DOUBLE METAL TO METAL KX SEAL

Field of the invention

The invention relates to a seal assembly to be used in connections between pipe elements, such as risers, hubs, modules, flowlines, connectors or similar. The seal assembly is particularly applicable in subsea applications.

Background of the invention

It exists prior art solutions utilizing a single metal to metal seal for a great variety of applications subsea. As customer's requirements become more stringent, the requirement for a secondary seal has been introduced for such applications. The requirements are today met utilizing an additional elastomer seal. The additional elastomer seal has natural limitations in form of chemical compatibility and temperature range. An example of a prior art solution having a single metal to metal seal and an additional elastomeric seal is disclosed in Norwegian patent NO332742B. This patent relates to a tubular joint comprising first and second tubular elements, a metallic seal ring designed to form a primary seal positioned between the tubular members, and an additional seal radially outwardly of the primary seal.

It has proved difficult to provide a seal, with metal to metal seal that is not damaged during make-up of connections. Seals comprising a single seal element might have low tolerance with regards to misalignments between the two parts that are connected due to the rigidity of the seal. This also makes it difficult to provide a double metal to metal seal system. If the degree of misalignment is high, the seal might be damaged, i.e. that it is not properly tight, or the connections on one or both of the parts being connected might be damaged.

An object of the invention is to provide a seal assembly that allows some degree of relative movement without damaging the seal, and which also provides a safer seal assembly and may be used as a metal to metal seal assembly.

Summary of the invention

The invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention.

The invention concerns a seal assembly for a piping connection comprising;
- a first part having at least one projecting rib extending at least partially along an outer circumference thereof, ~~and~~
~~- a second part arranged to be attached to the first part, the second part being provided with at least one recess on an inner surface thereof, which recess is adapted to receive the projecting rib when the first and second parts are connected,~~

where the first part is provided with a first and third corresponding shoulder for sealing connection with a first and third shoulder of a first and second piping end when connected, and

- a second part arranged to be attached to the first part, the second part being provided with at least one recess on an inner surface thereof, which recess is adapted to receive the projecting rib when the first and second parts are connected, and wherein the second part is provided with second and fourth corresponding shoulders for sealing connection with a second and fourth shoulder of the first and second piping ends when connected.

CLAIMS

1. A seal assembly (1) for a piping connection comprising;

- a first part (2) having at least one projecting rib (18) extending at least partially along an outer circumference thereof, where the first part (2) is provided with a first third corresponding shoulder (8', 13') for sealing connection with a first and third shoulder (8, 13) of a first and second piping end (4, 5) when connected, and

- a second part (3) arranged to be attached to the first part, the second part being provided with at least one recess (16) on an inner surface thereof, which recess (16) is adapted to receive the projecting rib (18) when the first (2) and second (3) parts are connected, and wherein the second part (2) is provided with second and fourth corresponding shoulders (9, 12) of the first and second piping ends (4, 5) when connected, and

- the recess (16) has a larger cross-section area than the cross-section area occupied by the projecting rib (18) within the recess (16),

such that when the first (2) and second (3) parts are connected, they are free to move relative to each other in at least one direction.

2. A seal assembly (1) according to claim 1, wherein the second part (3) is provided with at least one section (17) extending at least partially along the inner surface from a first axial end ending in the recess (16), wherein the at least one section (17) and recess (16) of the second part (3) is provided to receive the at least one projecting rib (18) of the first part (2) during connection of the first part (2) and second part (3).

3. A seal assembly (1) according to claim 2, wherein the at least one section (17) in the second part (3) is provided with threads, and the projecting rib (18) in the first part (2) is provided with corresponding threads.

4. A seal assembly (1) according to any of the preceding claims, wherein the first part (2) and second part (3) are made of metal.

5. A seal assembly (1) according to any of the preceding claims, wherein one of the first part (2) or second part (3) is made of metal and the other is made of composite material.

6. A seal assembly (1) according to any of the preceding claims, wherein the first part (2) and second part (3) are made of composite material.

7. A seal assembly (1) according to any of the preceding claims, wherein the seal assembly (1) comprises means (11) for performing pressure testing of the seal.

8. A seal assembly according to any of the preceding claims, wherein the first part (2) and second part (3) are ring-shaped.

CLAIMS

1. A seal assembly for a piping connection comprising:

- a first part having at least one projecting rib extending at least partially along an outer circumference thereof, where the first part is provided with a first and third corresponding shoulder for sealing connection with a first and third shoulder of a first and second piping end when connected, and

- a second part arranged to be attached to the first part, the second part being provided with at least one recess on an inner surface thereof, which recess is adapted to receive the projecting rib when the first and second parts are connected, and wherein the second part is provided with second and fourth corresponding shoulders for sealing connection with a second and fourth shoulder of the first and second piping ends when connected, and

- the recess has a larger cross-section area than the cross-section area occupied by the projecting rib within the recess,

such that when the first and second parts are connected, they are free to move relative to each other in at least one direction.

2. A seal assembly according to claim 1, wherein the second part is provided with at least one section extending at least partially along the inner surface from a first axial end ending in the recess, wherein the at least one section and recess of the second part is provided to receive the at least one projecting rib of the first part during connection of the first part and second part.

3. A seal assembly according to claim 2, wherein the at least one section in the second part is provided with threads, and the projecting rib in the first part is provided with corresponding threads.

4. A seal assembly according to any of the preceding claims, wherein the first part and second part are made of metal.

5. A seal assembly according to any of the preceding claims, wherein one of the first part or second part is made of metal and the other is made of composite material.

6. A seal assembly according to any of the preceding claims, wherein the first part and second part are made of composite material.

7. A seal assembly according to any of the preceding claims, wherein the seal assembly comprises means for performing pressure testing of the seal.

8. A seal assembly according to any of the preceding claims, wherein the first part and second part are ring-shaped.