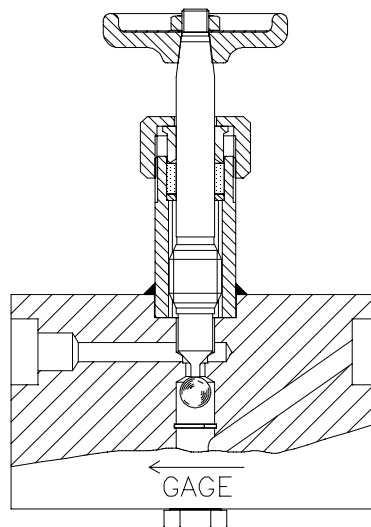
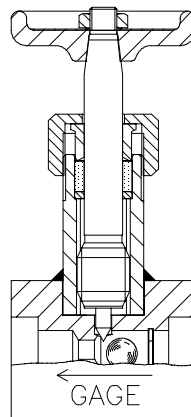


PENBERTHY®

Hy-P-Check Ball Check

For Steam Service



Installation, Operation and Maintenance
Instructions

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PENBERTHY PRODUCT WARRANTY

Tyco Valves & Controls Prophetstown warrants its Penberthy products as designed and manufactured by TV&C Prophetstown to be free of defects in the material and workmanship for a period of one year after the date of installation or eighteen months after the date of manufacture whichever is earliest. TV&C Prophetstown will, at its option, replace or repair any products which fail during the warranty period due to defective material or workmanship.

Prior to submitting any claim for warranty service, the owner must submit proof of purchase to TV&C Prophetstown and obtain written authorization to return the product. Thereafter, the product shall be returned to TV&C in Prophetstown, Illinois, with freight paid.

This warranty shall not apply if the product has been disassembled, tampered with, repaired or otherwise altered outside of TV&C Prophetstown factory, or if it has been subject to misuse, neglect or accident.

The responsibility of TV&C Prophetstown hereunder is limited to repairing or replacing the product at its expense. TV&C Prophetstown shall not be liable for loss, damage or expenses related directly or indirectly to the installation or use of its products, or from any other cause or for consequential damages. It is expressly understood that TV&C Prophetstown is not responsible for damage or injury caused to other products, buildings, personnel or property, by reason of the installation or use of its products.

THIS IS TV&C PROPHETSTOWN'S SOLE WARRANTY AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This document and the warranty contained herein may not be modified and no other warranty, expressed or implied, shall be made by or on behalf of TV&C Prophetstown unless made in writing and signed by the General Manager or Director of Engineering of TV&C Prophetstown.

INSTALLATION, OPERATION and MAINTENANCE MANUAL FOR PENBERTHY HY-P-CHECK BALL CHECKS

1.0 About the Manual

This manual has been prepared as an aid and guide for personnel involved in installation or maintenance. All instructions must be read and understood thoroughly before attempting any installation, operation or maintenance. Failure to follow any instruction could result in a malfunction of the ball check resulting in sudden release of pressure, property damage or physical injury to personnel.

SAFETY INSTRUCTION

Penberthy does not have any control over the manner in which its ball checks are handled, installed, or used. Penberthy cannot and will not guarantee that a ball check is suitable or compatible for the user's specific application.



WARNING



Vessel fluids may be pressurized and can unexpectedly exit vessel connections due to apparatus or material failure. Safety glasses should be worn when installing a ball check. Failure to do so could result in serious physical injury to personnel.

2.0 Introduction

Penberthy Hy-P-Check ball checks are a variation of classic gravity operated flapper type check valves. A free ball is located inside a flowstream bore. If flow occurs in one direction, the ball is displaced by flowstream impact forces against a stop and annular flow continues around the ball. If the flow direction is reversed, the ball is displaced onto a seat where it occludes flow.

Ball checks are provided for steam service with a vertical rising ball for lower mount applications and a horizontal ball with a leaky seat for upper mounting. The purpose of any ball check is to limit the flow of process fluid due to a sudden downstream pressure loss (such as glass breakage). In steam/water applications, the fluid is not costly or toxic but the sudden escape of high-pressure steam or water can cause severe damage or injury if personnel are present. The benefit of the ball check in this application is to safeguard personnel and property, possibly without tripping the unit. Ball checks are available with socketweld, flanged and NPTF connections.

