lb.</td>
</tr>
<tr>
<td>CP 26 S2 (N)</td>
<td>30 T metric - 56 k lb.</td>
</tr>
<tr>
<td>CP 26 S3 (N)</td>
<td>20 k – 200 k lb.</td>
</tr>
<tr>
<td>CP 26 S4 (N)</td>
<td>15 T – 40T metric</td>
</tr>
<tr>
<td>CP 26 S5 (N)</td>
<td>25 k – 200 k lb.</td>
</tr>
<tr>
<td>CP 175</td>
<td>50 k – 100 k lb.</td>
</tr>
<tr>
<td>SMB6</td>
<td>35k, 45 k lb.</td>
</tr>
<tr>
<td>T 92</td>
<td>5 k – 200 k lb.</td>
</tr>
<tr>
<td>T 93</td>
<td>5 k – 200 k lb.</td>
</tr>
<tr>
<td>TC 21</td>
<td>500 lb. – 100 k lb.</td>
</tr>
<tr>
<td>TC 31</td>
<td>500 lb. – 100 k lb.</td>
</tr>
</tbody>
</table>

(N) = NTP RATED
LC-CAP.Guide
J. Railroad Single Axle and Full Load Cell Scales

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP 26S3</td>
<td>50 k – 200k lb.</td>
</tr>
<tr>
<td>CP 26S5</td>
<td>50 k – 200k lb.</td>
</tr>
<tr>
<td>CP 175</td>
<td>50 k – 200k lb.</td>
</tr>
<tr>
<td>T 92</td>
<td>50 k – 200k lb.</td>
</tr>
<tr>
<td>T 93</td>
<td>50 k – 200k lb.</td>
</tr>
</tbody>
</table>

K. Miniature Force Sensors

<table>
<thead>
<tr>
<th>Load Cell Models</th>
<th>Capacity Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI FB</td>
<td>125 lb. – 250k lb.</td>
</tr>
</tbody>
</table>
MICROVOLTS PER ACTIVE COUNT CALCULATIONS FOR THE LOAD CELL CAPACITY SELECTION

Using microvolts per count calculations are very useful when selecting the best load cell capacity for a given application.

If the load cell(s) capacity is too small, the “signal level” is high (a large microvolts per count), but the load cell(s) is subject to mechanical overloads and load cell failures.

If the load Cell(s) capacity is too large, the signal level is low (a low microvolts per count) and the weightmeter reading will tend to drift and/OR the system may have an unstable zero (the zero reading drifts too much).

The load cell capacity should be selected so that the weightmeter sensitivity is between 2 to 4 microvolts per active count.

MICROVOLTS PER ACTIVE COUNT COMUTATIONS

To determine the microvolts per active count, the following steps must be calculated:

Step 1 Multiply the excitation voltage by the rated sensitivity of the load cell to Determine the millivolt output of the cell at its rated capacity.

\[
Example: \quad 15V \times 3mV/V = 45mv@ \text{ rated capacity}
\]

Step 2 Divide the live load by the rated capacity of the load cell to determine the percentage of the rated capacity being used.

\[
Example: \quad 300 \text{ lbs. (live load)} \text{ on a } 1,000 \text{ lb. load cell (rated capacity)} = 30\%
\]

Step 2A For multi load cell applications use the sum of the load cell capacities for the load cell capacity.

\[
Example: \quad 1000,000 \text{ lb. scale capacity truck scale with (8) eight 50,000 lb. Capacity load cells.}
\]

\[
\text{Percentage of LC Utilization} = \frac{100,000}{(8 \times 50,000)}
= \frac{100,000}{400,000} = 25\%
\]

Step 3 Multiply the percentage result of Step 2 by the output result of Step 1 to determine the millivolt output for the live load...

\[
Example: \quad 30\% \times 45 \text{ mv} = 13.5 \text{ microvolts live load}
\]
Step 4  Multiply the millivolt result of Step 3 by 1000 to determine the microvolt equivalent signal level.

