

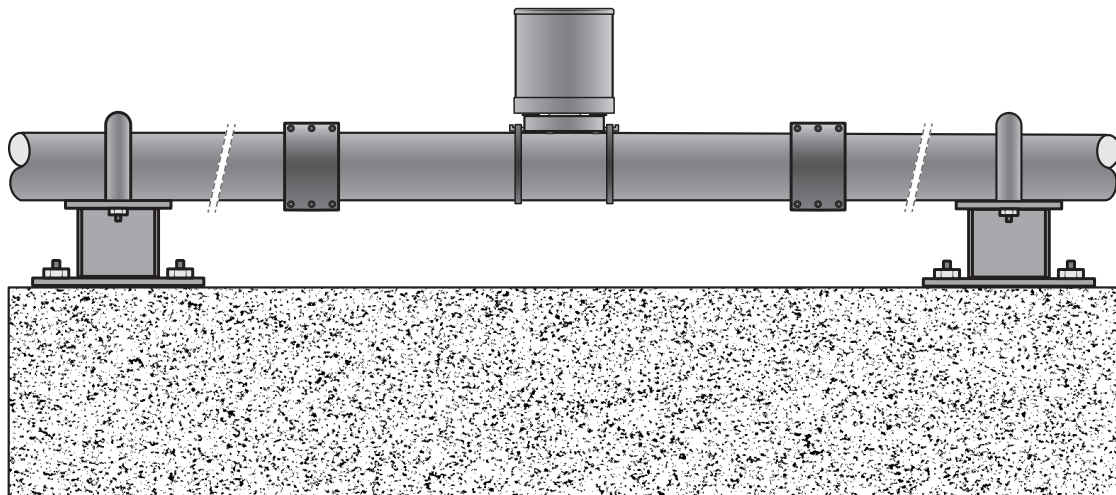


NON-INVASIVE MEASUREMENT. STRIKING ACCURACY.

www.ultimompd.com

Non-Nuclear Density Meter Site Preparation Requirements

FOR SITE MECHANICAL ENGINEERING DEPARTMENT



**Model - DM
Version 4.2**

Table of Contents

- 1.0 Introduction 1
- 2.0 The Measurement Zone 1
- 3.0 Mechanical Components to Create the Measurement Zone 3
- 4.0 Dynamic Isolators 4
- 5.0 Rigid Supports 5
 - 5.1 General Requirements of Rigid Supports: 5
 - 5.2 Specific Requirements of Rigid Supports: 6
 - 5.3 Examples of Improper Rigid Supports that Negatively Affect Meter Performance 6
- 6.0 Large Pipes 7
 - Resources Available for Download: 7

ULTIMO SITE PREPARATION REQUIREMENTS APPENDIX A: ULTIMO RIGID SUPPORT GUIDE

ULTIMO SITE PREPARATION REQUIREMENTS APPENDIX B: EXAMPLES OF IMPROPER RIGID SUPPORTS

1.0 Introduction

Proper preparation of the installation site is critical. The Ultimo Meter works using the pipe's mechanical vibrations, and improper site preparation will result in the SRM capturing unwanted signals from system vibrations and reporting inaccurate measurement data.

A proper installation requires establishing a **Measurement Zone** that isolates the SRM from system vibrations and helps to generate vibrations related to the density of the slurry being measured. This is accomplished by clamping specially engineered Dynamic Isolators on the pipe to create the boundaries of the Measurement Zone. When **Dynamic Isolators** cannot be used, such as for large pipes or due to infrastructure restrictions, the Measurement Zone can be created with existing or newly fabricated rigid pipe mounts that meet Ultimo's strict Rigid Mount criteria.

Confirmation that the Measurement Zone and Support Structures meet all Ultimo Design Specifications will help you avoid unnecessary technical service charges. Tools and forms that can be used for self-certification of the installation site are available for download on the Ultimo website.

2.0 The Measurement Zone

The Measurement Zone is a section of pipe that is isolated from system vibrations and other external influences that adversely affect the meter performance. The SRM should be mounted in the center of the Measurement Zone.