2.1 System Description

Penberthy ball checks are comprised of five basic components. Each component may vary slightly, depending on the desired physical and mechanical properties for the ball check. Use the cross-sectional view in Figure 1 as additional reference material.

Body – a pressure retaining structure through which fluid passes to enter a gage glass or other apparatus. Provides a rigid connection to the vessel and seating surface for the ball. The body is a straight pattern design.

Trim – wetted parts that mechanically control the fluid path from the vessel to the gage glass or other apparatus. The ball and ball knocker act to seal and release the fluid. In the event of mechanical failure, the ball will seat to prevent large quantities of the contained fluid from exiting the vessel. Fluid is allowed to exit the vessel into the gage glass or other apparatus when the ball is resting away from the seated position. The fluid is sealed when the ball is forced into the seated position by a sudden change in flow rate.

The packing retainer provides a compression surface between the process fluid and the packing. A packing gland is used to compress the packing against the retainer and around the ball knocker to prevent leakage.

Packing – under compression, the packing is forced to mold around the ball knocker and prevent leakage of process media during operation.

Ball knocker – used to unseat the ball from its seated position after the system has been brought under control following a leak situation.

Handwheel – rotated to engage threads and provide reciprocating action of the ball knocker.

3.0 Design Criteria

3.1 Design Ratings at Maximum and Minimum Operating Temperatures

The stand-alone ball checks are designed for steam/water use and are designed to ASME Boiler and Pressure Vessel Code (B&PV) Sections I, IIA, IID, IX and ASME B16.34. Manufacturer's rating is 3000 psig @ 700°F [20685 kPa @ 370°C].



WARNING



NEVER exceed the design ratings or application data. Exceeding design ratings or application data may result in mechanical failure of components resulting in serious personal injury and/or property damage.

3.2 Flow and Pressure Requirements for Ball Check Activation

Ball Material	Fluid and Orientation of Ballcheck					
	Air - Horizontal Ball		Water - Horizontal Ball		Water - Vertical Ball	
	Flow Rate	Pressure	Flow Rate	Pressure	Flow Rate	Pressure
Metal	13.3 SCFM [22.6 m ³ / hr]	4.0 psid [27.6 kPad]	3.7 GPM [14.0 ℓ / min]	4.0 psid [27.6 kPad]	4.4 GPM [16.7 ℓ / min]	6.0 psid [41.4 kPad]

4.0 Inspection

Upon receipt of a ball check, inspect all components carefully for damage incurred in shipping. If damage is evident or suspected, do not attempt installation. Notify carrier immediately and request damage inspection. Refer to cross-sectional view drawing in Figure 1 to inventory parts. Figure 1 also shows the differences between the upper and lower ball checks to aid in identification.

4.1 User Rating Inspection

The user should confirm that:

- 1) the pressure/temperature rating stamped on nameplate (see Figure 1, item 3) conforms to the description on the user's purchase order;
- 2) the operating conditions described in the purchase order agree with the actual operating conditions at the installation site;
- 3) the actual operating conditions at the installation site are within the applications data shown on the Penberthy Technical Data Bulletin or product proposal referred to previously;
- 4) the materials of construction of the ball check are compatible with both the contained fluid and the surrounding atmosphere in the specific application.

SAFETY INSTRUCTION

If the model or performance data of the ball check as received does not conform to any of the criteria above, do not proceed with installation. Contact an authorized Penberthy distributor for assistance. The incorrect ball check can result in unacceptable performance and potential damage to the gage or other apparatus.

5.0 Installation

Installation should only be undertaken by qualified personnel who are familiar with this equipment. They should have read and understood all of the instructions in this manual. The user should refer to Penberthy dimension sheets or Penberthy product proposal to obtain dimensional information for the specific size and type ball check.

Penberthy recommendations on ball check installations are not necessarily related to the installation of glass gages or other apparatus. The number of different types of ball check installations is too great to adequately explain in an installation manual. Therefore, it is the user's responsibility to assure that knowledgeable installation personnel plan and carry out the installation in a safe manner.

The ball checks must be installed in the proper orientation (see Figure 2), so that the ball will seat as designed. Ensure that the upper ball check is installed to the upper gage connection and that the lower ball check is installed to the lower gage connection. Each ball check body is stamped with the word "GAGE" and an arrow. The arrow must be pointing to the gage glass to ensure proper operation.