Example:  \(13.5 \text{ mv} \times 1000 = 13,500 \text{ microvolts live load}\)

Step 5  Determine the scale active counts. Active counts = scale capacity/scale read-by

Example:  
- \(\text{Scale capacity} = 120,000 \text{ lbs.}\)
- \(\text{Scale read-by} = 20 \text{ lbs.}\)
- \(\text{Active counts} = \frac{120,000 \text{ lbs.}}{20 \text{ lbs.}} = 6,000\)

Step 6  Divide the total number of active counts into the microvolt result of Step 4 to determine the microvolt per active

Example:  \(13,500 \text{ microvolts} / 6,000 \text{ counts} = 2.25 \text{ microvolts per active count}\)

Notes:  Refer to the signal requirements of the weighmeter used to determine the compatibility of your result of Step 6
1.0 **INITIAL DATA**

1.1 Scale Capacity ___________________ lb. kg – metric tons
1.2 Scale Read by ___________________
1.3 Number of load cells________
1.4 Scale Dead Load (Scale dock weight) ______________ lb. – kg – metric tons

2.0 **DETERMINE CAPACITY OF LOAD CELL NEEDED**

To minimize possible load cell overload, the selected load cell capacity should be equal to the scale capacity plus scale deck weight times a load cell safety factor.

Load cell capacity – (scale capacity + scale dead load) X safety factor

3.0 **EXAMPLE**

3.1 **Scale Date**
Scale capacity = 100 lbs
Scale deck weight = 15 lbs.
Safety factor = 1.1 to 1.3

3.2 **Load Cell Calculation**

Maximum weight on scale = scale capacity + scale dead load
= 100 lbs. + 15 lbs.
= 115 lbs.

Load cell capacity needed = Maximum weight on scale x safety factor
= 115 lbs. x 1.2
= 138 lbs.

3.3 Use a COTI load cell with a capacity of 150 lb. or 200lb. capacity.

4.0 **OTHER CONSIDERATIONS**

4.1 Do a microvolts per count calculation to check the signal level. The signal level should be greater than 2.0 microvolts per count.

4.2 If the LC signal level is less the 1.75 microvolts/count, the LC capacity is too small and if the LC signal is greater than 4 microvolts/count, the LC capacity is too big.
FOUR LC FLOOR SCALE LOAD CELL
SELECTION SHEET

1.0 INITIAL DATA
1.1 Scale Capacity ___________________ lb. kg – metric tons
1.2 Scale Read by ___________________
1.3 Number of Scale Sections ____ 2 ____
1.4 Number of load cells ________ 4 ______
1.5 Scale Dead Load (Scale dock weight) ___________ lb. – kg – metric tons

2.0 DETERMINE CAPACITY OF LOAD CELL NEEDED
To minimize possible load cell overload, the section capacity of the scale should be
equal to approximately the scale capacity plus the scale deck weight on the two LC’s.
Load cell capacity = 0.5 x scale capacity.

Load cell capacity = (scale capacity) + (scale dead weight on set of 2 load cells.)
2 (load cells)

Since the scale deck weight is usually a small percentage of the scale capacity for floor
scales under 5000 kg (10,000 lb.) capacity, the scale deck weight can be ignored in the
load cell capacity calculations.

3.0 EXAMPLE
3.1 Scale Data
Scale capacity = 4000 kg
Scale deck weight = 400 kg
Scale deck weight on 2 load cells = \( \frac{400 \text{ kg}}{2} = 200 \text{ kg} \)

3.2 Load Cell Calculations
Maximum weight on a scale section (2 load cells) = scale capacity + scale deck
Weight on 2 load cells

Maximum weight on scale section = 4000 + 200
= 4200 kg

3.3 Use a COTI load cell with a 2500 kg or 5000 lb. capacity.

4.0 OTHER CONSIDERATIONS
4.1 Do a microvolts per count calculation to check the signal level. The signal level
should be greater than 2.0 microvolts per count.

4.2 If the LC signal level is less the 1.75 microvolts/count, the LC capacity is too small
and if the LC signal is greater than 4 microvolts/count, the LC capacity is too big.
TANK AND HOPPER SCALE LOAD CELL
SELECTION SHEET

1.0 INITIAL DATA
1.1 Scale Capacity ___________________ lb. kg – metric tons
1.2 Scale Read by ___________________
1.3 Number of Tank (Hopper) Legs ______
1.4 Scale Dead Load Empty Weight of Tank/hopper _____ lb. – kg – metric tons

2.0 DETERMINE CAPACITY OF LOAD CELL NEEDED
To minimize possible load cell overload, the load cells should be derated by 20 to 40%

Load cell capacity required = (scale capacity) + (scale dead load) x (safety factor)
number of scale legs

