Tank Scale Service Checklist

Specifying Service
for Optimized Weighing Processes

Selecting the right weighing equipment is an important first step to ensuring that your weighing processes are able to meet internal and regulatory requirements. Specifying the right services for the equipment is the next step to making sure that your project is a success and that you maximize your return on investment over the life of the equipment.

Like other modern, adaptable and high-performance systems, weighing equipment must be installed, configured, tested, qualified, and maintained in a manner that delivers optimum business performance. Additionally, weighing measurements must be sufficiently accurate to ensure the quality of your process, contribute to your profitability and be documented in compliance with applicable regulations, standards and specifications.

Utilize this checklist to ensure that you have considered the necessary equipment specification, installation, configuration, calibration, certification, and maintenance services to assure that your equipment always performs within your expected process tolerances.

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1 Equipment and Service Requirements

The services that you require must be selected to meet the objectives of your project, in accordance with the requirements of your process, and to complement the capabilities of your personnel. This document can help you in this assessment by providing guidance for specifying recommended services. Requirements for equipment and services are divided into five categories with checklists of service tasks and recommended steps, to meet your objectives. Each task step is classified according to level of difficulty as follows:

B Basic – Performed by individuals with knowledge of weighing equipment and concepts
I Intermediate – Performed by individuals with specialized know-how of weighing equipment and processes
A Advanced – Performed by individuals with training and tools from the equipment manufacturer

2 Equipment and Service Specification

To ensure consistent product quality and prevent out-of-specification results or bad production batches, it's essential to select the proper equipment and required services.

Compliance with all regulations applicable to your weighing process must be investigated and should be documented for future reference. The below checklist will help you determine the proper equipment and service selection.

Equipment and Service Specification	Recommended Steps	Classification B	I	A	My Notes
Preparatory Tasks	1. Specify the application of the equipment	x			
	2. Determine the environmental factors for the equipment	x			
	3. Determine the minimum weight to be measured and required accuracy			x	
	4. Determine the largest gross load expected to be weighed	x			
	5. Determine the appropriate weights & measures authority and appropriate industry regulations			x	
Equipment Selection	1. Verify the equipment matches the application of your weighing process	x			
	2. Review the environmental conditions and ensure the proper selection	x			
	3. Specify the level of protection for hazardous environments		x		
	4. Specify the level of protection for wet environments		x		
	5. Determine the weighing accuracy required		x		
	6. Define the required weighing accuracy safety factor	x			
	7. Specify the standards and regulations this equipment is required to meet			x	
Service Selection	1. Determine your personnel's weighing equipment competencies and training needs		x		
	2. Determine the appropriate weight sets and SOP (Standard Operating Procedure) for periodic testing			x	
	3. Define the Installation and Setup processes		x		
	4. Determine the Equipment Qualification documentation requirements			x	
	5. Define the appropriate maintenance and calibration schedule			x	
	6. Train the equipment operators on proper maintenance			x	

3 Installation and Start-up

Proper installation of weigh modules for a tank scale is complex because the total weighing system performance is dependent on many factors. Often this is made more complex by the setting of advanced operational parameters and configuring and testing for network integration of instrumentation. A successful installation begins with an assessment of the environment of use and an evaluation of how equipment capabilities can be matched to process requirements and operational processes. Next, the equipment must be properly installed, wired, adjusted, configured, integrated and tested.

The final steps are confirmation of the operation and accuracy of the equipment in the process where it is utilized and familiarization of your personnel with operational and maintenance procedures.