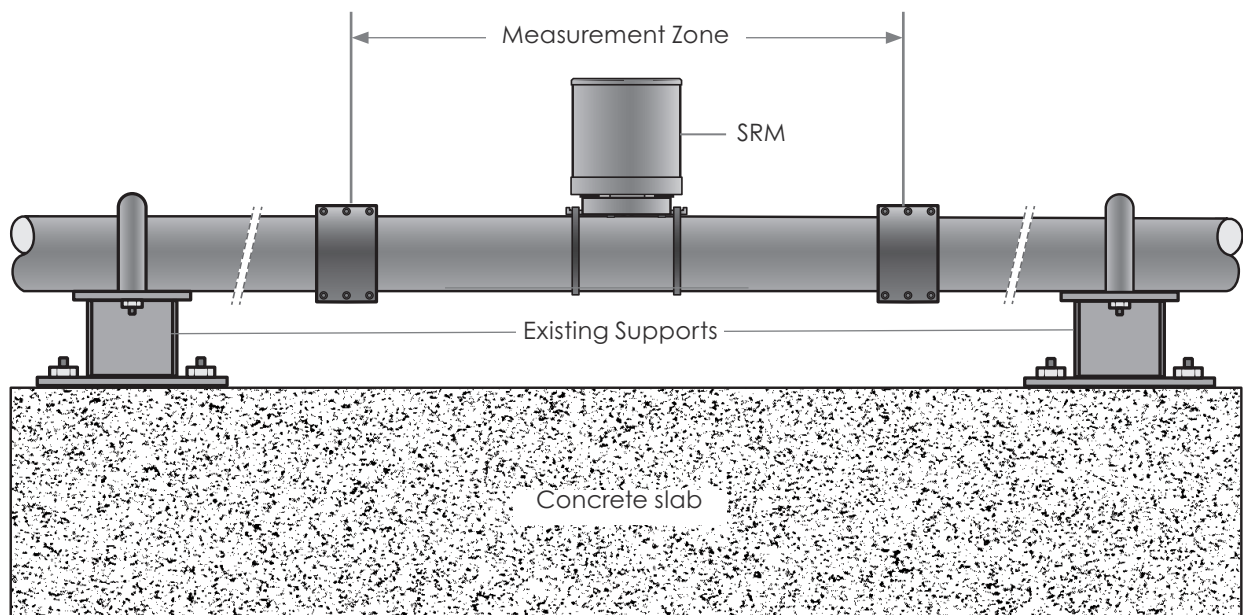


Figure 2.1

Specific requirements and considerations of the Measurement Zone include:

- **Measurement Zone Isolation:** The measurement zone must be created by adding Dynamic Isolators to define the zone boundaries. If Dynamic Isolators cannot be used, the Measurement Zone can be created using properly spaced existing rigid supports or newly added rigid supports. Rigid supports must meet specific design criteria, defined in Section 4.0 below.
Note: Neither dynamic Isolators nor additional rigid supports are required on pipes greater than 18 inches in diameter if an existing single pipe mount in the vicinity of the SRM mounting location is built in accordance with the pipe support standard.
- **SRM Position:** The SRM must be centered in the measurement zone. It must be located where the DPM can be within 100 ft (30m) of the SRM.
- **Material Flow Conditions:** The zone must have a normal flow condition for the material being measured.
- **Interference in the Measurement Zone:** The measurement zone cannot have pipe branches, flanges, additional supports, or vibration damping members within it.
- **Pump Interference:** The measurement zone must be a minimum distance from pumps. The farther away the pump is from the SRM, the better. For example, if the pipe size is ≤ 10 in. the distance from the DI or Rigid Support to the closest pump should be at least 100 in. For a pipe size ≥ 10 in. the distance should be at least 10 times the pipe O.D.
- **Measurement Zone Length:** The length of the zone depends on the pipe diameter and pipe material (Table 2.1). The measurement zone must meet this requirement or the sensor cannot be installed. The ideal measurement zone length is the midpoint of the allowable range.

Minimum and Maximum Dimensions in Inches
 (ideal dimension is center of range)

Pipe size	Metal and ceramic pipes		Other Pipe Material (e.g., plastic)	
	Minimum	Maximum	Minimum	Maximum
3	30	40	15	21
4	34	46	17	23
5	38	52	19	25
6	43	58	20	28
8	47	63	22	30
10	51	69	24	32
12	55	75	26	35
14	60	81	27	37
16	64	86	29	39
18	68	92	31	41
20 or more	76	104	34	46

Table 2.1 Measurement Zone Length

3.0 Mechanical Components to Create the Measurement Zone

The pipe size defines the structural components required to support the pipe and create the Measurement Zone. These guidelines must be followed to achieve a successful installation. The sections following this table provide more detail on the specific requirements of the different mechanical components.

Structural Components	Pipe ≤ 10"	10" < Pipe ≤ 18"	Pipe > 18"
Dynamic Isolators	Required	Required	Not used
Rigid Support with Spacer Block*	Optional**	Optional**	Not used
Rigid Support Alone	Do not use	Do not use	Must use at least one to create measurement zone***

* **Spacer Blocks** are used to eliminate the effects of surface irregularities that may be present on the rigid supports.