3.0 EXAMPLE
3.1 Scale Data
Scale capacity = 25,000 kg
Scale dead weight = 10,000 kg
Number of legs = 4
Safety factor = 1.3 (30%)

3.2 Load Cell Calculations
Maximum weight on a LC = (scale capacity) + (scale dead load) x (safety factor)
number of scale legs

Maximum weight on load cell = (25,000 + 10,000) x 1.3
\[
= \frac{35,000}{4} \times 1.3
\]
\[
= 11,375 \text{ kg (25,070 lb.)}
\]

3.3 Use a COTI load cell with a 25,000 lb. capacity.

4.0 OTHER CONSIDERATIONS
4.1 Do a microvolts per count calculation to check the signal level. The signal level should be greater than 2.0 microvolts per count.

4.2 If the LC signal level is less than 1.75 microvolts/count, the LC capacity is too small and if the LC signal is greater than 4 microvolts/count, the LC capacity is too big.

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S-BEAM CONVERSION TRUCK SCALE LOAD CELL SELECTION SHEET

1.0 INITIAL DATA

1.1 Scale Capacity ___________________ lb. kg – metric tons
1.2 Scale Read by _____________________
1.3 Scale Dead Load (Scale deck weight) _______________ lb. – kg – metric tons
1.4 Scale Multiple ___________________

2.0 DETERMINE CAPACITY OF LOAD CELL NEEDED

2.1 The load on the S-beam LC = Scale capacity + scale dead load
   Multiple

2.2 The load cell used for the scale conversion should be 1.2 to 1.4 times larger than
   the LC load calculated in step 2.1 for a LC safety factor.

3.0 EXAMPLE

3.1 Scale Data
   Scale capacity = 80,000 kg
   Scale dead load: = 30,000 kg
   Scale multiple: 125

3.2 Determine Load on S-Beam LC
   Load = Scale capacity + scale dead load
         Multiple
   = 80,000 +30,000
      125
   = 880 kg (1,940 lb.)

3.3 Use a COTI load cell with a 2,500 lb. capacity.

4.0 OTHER CONSIDERATIONS

4.1 Check the scale lever system, pivots and bearings. Repair and adjust the lever system
   as needed

4.2 Do a microvolts per count calculation to check the signal level. The signal level
   should be greater than 2.0 microvolts per count.

4.3 If the LC signal level is less the 1.75 microvolts/count, the LC capacity is too
   small and if the LC signal is greater than 4 microvolts/count, the LC capacity is
   too big.
FULL LC TRUCK SCALE LOAD CELL SELECTION SHEET

2.0 INITIAL DATA
2.1 Scale Capacity ___________________ lb. kg – metric tons
2.2 Scale Read by ___________________
2.3 Number of Scale deck Sections _________
2.4 Total number of load cells___________
2.5 Scale Dead Load (Scale deck weight) ________ lb. – kg – metric tons

2.0 DETERMINE CAPACITY OF LOAD CELL NEEDED
To minimize possible load cell overload, the section capacity should be equal to approximately one half the scale capacity plus the scale deck weight on the two load cells.

Load cell capacity = load cell section capacity (2 LC’s) / 2
Load cell capacity required = (scale capacity) + (scale deck weight on set of 2 LC’s.) / 2

3.0 EXAMPLE
3.1 Scale Data
Scale capacity = 80,000 kg
Scale deck dead load = 30,000 kg
Number of sections = 3
Each scale deck weighs 30,000/3 = 10,000 kg

3.2 Load Cell Calculations
Maximum weight on a scale section (2 LC’s) = \( \frac{\text{scale capacity}}{2} + \text{scale deck weight} \)

\[
\text{Maximum weight on scale section} = \frac{80,000 + 10,000}{2} = 50,000 \text{ kg (110,000 lbs.)}
\]

3.2 Maximum weight on a load cell = max weight on a scale section/2 = 50,000 kg/2 = 25,000 kg (55,000 lbs.)

3.4 Use a COTI load cell with a 60,000 to 75,000 lb. capacity.

4.0 OTHER CONSIDERATIONS
4.1 Do a microvolts per count calculation to check the signal level. The signal level should be greater than 2.0 microvolts per count.