6.0 Operation



W A R N I N G



When in service, the ball knocker must be fully retracted for proper ball check operation. Failure to follow the operating procedures could result in severe personal injury and/or property damage.



Before initializing operation, check that all installation procedures have been completed. Use only qualified, experienced personnel who are familiar with ball check equipment and thoroughly

understand the implications of the tables and all the instructions. Check to determine that all connections are pressure tight.

During normal operation, the ball knocker is fully retracted. In the event of a downstream leak that causes the ball to seat, the pressure in the system must be relieved before the ball is unseated. Once the pressure has been relieved, the ball-knocker may be used to unseat the ball.

If the leak was allowed to continue for an extended period, the ball and seat should be examined for signs of damage - see Section 9.0 Disassembly-Reassembly. Remember to retract the ball-knocker before placing the unit back into service.

7.0 Maintenance

	WARNING	
<p>Use only qualified, experienced personnel who are familiar with ball check equipment and thoroughly understand the implications of the tables and all the instructions. DO NOT proceed with any maintenance unless the ball check assembly has been relieved of all pressure, has been allowed to reach ambient temperature, and has been drained or purged of all fluids. Failure to do so can cause serious personal injury and property damage.</p>		



The user must create maintenance schedules, safety manuals and inspection details for each ball check. These will be based upon the users' own operating experience with their specific application. Realistic maintenance schedules can only be determined with full knowledge of the services and application situations involved.

During system shutdown, the ball checks should be left open to permit the gage to lose pressure and cool with the rest of the system. Failure to leave the ball check open during system shut down may trap high-pressure fluid in the gage.

On all installations, the following items should be regularly evaluated by the user for purposes of preventative maintenance:

1. Leakage around the packing
2. Condition of the ball & seat

8.0 Troubleshooting

	WARNING	
<p>Use only qualified, experienced personnel who are familiar with ball check equipment and thoroughly understand the implications of the tables and all the instructions. DO NOT proceed with any maintenance unless the ball check assembly has been relieved of all pressure, has been allowed to reach ambient temperature, and has been drained or purged of all fluids. Failure to do so can cause serious personal injury and property damage.</p>		

8.1 Packing Leakage

Tightening the packing nut can often stop packing leakage. If the leak persists, the packing should be replaced by following steps 1 through 4 of the Disassembly instructions and 1 through 7 of the reassembly instructions.

8.2 Seat Leakage

Seat leakage is an indication of a worn or damaged ball or seat. To renew the lower seat surface, follow steps 1 and 2 of the disassembly instructions. Renew the seats by using a fine lapping compound and a mandrel the same size, shape, and seat angle as the ball knocker. Flush the ball check body clean and reassemble by following steps 4 and 5 of the Reassembly instructions. The lower ball can be removed by removing the pipe plug (12) and the ball check retainer (11).

Note: Adhering to ASME Boiler Code, the upper ball check is manufactured with a leaky seat. This allows a small amount of steam to escape, giving visual indication that the gage requires maintenance.

If the upper ball has worn to the point of allowing excessive steam passage, the entire upper ball check should be replaced.

9.0 Disassembly - Reassembly

9.1 Disassembly

Refer to the cross-section parts drawing in Figure 1 for additional Reference during disassembly and reassembly of the ball checks.

1. Remove handwheel nut (1), I.D. plate (3), and handwheel (2) from ball knocker.
2. Loosen and remove packing nut (9).
3. Remove ball knocker (4) by turning counterclockwise, along with packing gland (5), packing (6), and packing retainer (7).
4. Slip the packing gland, packing and packing retainer off the ball knocker.

9.2 Reassembly

Refer to the cross-section parts drawing in Figure 1 for additional Reference during disassembly and reassembly of the ball checks.

1. Prepare for installation of new packing by cleaning all packing chambers and glands of ball checks.
2. Slip packing retainer (7) onto ball knocker (4).
3. Install new packing (6) and packing gland (5).
4. Thread ball knocker assembly into ball check by turning clockwise until ball knocker seats and then back off one turn.
5. Assemble packing nut (9) and tighten in place.
6. Assemble handwheel (2), I.D. plate (3) and handwheel nut (1) onto ball knocker and tighten securely in place.
7. After the unit is returned to service, fully retract the ball knocker by turning counterclockwise, to allow the ball check to function normally.