** Dynamic Isolators are required on all pipes ≤ 18". If existing structures inhibit the use of Dynamic Isolators to create the Measurement Zone, then Rigid Supports can be used if they meet all Ultimo requirements.

*** Rigid Supports are not required on pipes > 18" to create the Measurement Zone, but existing supports near the Sensor must meet Ultimo Measurement Zone spacing requirements.

ALL Rigid Supports must:

- Comply with all Measurement Zone spacing requirements and rules
- Mechanical members must meet strict rigidity requirements as defined in **Appendix A: Ultimo's Rigid Support Design Requirements Guide**
- Meet ANSI / ISO Pipe Supports Standard requirements
- Comply with all local codes

4.0 Dynamic Isolators

Dynamic Isolators are two-piece collars that clamp onto the pipe to create nodal points and establish the Measurement Zone. Dynamic Isolators should always be used on pipes $\leq 18"$. This is the simplest and most effective way to create a Measurement Zone.

- Dynamic Isolators can be purchased from Ultimo or fabricated locally.
- Drawings and specifications for fabricating Dynamic Isolators can be downloaded at www.ultimompd.com
- Dynamic Isolators are not used on pipes larger than 18"
- The spacing of a Dynamic Isolator collar to its nearest Rigid Support must be at least 1/3 the length of the Measurement Zone. See Figure 4.1.

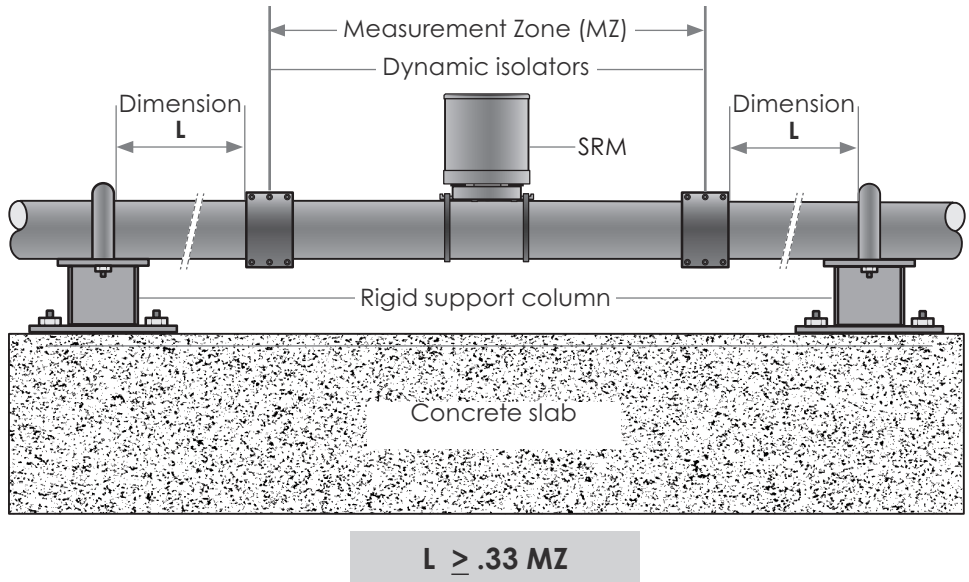


Figure 4.1 Distance from Dynamic Isolator to Rigid Support

If infrastructure restrictions prevent the use of two Dynamic Isolators, the Measurement Zone can be established using one Dynamic Isolator and one Rigid Support, as shown in Figure 4.2. All other Measurement Zone requirements must be met.

