

Engineering Specifications

Tension Weigh Modules

The portions of this specification that have been left blank (_____) should be filled with information about the specific application. Information for the blanks in Section 1.1 can be found in Table 12-28 for capacities in pounds (Table 12-29 for capacities in kilograms). Information for the blanks in Sections 4.2.1 to 4.2.9 can be found in Table 12-30.

1 General Provisions

- 1.1 Provide a complete system consisting of _____ (qty) _____ lb/kg tension weigh modules.
- 1.2 Each module shall include S-cell, clevis pins, clevis, jam nuts, rod ends, and hitch pins.
- 1.3 The system shall include a stainless steel NEMA 4X summing junction box.
- 1.4 Each weigh module shall be completely factory assembled.

2 Mechanical Specifications

- 2.1 The load cells shall be positioned around the vessel so that each support point carries an equal portion of the load.
- 2.2 Tension weigh module assemblies shall include a spherical rod end bearing/clevis attachment on both ends of the load cell to compensate for any misalignment of support rods.
- 2.3 Each tension weigh module in a system shall share an equal portion of the gross load. Space the modules accordingly.
- 2.4 Always use a secondary safety support system of chains or rods to prevent the vessel from falling in case of tension weigh module component failure.

3 Material and Finish Specification

- 3.1 Load cells shall be made of 17-4ph stainless steel.
- 3.2 Clevis, hitch pin, and rod end shall be electroless nickel plated.
- 3.3 Pivoting ball in rod end shall be alloy steel, heat treated, and hard chrome plated.

4 Load Cell Specifications

- 4.1 All load cells shall meet or exceed the National Institute of Standards and Technology (NIST) Handbook 44 for Class III weighing devices and shall be certified by the National Type Evaluation Program (NTEP) for 3,000 division Class III accuracy.
- 4.2 Load cells shall have the following individual characteristics:
 - 4.2.1 Rated Capacity (R.C.): _____
 - 4.2.2 Rated Output: _____
 - 4.2.3 Zero Balance: _____
 - 4.2.4 Combined Error Due To Non-Linearity & Hysteresis: _____
 - 4.2.5 Non-Repeatability: _____
 - 4.2.6 Temperature Compensation: _____

4.2.7	Terminal Resistance	
	Input:	_____
	Signal:	_____
4.2.8	Excitation Voltage:	_____
4.2.9	Insulation Resistance:	_____
4.2.10	Maximum Loads	
	Safe:	150% of R.C.
	Ultimate Overload:	300% of R.C.
	Safe Side:	100% of R.C.

- 4.3 Load cells shall be constructed of 17-4ph stainless steel and shall have an environmentally protected gauge cavity.
- 4.4 Each load cell shall have a sealed cable fitting on the cable entrance into the load cell for enhanced moisture protection.
- 4.5 Each load cell shall have a data plate affixed to the load cell which clearly shows:
 - 4.5.1 Manufacturer
 - 4.5.2 Capacity
 - 4.5.3 Part Number
 - 4.5.4 Serial Number
 - 4.5.5 Class Number
 - 4.5.6 NTEP Certificate of Conformance Number
 - 4.5.7 Maximum Divisions (Nmax)
 - 4.5.8 Load Cell Vmin

5 Junction Box Specifications

- 5.1 Junction box enclosure shall be constructed of type 304 stainless steel and shall be designed to NEMA 4X standards.
- 5.2 The junction box enclosure shall have washdown duty connectors, one for each load cell cable, and one additional connector for the instrument cable. Multiple cables using single box connectors are not acceptable.
- 5.3 The junction box shall contain a printed circuit board for the purpose of individual load cell wiring termination, summing of the output signals from each load cell, trimming/balancing the load cell signals, and wiring the interface to the digital instrument.
- 5.4 The printed circuit board shall have individual connectors for each of the load cells, and the instrument interface cable. Each wire shall have a single terminal connection. Doubling up or ganging of wires to one terminal is not acceptable.
- 5.5 The summing printed circuit board shall have potentiometers, one per load cell for the electrical trimming/balancing of the load cell signals during calibration.

6 Warranty

- 6.1 The product shall be free from defects in workmanship and materials for a period of 1 year from date of original installation, or 18 months from the date of shipment to the original buyer, whichever occurs first. Technician travel time and mileage costs shall be covered by the manufacturer for the first 30 days after installation, with on-site labor and replacement parts covered for the first 12 months after installation.

7 Acceptable Manufacturers:

- 7.1 Scale system shall be METTLER TOLEDO's 0978 Tension Weigh Modules.

