

LOAD CELL SPECIFICATION EXPLAINED

MPE

On loadcell specification graphs this means- Maximum Permissible Error and Max is the permissible errors as stipulated by NRCS 0-500e, 500 -2000e and 2000 – 3000 e

Accuracy Class:

All loadcell are tested when manufactured and are rated to an Approved Standard. During manufacture there could be some small defect in its build. (Structural, electronic and the mounting of the Wheatstone bridge circuit) The rating ranges from a Class C1 to a Class C6. C1 is the lowest spec C1 and C2 are usually use on Vessel weighing and installation where an Approval is not required. C3 is the industrial standard for trade application. C4 to C6 are use were a finer graduation and are normally used in high precision equipment and Metrology labs.

Max No. Of Intervals:

This is linked to the above and if the loadcell is rated above the NRCS standard (Max 3000e increments). If this rating exceeds the standard 3000e then application to the approval board for this equipment/scale / bridge to exceed 3000e E.g. a weighbridge approved to 80 Ton by 20 kg (4000e) where the standard is 60 Ton by 20 kg. (3000e)

Ultimate Overload:

This is the maximum mass that can be applied to the load cell before is will suffer permanent structural failure.

Peak Lateral Load:

This is the maximum side thrust on a rigid mounting loadcell before the loadcell will suffer permanent damage. This is the reason for the pendulum strut design which allows the load cell to move and absorb the lateral thrust. It also allows the CPD to operate out of level to a max of 8° angle from the vertical.

Zero Balance:

This is the minimum discrepancy of the cell when it returns to balance once a load has been unloaded. This is hysteresis creep (settling time) is measured per second.

Combined Error:

(Non linearity and Hysteresis) The maximum deviation from the straight line drawn between the original no-load and rated load outputs expressed as percentage of the rated output and measured on both increasing and decreasing loads. Error greater than this will come from the deck, environment and other outside forces.

Effects of Barometric Variation:

This is a European Standard which measures the change in the loadcell in relation to the change in atmospheric pressure.

Load Cell Creep:

Load Cell creep is the amount of change in the output signal measured as a percentage for a given period when a load is applied.

General Load Cell Terminology

Ambient Conditions:

The conditions (humidity, pressure, temperature, etc.) of the medium surrounding the load cell.

Ambient Temperature:

The temperature of the medium surrounding the load cell.

Angular Load Eccentric:

A load applied eccentric with the primary axis at the point of application and at some angle with respect to the primary axis.

Angular Load Concentric:

A load applied concentric with the Primary axis at the point of application and at some angle with respect to the Primary axis.

Axial Load:

A load applied along or parallel to and concentric with the primary axis.

Calibration:

The comparison of load cell outputs against standard test loads.

Calibration Curve:

A record (graph) of the comparison of the load cell outputs against standard test loads.

Compensation:

The utilization of supplementary devices, materials, or process to minimize known sources of error.

Creep:

The change in load cell output occurring with time while under load and with all environmental conditions and other variables remaining constant.

Creep Recovery:

The change in no-load output occurring with time after removal of a load which had been applied for a specific period of time. Usually measured over a specific time period immediately following removal of rated load and expressed as a percent of rated output over a specific period of time.

Deflection:

The change in the length along the primary axis of the load cell between no-load and rated load conditions.

Drift:

A random change in output under constant load conditions.

Eccentric Load:

The algebraic difference between the indicated and true value of the load being measured.

Error:

Any load applied parallel but not concentric with the primary axis.

Excitation, Electrical:

The voltage or current applied to the input terminals of the load Cell.

Frequency Response:

The range of frequencies over which the load cell output will follow the sinusoidal varying mechanical input within specified Limits.

Hysteresis:

The maximum difference between load cell output readings for the same applied load; one reading obtained by increasing the load from zero and the other by decreasing the load from rated output.

Insulation Resistance:

The resistance measured between the load cell circuit and the load cell structure. Normally measured at fifty volts, under standard test conditions.

Load:

The weight or force applied to the load cell.

Load Cell:

A device which produces an output signal proportional to the applied weight or force.

Natural Frequency:

The frequency of free oscillations under no-load load conditions.

Nonlinearity:

The maximum deviation of the calibration curve from a straight line drawn between the no-load and rated outputs; expressed as a percentage of the rated output and measured on increasing load only.

Analogue Output:

The signal (voltage, current, pressure, etc.) produced by the load cell. Where the output is directly proportional to excitation, the signal must be expressed in terms of volts per volt, per ampere, etc., of excitation.

Output, Rated:

The algebraic difference between the outputs at no-load and at a rated load.

Overload Rating, Safe:

The maximum load in percent of rated capacity which can be applied without producing a permanent shift in performance characteristics beyond those specified.

Overload rating, Ultimate:

The maximum load as a percent of rated capacity which can be applied without producing a structural failure.

Primary Axis:

The axis along which the load cell is designed to be loaded; normally its geometric centreline.

Rated Capacity (Rated Load):

The maximum axial load the load cell is designed to measure within its specifications.

Reference Standard:

A force measuring device whose characteristics are precisely known in relation to a primary standard.

Repeatability:

The maximum difference between load cell output readings for repeated loadings under identical loading and environmental conditions.

Resolution:

The smallest change in mechanical input which produces a change in the output signal.

Sensitivity:

The ratio of the change in output to the mechanical input.

Shunt Calibration:

Electrical simulation of load cell output by insertion of known shunt resistors between appropriate points within the circuitry.

Shunt-To- Load Correlation:

The difference in output readings obtained through electrically simulated and actual applied loads.

Side Load:

Any load acting 90 degrees to the primary axis at the point of axial load application.

Stabilization Period:

The time required to insure that any further change in the parameter being measured is tolerable.

Standard Test Conditions:

The environmental conditions under which measurements should be made when the measurements under any other condition may result in disagreement between various observers at different times and places. These conditions are as follows: Temperature -10 degrees +or- 2 degrees C and 40 degrees +or- 3.6 degrees C

Temperature Effect on Rated Output:

The change in the rated output, due to a change in ambient temperature.

Temperature Range Compensated:

The range of temperature over which the load cell is compensated to maintain the rated output and the zero balance within specific limits.

Temperature Range Safe:

The extremes of temperature within which the load cell that will operate within permanent adverse change to any of its performance characteristics.

Loadcell Specification Explained

Terminal Resistance Corner To Corner:

The resistance of the load cell circuit measured at specific adjacent bridge terminals at standard temperature, with no load applied, and with the excitation and output terminals open-circuited.

Terminal Resistance Input:

The resistance of the load cell circuit measured at the excitation terminals at standard temperature, with no load applied and with the output terminals open-circuited

Zero Balance

The signal of the load cell in the no load condition.

Zero Float or Dead Band

The shift in zero balance resulting from a complete cycle of equal tension and compression loads. Normally expressed in units of %FS and usually characterized at FS = CAPACITY.

Zero Stability

The degree to which Zero Balance is maintained over a specified period of time with all environmental conditions, loading history, and other variables remaining constant.