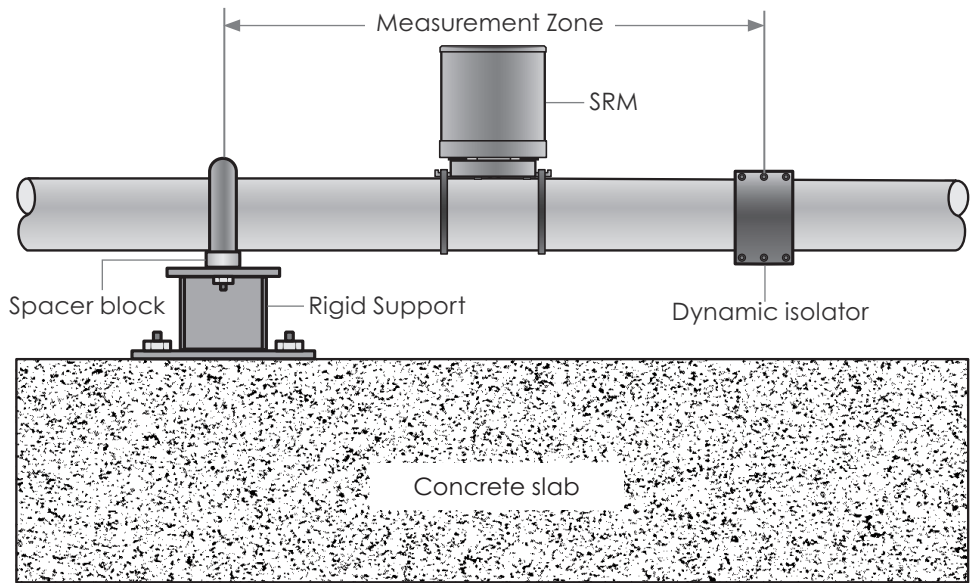


Figure 4.2 Measurement Zone using one Dynamic Isolator and one Rigid Support

5.0 Rigid Supports

If infrastructure restrictions prevent the use of Dynamic Isolators, Rigid Supports can be used.

It is important to understand that Rigid Supports creating a Measurement Zone have special requirements beyond those normally used to support the pipe. Extra consideration must be given to the pipe support structure to ensure that the Measurement Zone is free of unwanted vibrations that could affect the meter's measurement.

In the location of the **Measurement Zone**, the attachment of the pipe to the rigid supports and the attachment of the rigid supports to the infrastructure must be secure so the pipe cannot move in any direction.

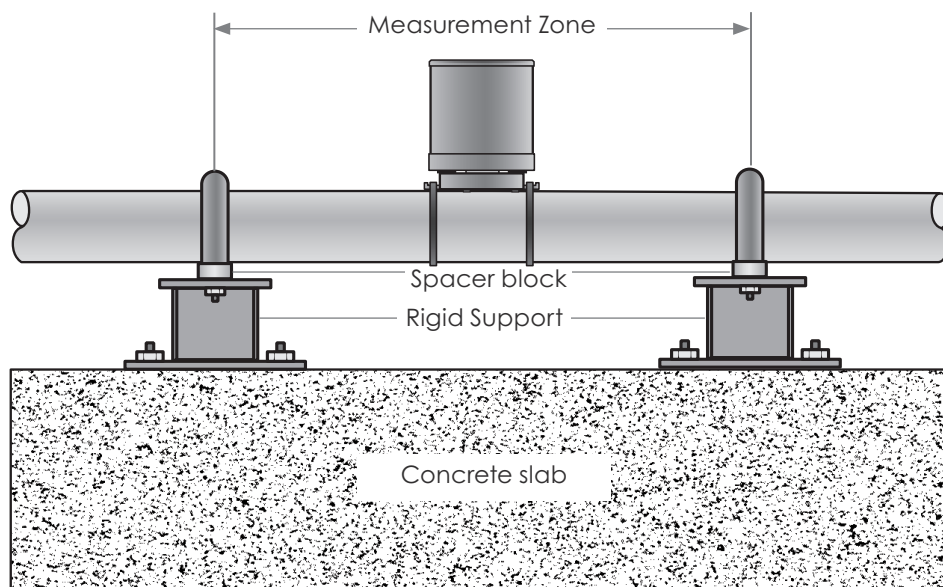


Figure 5.1 Measurement Zone using two Rigid Supports

In addition to the typical structural requirements of pipe supports, the Rigid Supports must meet strict stiffness requirements. A design guide including tables of structural member shapes and size requirements are in **Appendix A: Ultimo's Rigid Support Design Requirements Guide**

5.1 General Requirements of Rigid Supports:

The pipe section to which the SRM will be attached must:

- Be fitted with the proper rigid pipe supports.
- Have rigid pipe supports that are properly spaced.
- Be attached to infrastructure that does not move (i.e.: concrete block, floors, fixed wall).
- Be secured to the infrastructure by robust pipe clamps.
- Pipes $\leq 10''$ must use a Spacer between the pipe and the rigid support.

5.2 Specific Requirements of Rigid Supports:

- Rigid Supports must meet ANSI / ISO Pipe Supports Standard requirements
- Must comply with all applicable local codes
- Must meet Ultimo Rigid Support Design Requirements
- If the rigid supports are comprised of several sections, welding is strongly preferred over bolting. If welding is not possible and bolts are used, the bolts should be aligned axially in the same direction in which the sensor strikes the pipe, as shown in Figure 5.2
- A rigid support column should be bolted to a concrete slab (Figure 5.1), buried in the ground, or attached to an immobile infrastructure using approved standard methods for supporting such pipes.