Weigh Module Installation	Recommended Steps	Classification B	I	A	My Notes
Preparatory Tasks	1. Confirm the suitability of the environment where the equipment will be utilized		x		
	2. Confirm the weighing vessel is properly constructed to accept the weigh modules		x		
	3. Confirm the foundation support is adequate		x		
	4. Confirm the suitability of any live to dead connections (pipes, cables, etc.)		x		
Weigh Module Installation	1. Attach weigh modules to weighing vessel	x			
	2. Position weighing vessel on the support foundation		x		
	3. Attach weigh modules to support foundation	x			
	4. Run and terminate weigh module cables to junction box		x		
	5. Route and terminate instrument cable from terminal to junction box		x		

Terminal Installation	Recommended Steps	Classification B	I	A	My Notes
Preparatory Tasks	1. Confirm application, power source and environmental suitability of the equipment		x		
	2. Confirm regulatory, weighing performance, process work steps, data handling, peripheral and network interface requirements			x	
	3. Evaluate the installation environment to check that desired weighing performance can be achieved			x	
	4. Verify the condition and contents of the terminal package	x			
Mounting	1. Determine the optimal mounting location for operator efficiency and/or system integration and mount the terminal	x			
Install Other Hardware	1. Install additional interfaces and/or optional components as appropriate			x	
	2. Set any switches and jumpers as required for sensor and interface compatibility			x	
	3. Route load cell, peripheral, device cables/wiring into the terminal enclosure and make connections		x		
	4. Install RF filtering components as specified			x	
	5. Route power wiring and make power connection to terminal	x			
	6. After confirming a safe operating condition, power-up the terminal	x			

Operational Tests	Recommended Steps	Classification B	I	A	My Notes
Scale System Operational Test	1. Apply power to scale terminal	x			
	2. Confirm weigh module communication to the terminal		x		
	3. Check the distribution of load between weigh module supports			x	
	4. Adjust weigh modules to achieve proper load distribution			x	
	5. Confirm scale operates properly over each weigh module			x	

Terminal Programming	Recommended Steps	Classification B	I	A	My Notes
Setup Standard Configurations	1. Set terminal scale parameters for scale type(s), capacity, readability, motion, alternative units, zero and tare functions			x	
	2. Determine and set the scale filter parameters to ensure stability and required responsiveness			x	
	3. Enable/setup peripheral communication and network interfaces as appropriate			x	
Setup Terminal Application Data	1. Enable transaction log for legal-for-trade applications or per regulatory requirements		x		
	2. Select the tolerance type required		x		
	3. Enter article data into the article database		x		
	4. Backup the target table and message tables with back up tool			x	
Setup Terminal Integration	1. Assign and confirm connections to the needed serial COM and network ports	x			
	2. Configure discrete I/O attributes		x		
	3. Setup File transfer Protocol (FTP) usernames, access rights and passwords			x	
	4. Setup email alert parameters for service events			x	
	5. Configure analog output settings		x		
	6. Configure PLC settings to match PLC requirements			x	
	7. Setup print and report templates			x	
	8. Test communications for proper operation		x		
Setup Terminal Communication Data	1. Configure, save, store, and upload templates			x	
	2. Conduct a print test for each print out format to ensure proper layout and operation		x		
	3. Configure tare, target, and message table reports			x	
	4. Print tare, target and message table reports to ensure proper data entry		x		
Advanced Terminal Configuration	1. Design soft-key setup to optimize operator efficiency			x	
	2. Enable the ID soft-key for the ID Function			x	
	3. Enter terminal asset information, including scale base, company, or other desired identification			x	
	4. Update time/date format and information	x			
	5. Enable graphing displays and language preferences			x	
	6. Configure any remaining soft-keys			x	
	7. Configure maintenance settings			x	

4 Equipment Qualification for Validated Processes

There is an increasing need for assurance that products are safe and of a consistent quality. Consequently, as a manufacturer, you must document that processes are proven and that equipment is qualified to produce results that meet specifications. Equipment Qualification uses Installation Qualification, Operational Qualification and Performance Qualification (IQ/OQ/PQ) protocols to guide and document the installation and operational performance testing of the equipment. This ensures that you are able to achieve and maintain the qualified state, that weighing processes are capable of delivering results that meet quality requirements, and that the risk of an audit challenge is reduced.

