

Penberthy Magnetic Level Gages



Table of Contents

Management of Change – Page 3

Background – Page 3

Summary of Changes – Page 3-5

Frequently Asked Questions – Page 6

Comparison & Conclusion – Page 7

Management of change

The Management of Change (MOC) process is to ensure that changes to equipment are evaluated, documented and implemented safely. They are designed to proactively address changes that could affect safety or operations within a plant. Exploring new approaches to simplify MOC approval process can improve the efficiency of plant operations. In the past, efforts to upgrade outdated products or replace existing process equipment were often delayed due to the significant amount of paperwork required for completing a complex MOC approval form

Background

Magnetic Level Gauges have been in widespread use for industrial level applications starting in the early 1970's. They offer significant advantages over traditional glass gauges through enhanced safety and durability. Utilizing a fully sealed chamber to isolate the fluid being measured, they reduce the risk of leaks, particularly in hazardous or toxic chemicals. In December 2024, the Penberthy Multiview™ Magnetic Level Gauge Products were acquired by Clark Reliance. To streamline offerings minor design changes have been implemented. In many cases this has resulted in enhanced functionality with potentially no, or minimal impact to form and fit. By combining the expertise, resources, and innovation of both companies, Penberthy can offer a broader range of solutions for diverse applications across the industries.

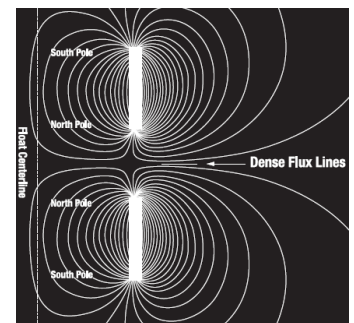
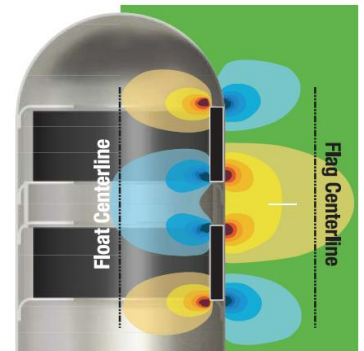
Summary of Changes

Model Code

The model code for Penberthy Magnetic Level Gauges has been updated to align with the Clark Reliance standardized coding system. This change ensures consistency across product lines and facilitates streamlined operations. While the model code has been modified, the product's functionality, and performance specifications remain unchanged. Please refer to updated Magnetic Gauge Bulletin PB100.01 for the revised model codes and corresponding product details.

Float Design

The float design has been upgraded from a single-ring magnet made of Alnico 5 to a dual-ring magnet constructed from Alnico 8. This enhancement generates a stronger magnetic field, effectively preventing decoupling between the float and the indicator. Additionally, the float shell is now manufactured using deep-drawn components, which offer improved strength compared to the previous tubing-based design. These deep-drawn components are seamlessly joined using an autogenous weld, ensuring an unobstructed path for the float within the chamber. Due to these design modifications, the floats are slightly heavier, which may result in a marginally longer float length.



Summary of Changes Cont'd

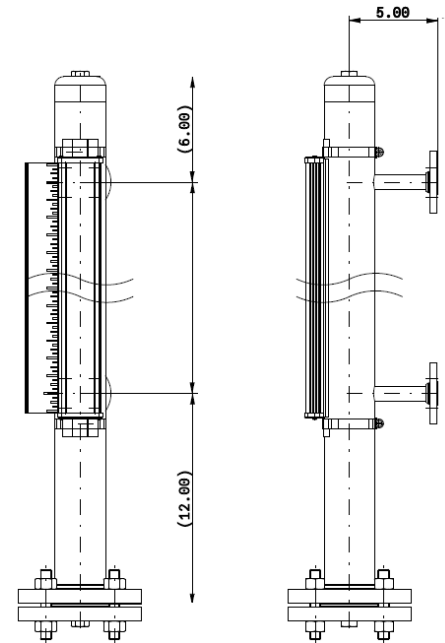
Float Leg (Dimension between the end flange and lower process connection)

The standard float leg dimension is being increased from 10 inches to 12 inches. Magnetic level gauges are engineered-to-order products, and dimensional adjustments to the standard design are common based on process conditions and space constraints.

For retrofit applications where the existing chamber is being reused, it is necessary to procure both a float and an indicator to ensure proper magnetic coupling between the two components. The float is specifically designed based on operating temperature, pressure, and specific gravity (S.G.). In most cases, the float leg dimensions can be maintained. However, in scenarios involving more demanding operating conditions, such as high-pressure or low specific gravity, an increase in float length may be required. This adjustment could result in a reduced visible range or necessitate the addition of a spool piece to accommodate the design modifications.

For MRO (Maintenance, Repair, and Operations) applications, minor piping modifications may be required to integrate the new gauge into the existing setup. Typically, this is only a concern if there are existing connections to the vent or drain of the magnetic level gauge. The center-to-center process connection dimension is the most critical and will remain unchanged. For gauge replacements, it is recommended to contact the factory to review whether the existing dimensions can be maintained.

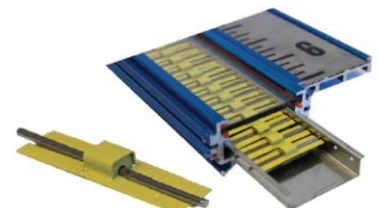
For new construction, approval drawings can be provided upon request to facilitate planning. Any specific space constraints should be communicated in advance so that the design can be adjusted accordingly.



Indicator Design

Follower-style indicators have been discontinued due to the potential risk of decoupling between the float and the indicator, which could result in a complete loss of visible measurement. To enhance reliability and accuracy, alternative solutions with improved magnetic coupling and performance have been implemented.