10.0 Disposal at End of Useful Life

Penberthy Hy-P-Check ball checks are used in a variety of fluid applications. By following the appropriate federal and industry regulations, the user must determine the extent of preparation and treatment the Hy-P-Check ball checks must incur before its disposal. A Material Safety Data Sheet (MSDS) may be required before disposal services accept certain components.

Metal, glass and polymers should be recycled whenever possible. Refer to order and TV&C - Prophetstown Material Specification sheets for materials of construction

11.0 Telephone Assistance

If you are having difficulty with your Hy-P-Check ball checks, contact your local Penberthy distributor. You may also contact the factory direct at (815) 537-2311 and ask for an applications engineer. So that we may assist you more effectively, please have as much of the following information available as possible when you call:

Model #

Name of the company from whom you purchased the Hy-P-Check ball checks

Invoice # and date

Process conditions (pressure, flow rates, tank shape, etc)

A brief description of the problem

Troubleshooting procedures that failed

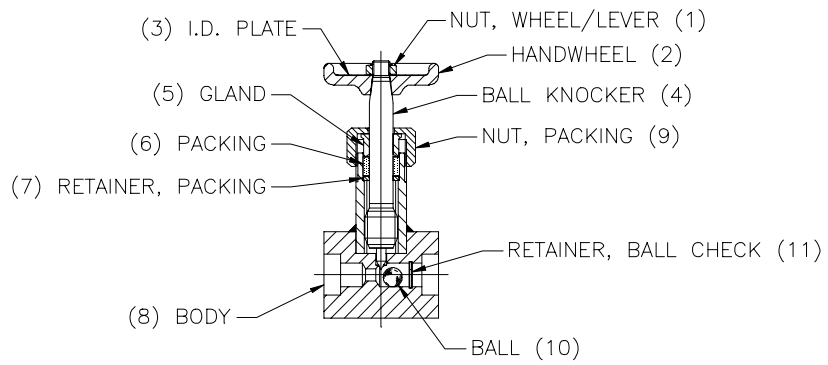
If attempts to solve your problem fail, you may request to return your Hy-P-Check ball checks to the factory for intensive testing. You must obtain a Return Authorization (R.A.) number from TV&C Prophetstown before returning anything. Failure to do so will result in the unit being returned to you without being tested, freight collect. To obtain an R.A. number, the following information (in addition to that above) is needed:

Reason for return

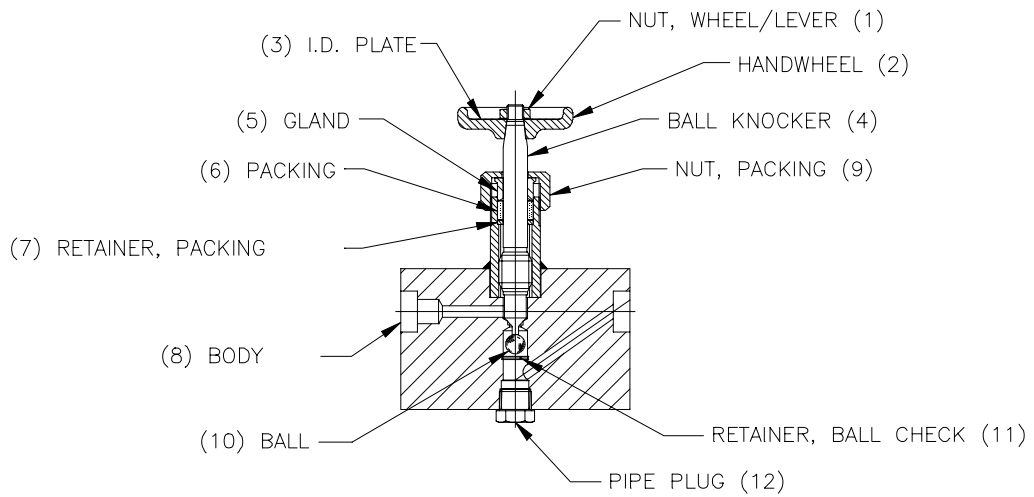
Person to contact at your company

"Ship To" address

There is a minimum charge of \$75.00 for evaluation of non-warranty units. You will be contacted before any repairs are initiated should the cost exceed the minimum charge. If you return a unit under warranty, but is not defective, the minimum charge will apply.