4.3 If the LC signal level is less than 1.75 microvolts/count, the LC capacity is too small and if the LC signal is greater than 4 microvolts/count, the LC capacity is too big.
## RAILROAD AXLE SCALE LOAD CELL SELECTION SHEET

### 3.0 INITIAL DATA

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Scale Capacity ___________________ lb. kg – metric tons</td>
</tr>
<tr>
<td>3.2</td>
<td>Scale Read by ___________________</td>
</tr>
<tr>
<td>3.3</td>
<td>Number of Scale Sections <strong>2</strong>__</td>
</tr>
<tr>
<td>3.4</td>
<td>Number of load cells____4____</td>
</tr>
<tr>
<td>3.5</td>
<td>Scale Dead Load (Scale dock weight) __________ lb. – kg – metric tons</td>
</tr>
</tbody>
</table>

### 2.0 DETERMINE CAPACITY OF LOAD CELL NEEDED

To minimize possible load cell overload, the section capacity of the scale should be equal to approximately the scale capacity plus the scale deck weight on the two loads cells.

Load cell capacity = 0.5 x (scale capacity + 0.5 x scale deck dead load) x (safety factor)

Load cell capacity = (scale capacity) + (scale deck weight on set of 2 LC’s) x (safety factor)

Load cell capacity = (scale capacity) x (safety factor). The safety factor value should range between 1.2 to 1.5

**NOTE:**

1. Since the scale deck weight is usually a small percentage of the scale capacity, the scale deck weight can usually be left out of the load cell capacity calculation.

2. If RR locomotives move over the axle scale, the locomotive axle weight must be considered when determining the scale capacity and the required load cell capacity.

3. In the U.S. the following axle weights are typical:

   RR Cars = 50,000 lb. (23 metric tons) per axle
   RR Locomotives = 80,000 lb. (36 metric tons) per axle

### 3.0 EXAMPLE

#### 3.1 Scale Data

- Scale capacity - 100,000 lb (scale will weigh cars and locomotives)
- Scale deck weight = 10,000 lb.
- Scale deck weight on 2 load cells = 5,000 lb.
- Safety factor value = 1.5

#### 3.2 Load Cell Calculations

LC section capacity needed = (scale capacity) x (safety factor) / 2

= 100,000 x 1.5 / 2 = 75,000 lb.
3.3 LC capacity = section load / 2  
= 75,000 / 2 = 37,500 lb.

3.4 Use a COTI load cell with a 50,000 lb. capacity.

4.0 OTHER CONSIDERATIONS

4.1 Do a microvolts per count calculation to check the signal level. The signal level should be greater than 2.0 microvolts per count.

4.4 If the LC signal level is less than 1.75 microvolts/count, the LC capacity is too small and if the LC signal is greater than 4 microvolts/count, the LC capacity is too big.
FULL LC RAILROAD SCALE LOAD CELL
SELECTION SHEET

1.0 INITIAL DATA
1.1 Scale Capacity ___________________________ lb. kg – metric tons
1.2 Scale Read by ____________________________
1.3 Number of Scale deck sections ______
1.4 Number of load cells ______
1.5 Scale Dead Load (Scale deck weight) ___________ lb. – kg – metric tons

2.0 DETERMINE CAPACITY OF LOAD CELL NEEDED

To minimize possible load cell overload, the section capacity of the scale should be equal to approximately one half the scale capacity plus the scale deck weight on the two load cells.

Load cell capacity = load cell section capacity / 2

Load cell capacity required = \( \frac{(\text{scale capacity}) + (\text{scale deck weight on set of 2 LC’s})}{2} \)

3.0 EXAMPLE

3.1 Scale Data

Scale capacity - 400,000 lb.
Scale deck weight = 80,000 lb.
Number of sections = 3
Each scale deck weighs 80,000/3 = 26,667 lb.

3.2 Load Cell Calculations

Maximum weight on a scale section (2 LC’s) = \( \frac{(\text{scale capacity}) + \text{scale deck weight}}{2} \)

Maximum weight on scale section = \( \frac{400,000 + 26,667}{2} \)
= 226,667 lb.

3.4 Maximum weight on a load cell = max weight on a scale section/2 = 226,667 lb/2
= 113,334 lb.

3.5 Use a COTI load cell with a 125,000 to 150,000 lb. capacity

4.0 OTHER CONSIDERATIONS

4.1 Do a microvolts per count calculation to check the signal level. The signal level should be greater than 2.0 microvolts per count.

4.5 If the LC signal level is less the 1.75 microvolts/count, the LC capacity is too small and if the LC signal is greater than 4 microvolts/count, the LC capacity is too big.