Equipment Qualification	Recommended Steps	Classification B	I	A	My Notes
Installation Qualification (IQ)	1. Unpack, verify and document the condition and contents of the packages			x	
	2. Record the location of the equipment documentation			x	
	3. Document the suitability of equipment location and environment			x	
	4. Describe and diagram the equipment configuration			x	
	5. Document the scale terminal and scale configuration and installed accessories and peripherals			x	
Operation Qualification (OQ)	1. Document the configuration of the terminal, scale(s) and peripherals and confirm their suitability			x	
	2. Record the details of the scale calibration; see the Calibration and Certification Checklist for details			x	
	3. Document training of scale operators and other personnel on proper use/maintenance of the scale system			x	
Performance Qualification (PQ)	1. Create Standard Operating Procedures (SOP) for periodic performance testing and documentation			x	
	2. Record the details of applicable SOPs			x	

5 Calibration and Certification

Scales can help increase business performance, ensure product quality and increase revenue by lowering costs. It is easy to erroneously assume that the weight value displayed is the exact weight of the object or material on the scale. However, this is not true; every measurement has an uncertainty associated with the measurement device's capabilities, the environmental conditions of the measurement and the weighing process. The only way to determine the suitability of a measurement for meeting your process specifications, or for delivering acceptable cost and revenue impact, is to calibrate the measurement device with a traceable reference standard and to determine accuracy. Additionally, to have traceability for your process, you must document calibration results and certify that measurements meet quality and regulatory requirements. Finally, for critical processes or when a measurement device is used at the low end of its range, it is critical to determine measurement uncertainty and minimum weight.

Calibration & Certification	Recommended Steps	Classification B	I	A	My Notes
Preparatory Tasks	1. Evaluate / confirm calibration and certification requirements according to process, quality, regulatory, and/or industry requirements (Pass/Fail Determination, Minimum Weight Determination, Customer Specifications, etc.)			x	
	2. Decide if "As Found" results should be determined and documented		x		
	3. Select an appropriate calibration procedure and certificate type			x	
	4. Perform a visual inspection of the weighing system's operational condition		x		
	5. Select sufficient reference weights of the required class and tolerance according to the scale classification			x	
	6. Select or record device serial number, model and metrological details		x		
	7. Select or record scale owner, location, asset and other information		x		
Testing Procedures "As Found'	1. Perform and record results of tests that were determined to be required		x		
	2. Perform and record results: • Sensitivity Test • Eccentricity Test • Linearity Test • Repeatability Test		x		
Make Adjustments	1. Make any needed adjustments to the scale and terminal in order to improve weighing performance to meet requirements			x	
Testing Procedures "As Left'	1. Perform and record results of tests that were determined to be required		x		
	2. Perform and record results: • Sensitivity Test • Eccentricity Test • Linearity Test • Repeatability Test		x		
Create Certificate	1. Record comments regarding the condition of the calibration tests or other relevant information		x		
	2. Record the next calibration due date		x		
	3. Calculate measurement uncertainty and minimum weight values (as required)			x	
	4. Print and archive the test certificate		x		
	5. Review test results to ensure that scale is suitable for use in the required processes and applications			x	
	6. Check if re-verification is required		x		

6 Maintenance, Training and Support

Proper maintenance according to factory specifications will significantly improve weighing equipment uptime and performance and extend its life. Preventative maintenance should be periodically performed with a frequency appropriate to the type of equipment, application environment, regularity of use, and criticality of the equipment to your process, product quality and downtime costs. Additionally, planned maintenance can make your costs more predictable. You should also have a training plan to ensure an effective start-up of any new weighing process and to provide for the on-boarding of new employees. Finally, make sure that you have a support plan and processes that provide access to the expertise that you need when you need it.