NIST System Specifications					
Qty.	Load Cell Capacity (lb)	System Capacity (lb)	Cable Length (ft)	(H)ermetic (P)otted	Load Cell Material
1	50	50	25	P	17-4 ph Stainless Steel
3	50	150	25	P	17-4 ph Stainless Steel
4	50	200	25	P	17-4 ph Stainless Steel
1	100	100	25	P	17-4 ph Stainless Steel
3	100	300	25	P	17-4 ph Stainless Steel
4	100	400	25	P	17-4 ph Stainless Steel
1	200	200	25	P	17-4 ph Stainless Steel
3	200	600	25	P	17-4 ph Stainless Steel
4	200	800	25	P	17-4 ph Stainless Steel
1	300	300	25	P	17-4 ph Stainless Steel
3	300	900	25	P	17-4 ph Stainless Steel
4	300	1,200	25	P	17-4 ph Stainless Steel
1	500	500	25	P	17-4 ph Stainless Steel
3	500	1,500	25	P	17-4 ph Stainless Steel
4	500	2,000	25	P	17-4 ph Stainless Steel
1	1,000	1,000	25	P	17-4 ph Stainless Steel
3	1,000	3,000	25	P	17-4 ph Stainless Steel
4	1,000	4,000	25	P	17-4 ph Stainless Steel
1	2,000	2,000	25	P	17-4 ph Stainless Steel
3	2,000	6,000	25	P	17-4 ph Stainless Steel
4	2,000	8,000	25	P	17-4 ph Stainless Steel
1	3,000	3,000	25	P	17-4 ph Stainless Steel
3	3,000	9,000	25	P	17-4 ph Stainless Steel
4	3,000	12,000	25	P	17-4 ph Stainless Steel
1	5,000	5,000	25	P	17-4 ph Stainless Steel
3	5,000	15,000	25	P	17-4 ph Stainless Steel
4	5,000	20,000	25	P	17-4 ph Stainless Steel
1	10,000*	10,000	25	P	17-4 ph Stainless Steel
3	10,000*	30,000	25	P	17-4 ph Stainless Steel
4	10,000*	40,000	25	P	17-4 ph Stainless Steel

*Not NTEP Certified.

Table 12-28: NIST Weigh Module System Specifications (Tension Weigh Modules)

OIML System Specifications					
Qty.	Load Cell Capacity (kg)	System Capacity (kg)	Cable Length (ft)	(H)ermetic (P)otted	Load Cell Material
1	25	25	25	P	17-4 ph Stainless Steel
3	25	75	25	P	17-4 ph Stainless Steel
4	25	100	25	P	17-4 ph Stainless Steel
1	50	50	25	P	17-4 ph Stainless Steel
3	50	150	25	P	17-4 ph Stainless Steel
4	50	200	25	P	17-4 ph Stainless Steel
1	100	100	25	P	17-4 ph Stainless Steel
3	100	300	25	P	17-4 ph Stainless Steel
4	100	400	25	P	17-4 ph Stainless Steel
1	200	200	25	P	17-4 ph Stainless Steel
3	200	600	25	P	17-4 ph Stainless Steel
4	200	800	25	P	17-4 ph Stainless Steel
1	500	500	25	P	17-4 ph Stainless Steel
3	500	1,500	25	P	17-4 ph Stainless Steel
4	500	2,000	25	P	17-4 ph Stainless Steel
1	1,000	1,000	25	P	17-4 ph Stainless Steel
3	1,000	3,000	25	P	17-4 ph Stainless Steel
4	1,000	4,000	25	P	17-4 ph Stainless Steel
1	2,000	2,000	25	P	17-4 ph Stainless Steel
3	2,000	6,000	25	P	17-4 ph Stainless Steel
4	2,000	8,000	25	P	17-4 ph Stainless Steel
1	5,000	5,000	25	P	17-4 ph Stainless Steel
3	5,000	15,000	25	P	17-4 ph Stainless Steel
4	5,000	20,000	25	P	17-4 ph Stainless Steel

Table 12-29: OIML Weigh Module System Specifications (Tension Weigh Modules)

Load Cell Specifications		
Rated Capacity of Load Cell	50, 100, 200, 300, 500, 1,000, 2,000, 3,000, 5,000, 10,000 (lb)	25, 75, 100, 200, 500, 1,000, 2,000, 5,000 (kg)
Rated Output	2.0 ± 0.2 mV/V	2.0 ± 0.2 mV/V
Zero Balance	± 1.0% of R.C.	± 1.0% of R.C.
Combined Error Due to Non-Linearity and Hysteresis	0.03% of R.C.	0.03% of R.C.
Non-Repeatability	0.01% of R.C.	0.01% of R.C.
Temperature Compensation	-10° to +40° C +14° to +104° F	-10° to +40° C +14° to +104° F
Terminal Resistance	Input: 350Ω Signal: 350Ω ±3Ω	Input: 350Ω Signal: 350Ω ±3Ω
Excitation Voltage	20 VDC max.	20 VDC max.
Insulation Resistance	5 GigaΩ min. @ 50 VDC	5 GigaΩ min. @ 50 VDC
Maximum Loads % of R.C.	Safe: 150 Ultimate Overload: 300 Safe Side: 100	Safe: 150 Ultimate Overload: 300 Safe Side: 100

Table 12-30: Load Cell Specifications (Tension Weigh Modules)