UPPER BALL CHECK



LOWER BALL CHECK

Figure 1 - Ball Check Components

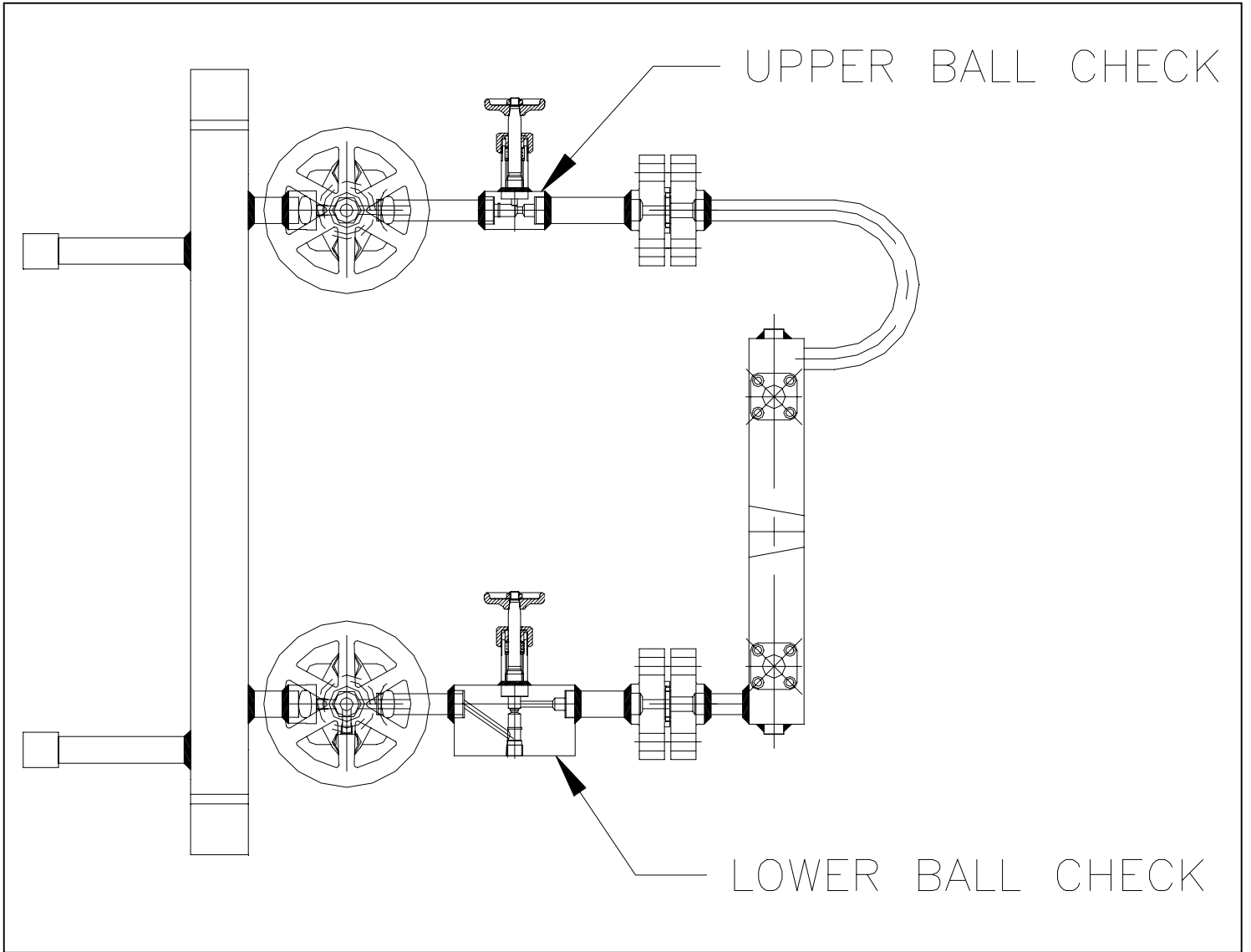


Figure 2 - Example Ball Check Installation



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