Weigh Vessel Maintenance	Recommended Steps	Classification B	Classification I	Classification A	My Notes
Physical Condition Checks	1. Remove power from scale terminal	x			
	2. Check for buildup of foreign material and clean as required	x			
	3. Inspect the scale for signs of excessive wear or exposure to water or corrosive materials		x		
	4. Confirm that the floor or structure where the scale is installed is in suitable condition		x		
	5. Inspect inlet and outlet pipes for scale interference		x		
	6. Inspect weighing vessel and any connections to the scale for damage		x		
	7. Confirm the junction box lid and cables are properly sealed			x	
	8. Inspect bumper gaps (if applicable) and anti-lift devices for clearance and secure fastening			x	
	9. Inspect stabilizers (if applicable) for proper adjustment and secure fastening			x	
	10. Confirm scale is level, unobstructed, clean and ready for use		x		
Operational Tests	1. Restore power to the scale terminal	x			
	2. Confirm the scale is zeroed and returns to zero after loading		x		
	3. Perform a calibration test and seal as required (refer to Calibration and Certification)			x	

Terminal Maintenance	Recommended Steps	Classification B	I	A	My Notes
Preparatory Tasks	1. Identify and document issues that have occurred since the last maintenance		x		
	2. Examine terminal maintenance logs for signs of prior operational issues or potential failure			x	
	3. Connect to terminal and backup configuration, maintenance logs and data			x	
	4. Remove and lockout terminal power	x			
Physical Condition Checks	1. Look for signs of excessive wear or exposure to water or corrosive materials		x		
	2. Look for damage to the keyboard or display	x			
	3. Make sure the terminal cover and cables are properly sealed	x			
	4. Inspect terminal cables for loose connections, proper routing and damage		x		
	5. Verify terminal and scale system grounding			x	
Operational Tests	1. Restore power to the scale terminal	x			
	2. Confirm terminal safe operational mode for tests		x		
	3. Zero scale and perform a calibration test (refer to Calibration and Certification)		x		
	4. Access terminal diagnostics to record load counts and calibration values (as required)			x	
	5. Access terminal statistics to record number of weighments, overloads, etc. (as required)			x	
	6. Perform keyboard and display tests			x	
	7. Check communication to peripherals and networks		x		
	8. Test and confirm I/O function (as required)			x	
	9. Check for error alerts during normal operation			x	
	10. Add entry to maintenance log and back up terminal			x	
Final Review	1. Seal terminal as required by customer or Weights and Measures regulations			x	

7 Your Qualified Service Provider

Contact METTLER TOLEDO to ensure you maximize the return on your investment. Our technicians have the advanced skill-set to safeguard the life of your weighing equipment through these comprehensive service offerings:

Equipment & Service Specification
With GWP®, METTLER TOLEDO performs a comprehensive analysis of your weighing process and recommends the exact weighing equipment along with the right services.

Installation and Start-up
Includes proper installation in the working environment, setup and configuration for optimal operator efficiency, and interface to peripherals, data collection or automation systems.

Equipment Qualification
IPac delivers a professional installation for weighing equipment in production and is designed to meet the requirements of a validated process.

Preventative Maintenance
METTLER TOLEDO provides the right level of periodic preventive maintenance to match equipment utilization, process criticality and equipment lifecycle.

METTLER TOLEDO will assist you in determining the key requirements before defining a services program:

- How important is maximizing uptime to your process and business?
- What measurement accuracy will ensure required quality and profitability?
- What are your regulatory, quality and customer compliance requirements?
- How should your equipment be integrated into your process and systems?
- What is the optimal equipment configuration for your process and operation?
- Can your staff safely and productively operate and maintain your equipment?

GWP® Verification
A unique, science-based service to certify the accuracy of weighing processes

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Benefits of Using METTLER TOLEDO Service:

- Consultation for an optimal service plan to achieve your desired business results
- A global network of factory-trained technicians delivering exceptional service
- A field service force backed by local and global support personnel to provide ideal solutions
- Proprietary service tools to realize and maintain the best performance for your equipment
- Factory maintenance procedures to maximize your return on investment
- Consistent procedures to ensure measurement results that lower costs and increase revenues
- Certification solutions that are compliant with local and global regulations and standards
- Calibration services that are ISO17025 accredited, giving third-party credibility to results

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