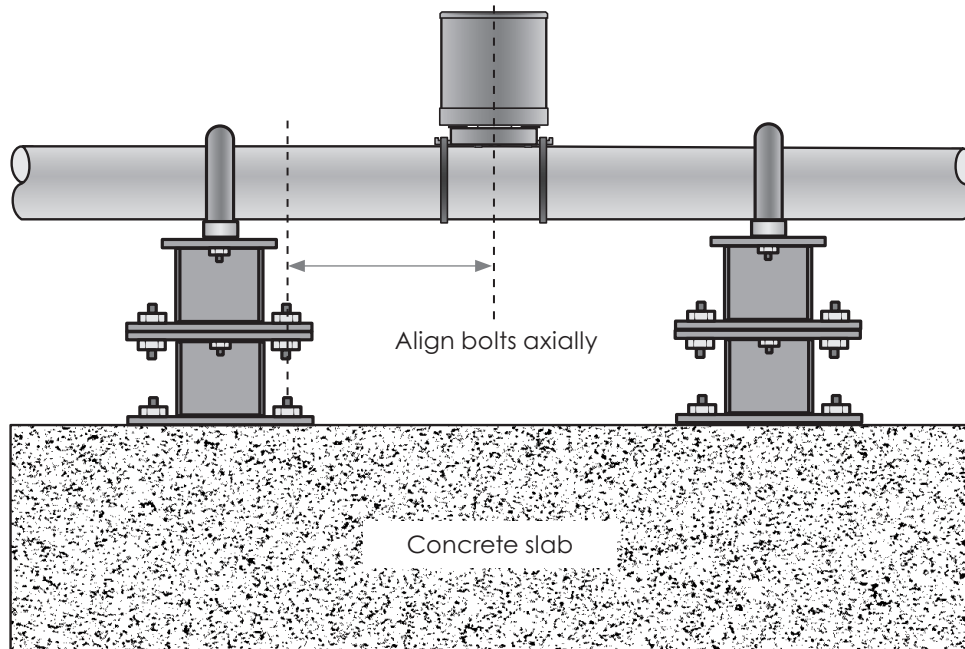


Figure 5.2
Multi-section rigid support, with two sections bolted together

5.3 Examples of Improper Rigid Supports that Negatively Affect Meter Performance

- Many pipe support structures will adequately support the pipe but will not meet the Ultimo Rigid Support requirements. Please see **Appendix B: Examples of Improper Rigid Supports** for examples of support structures that do not meet requirements and result in unsuccessful installations.

6.0 Large Pipes

Pipes larger than 18" do not require Dynamic Isolators or two Rigid Supports to create a Measurement Zone. Large pipes require a single Standard Support within the specified distance range to create a single node. The other side of the measurement zone is not controlled, but must be free of supports, branches, pumps, etc.

SRM mounting location:

- **Metal Pipes:** 38 to 52 inches away from an existing Rigid Support
- **Plastic Pipes:** 17 to 23 inches away from an existing Rigid Support
- The Rigid Support and SRM can be located anywhere along the pipe where the material flow and interference conditions defined in Section 2.0 are met.

Note that the dimensions above are one half the Measurement Zone length specified in Table 2.1. Apply the proper dimension base on pipe size.

If a second Rigid Support exists in the vicinity of the Sensor, the Sensor must be centered between the two Rigid Supports to create a Measurement Zone that meets all length and spacing criteria specified in table 2.1.

Resources Available for Download:

The following tools useful for developing and evaluation the Measurement Zone are available for download on the Ultimo website: www.ultimompd.com

- **Installation Site Mechanical Layout Calculator:** An interactive spreadsheet that allows the user to input application site criteria and will output support structure and spacing requirements. This tool can be used to verify your manual calculations or to design the structural layout of the Measurement Zone.
- **Ultimo Rigid Support Design Requirements:** A technical document showing Rigid Support options with tables showing size requirements and restrictions for different structural component types. (Note that this information is the basis for the outputs generated by the Mechanical Layout Calculator).
- **Dynamic Isolator Drawings:** Use these to fabricate Dynamic Isolators locally.
- **Spacer Drawings:** Use these to fabricate Spacers locally.
- **Installation Site Self Certification:** Tools and forms required for site approval.

For additional support please contact your local Reseller or Tech Support at Ultimo:
Techsupport@ultimompd.com