Feedthrough for a Pressure Vessel

Related Applications

[0001] This application claims priority to U.S. Non-Provisional Patent Application No. 17/703,629, filed March 24, 2022 entitled “Feedthrough for a Pressure Vessel”, which is incorporated by reference herein in its entirety.

Technical Field

[0002] Embodiments of the present invention are related to a feedthrough for use in a pressure vessel.

Discussion of Related Art

[0003] Pressure vessels are used in a variety of application, including metal hydrogen batteries, hydrogen storage vessels, and other applications. For renewable energy resources such as wind and solar to be competitive with traditional fossil fuels, large-scale energy storage systems are needed to mitigate their intrinsic intermittency. Metal hydrogen batteries can be used in such applications. Additionally, storage of high-pressure gas or fuel gasses such as hydrogen can be used to store energy. Feedthroughs that allow for gas or liquid flow as well as electrical communications with the contents of a pressure vessel are important. However, feedthroughs that provide sufficient access and sealing properties are difficult to provide.

[0004] Consequently, there is a need for better feedthroughs for pressure vessel applications.

Summary

[0005] In accordance with embodiments a feedthrough that can be used in pressure vessels is presented. According to a first aspect of the present invention, there is provided a feedthrough that includes a body that includes a base portion configured to be attached to a pressure vessel, a barrel portion coupled to the base portion, a through-hole formed through the base portion and the barrel portion that accommodates a terminal, and threads formed on the inner portion of the through-hole, the threads having a rounded or a square thread; and an insulator that includes a top portion, a barrel portion coupled to the top portion, a through-hole formed through the top portion and the barrel portion, and threads formed on the outer portion of the barrel portion; and wherein the insulator is screwed into the body to form the feedthrough.

[0006] According to a second aspect of the present invention, there is provided a method of operating a feedthrough attached to a pressure vessel that includes screwing an insulator into a body, the body being attached to the pressure vessel, wherein the insulator and the body both include threads that are rounded or square to form a seal between the threads of the body and the threads of the insulator; inserting a component through a through-hole in the insulator; and compressing the body to form seals between the component and the through-hole in the insulator and the threads of the insulator and the body.

[0007] According to a third aspect of the present invention, there is provided a method of operating a feedthrough attached to a pressure vessel that includes screwing an insulator into a body, the body being attached to the pressure vessel, wherein the insulator and the body both include threads; inserting a component through a through-hole in the insulator such that an interference seal is formed between the component and the insulator; using a fill structure formed in the insulator, the fill structure including a first pipe extending from the insulator and communicating with a fill through-hole in the insulator and a second pipe angularly extending from the insulator and communicating with the fill through-hole in the insulator, wherein the first pipe includes a barrier; inserting a plug through the barrier in the first pipe and into the fill through-hole; compressing the body to form seals between the component and the through-hole in the insulator, the plug and the fill through-hole in the insulator, and the threads of the insulator and the body; and removing the first pipe and the second pipe.

[0008] According to a fourth aspect of the present invention, there is provided a feedthrough that includes a body, the body including a base portion configured to be attached to a pressure vessel, a barrel portion coupled to the base portion, a through-hole formed through the base portion and the barrel portion, and threads formed on the inner portion of the through-hole; and an insulator, the insulator including a top portion, a barrel portion coupled to the top portion, a through-hole formed through the top portion and the barrel portion, threads formed on the outer portion of the barrel portion, a bottom thread of the threads being tapered, and one or more additional through-holes formed in the top portion and the barrel portion of the insulator; and wherein the insulator is screwed into the body to form the feedthrough.

[0009] These and other embodiments are discussed below with respect to the following figures.