The updated indicator design features a wide viewing arrangement for enhanced visibility. Each flag is equipped with an individual bar magnet and dual rotation points to ensure consistent performance. Additionally, hermetically sealed indicator options are available for applications requiring increased protection and durability.



Summary of Changes Cont'd

Chamber Construction / Branch Connections

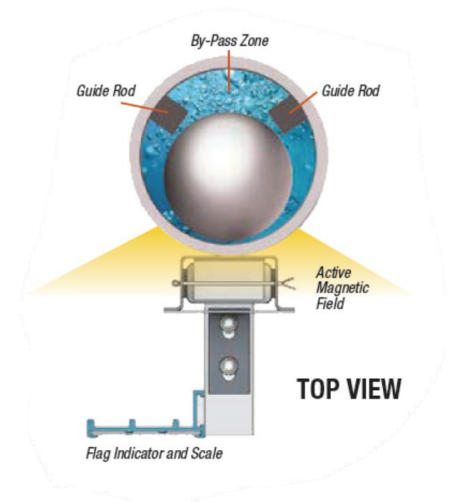
The standard chamber design has been updated to a 2-1/2" Schedule 40 pipe. However, various options are available based on design criteria, allowing for chamber size and schedule increases up to 3" Schedule 160 as needed.

The pressure rating for a Penberthy Magnetic Level Gauge now supports up to 1500# pressure class. Depending on the design requirements, branch connections are typically constructed using a saddle-weld pipe nipple, sockolet / weldolet, or butt-weld prep fitting, with additional options available for butt-weld tees.

Ultimately, the magnetic level gauge is designed to accommodate specific process conditions and is highly configurable to meet customer preferences and application requirements.

Vapor Bypass (PMGV models)

The vapor bypass design, originally intended to assist with flashing applications and unclean service, has been modified. The previous design utilized an internal baffle plate within a 4" chamber. The new design features a 3" chamber with guide rods, which direct the float to one side of the chamber while maintaining the same functionality. This updated design offers a more compact and lightweight solution, addressing space and weight concerns, while also providing a more economical alternative without compromising performance.



Frequently Asked Questions

Q: Does the proposed modification change process technology, or operating and control philosophies?

A: No. Magnetic Level Gauges are engineered to order and as such will be designed to be suitable for the application being installed in.

Q: Have the codes and standards to which the new equipment has been designed changed?

A: No. The Magnetic Level Gauges are designed in accordance with B31.3 with optional design implementation for B31.1.

Q: Do the proposed design modifications affect chemical compatibility ?

A: No. Material compatibility depends on factors such as chemical composition, temperature, pressure, and potential corrosion risks. Penberthy will continue to offer Magnetic level gauges made from a variety of materials to meet various application needs.

Q: Do the proposed modification cause any changes to the piping and instrumentation diagram (P&ID)?

A: Potentially. For many MRO applications, the dimensions of the existing gauge can often be maintained. However, in certain cases, minor adjustments to the float leg may be necessary, which could require piping modifications to the drain connection.

Q: Do the changes to the float design affect measurement accuracy?

A: No. As long as the float remains properly sized for the fluid density and process conditions, measurement accuracy will be maintained. Any modifications are carefully engineered to ensure compatibility with the existing system.

Q: If the chamber size is changed, will the process connection dimensions remain the same?

A: Typically, process connection center-to-center dimensions remain unchanged unless otherwise specified. However, changes in chamber size may require slight modifications to accommodate float movement or clearance.

Q: Who should I contact to ensure a design modification meets my application requirements?

A: For custom modifications, MRO replacements, or new applications, it is recommended to consult the Penberthy applications engineering team to verify compatibility and ensure optimal performance for your specific process conditions.

Comparison

	Design Modification Comparison	
	Updated	Existing
Pressure Class	1500#	900#
Minimum S.G.	0.36	0.37
Temperature	1000F	750F
Float	360 degree dual ring magnet (Alnico8)	Single ring magnet (Alnico5)
Float Materials	316SS, HastC, Monel, Alloy20, PVDF, Titanium	316SS, HastC, Monel, Alloy20, PVDF, Titanium
Float Design	Deep drawn autogenous weld	Tubing
Light Duty	1.5" Sch 10	2" Sch 10
Std Design	2-1/2" Sch 40, 2" Sch 40 (up to sch 160 for high pressure)	2-1/2" Sch 40, 2" Sch 40 (up to sch 80 for high pressure)
Flashing	3" Sch 40 with internal guide rods	4" sch 40 with Baffle Plate
Branch Connection	Various Options Available	Various Options Available
Material Availability	316SS, 304SS, Exotic Alloys	316SS, 304SS, Exotic Alloys
Follower Type Indicator	Not available	Available
Flag Type Indicator	Wide Flag, Traditional Flag, Hermetic Polycarb, Hermetic Glass	Traditional Flag, Hermetic Glass
Scale	Ft/in, M/mm, %, Volume, Custom	Ft/in, M/mm, %, Volume, Custom

Conclusion

The design modifications outlined in this document represent minor adjustments to the Penberthy magnetic level gauge line while maintaining the proven reliability and functionality of the technology. These enhancements have been carefully implemented to optimize performance, improve efficiency, or address specific design considerations, without compromising the gauge's core capabilities. Customers can be assured that the updated design will continue to meet application requirements, industry standards, and performance expectations. Our team remains available to address any questions or concerns and to ensure a seamless transition for both new and existing installations.

For more information...

Bulletin PB100.01

Instruction Manual: PB500.01