CLAIMS:

1. A connector for use with a subsea riser installation, the connector comprising a body with a first connecting face having a through-passageway and adapted for connection to a first, external conduit element and a gimbal joint within the body, the gimbal joint having a through-passageway which is substantially aligned with the through-passageway in the first face, and a second connecting face on an opposite side of the connector to the first connecting face and adapted for connection to a second external conduit element, the connector further comprising at least one detent mechanism adapted to engage a corresponding locating feature on the gimbal joint, whereby the through-passageways are maintained in alignment and the gimbal joint prevented from moving relative to the body until a predetermined bending moment is applied to the gimbal joint across the axis of its through-passageway.

2. A connector according to claim 1, wherein a plurality of detent mechanisms are provided spaced around the body to engage corresponding locating features on the gimbal joint.

3. A connector according to claim 2, wherein the detent mechanisms are evenly spaced around the axis of the through-passageway of the body.

4. A connector according to any preceding claim, wherein the or each detent mechanism includes adjustment means for adjusting the force to be applied to the corresponding locating feature for determining the predetermined bending moment required to trigger movement of the gimbal joint.

5. A connector according to any preceding claim, wherein the or each detent mechanism comprises a detent acted on by spring means.

6. A connector according to claim 5 as dependent on claim 4, wherein the or each adjustment means comprises means for adjusting the spring rate of the spring means of the detent mechanism.

7. A connector according to claim 4, wherein the or each adjustment means comprises hydraulic means.

8. A connector according to any preceding claim, wherein the or each detent mechanism is disposed in a direction normal to the axis of the through-passageway of the body.

9. A connector according to any of claims 1 to 7, wherein the or each detent mechanism is disposed in a direction inclined relative to the axis of the through-passageway of the body.

10. A connector according to any preceding claim, wherein the body comprises an outer body part which receives the gimbal joint and an inner body part retaining the gimbal joint in place.

11. A riser installation including a connector according to any preceding claim.

12. A method of providing a relief joint for a riser installation, the method comprising: providing a connector comprising a body with a first connecting face having a through-passageway; providing a gimbal joint within the body, the gimbal joint having a through-passageway which is substantially aligned with the through-passageway in the first face, and a second connecting face on an opposite side of the connector to the first connecting face; connecting the first connecting face to a first, external conduit element; and connecting the second connecting face to a second external conduit element, the method further comprising providing at least one detent mechanism which engages a corresponding locating feature on the gimbal joint, whereby the through-passageways are maintained in alignment and the gimbal joint is prevented from moving relative to the body until a predetermined bending moment is applied to the gimbal joint across the axis of its through-passageway.

13. A method according to claim 12, wherein a plurality of detent mechanisms are provided, spaced around the body to engage corresponding locating features on the gimbal joint.

14. A method according to either of claims 12 and 13, including the step of adjusting the force applied by the or each detent mechanism to the corresponding locating feature for determining the predetermined bending moment required to trigger movement of the gimbal joint.

15. A method according to any of claims 12 to 14, wherein the or each detent mechanism comprises a detent acted on by spring means.

16. A method according to claim 15 as dependent on claim 14, wherein the adjusting step comprises adjusting the spring rate of the spring means of the or each detent mechanism.

Claims

1. A connector (10A) for use with a subsea riser installation, the connector (10A) comprising a body with a first connecting face having a through-passageway (14) and adapted for connection to a first, external conduit element and further comprising a ball joint (15) within the body, the ball joint (15) having a through-passageway (17) which is substantially aligned with the through-passageway (14) in the first face, and the ball joint having a second connecting face on an opposite side of the connector (10A) to the first connecting face and adapted for connection to a second external conduit element, characterised in that the connector (10A) further comprises at least one detent mechanism adapted to engage a corresponding locating feature on the ball joint (15), whereby the through-passageways are maintained in alignment and the detent mechanism prevents the ball joint (15) from moving relative to the body until a predetermined bending moment is applied to the ball joint across the axis of its through-passageway.

2. A connector (10A) according to claim 1, wherein a plurality of detent mechanisms (20) are provided spaced around the body to engage corresponding locating features on the ball joint (15).

3. A connector (10A) according to claim 2, wherein the detent mechanisms (20) are evenly spaced around the axis of the through-passageway of the body.

4. A connector (10A) according to any preceding claim, wherein the or each detent mechanism (20) includes adjustment means for adjusting the force to be applied to the corresponding locating feature for determining the predetermined bending moment required to trigger movement of the ball joint (15).

5. A connector (10A) according to any preceding claim, wherein the or each detent mechanism (20) comprises a detent acted on by spring means.

6. A connector (10A) according to claim 5 as dependent on claim 4, wherein the or each adjustment means comprises means for adjusting the spring rate of the spring means of the detent mechanism.

7. A connector (10A) according to claim 4, wherein the or each adjustment means comprises hydraulic means.

8. A connector (10A) according to any preceding claim, wherein the or each detent mechanism (20) is disposed in a direction normal to the axis of the through-passageway of the body.

9. A connector (10A) according to any of claims 1 to 7, wherein the or each detent mechanism (20) is disposed in a direction inclined relative to the axis of the through-passageway of the body.

10. A connector (10A) according to any preceding claim, wherein the body comprises an outer body part which receives the ball joint (15) and an inner body part retaining the ball joint (15) in place.

11. A riser installation including a connector (10A) according to any preceding claim.

12. A method of providing a relief joint for a riser installation, the method comprising: providing a connector (10A) comprising a body with a first connecting face having a through-passageway (14); providing a ball joint (15) within the body, the ball joint (15) having a through-passageway (17) which is substantially aligned with the through-passageway (14) in the first face, and the ball joint having a second connecting face on an opposite side of the connector (10A) to the first connecting face; connecting the first connecting face to a first, external conduit element; and connecting the second connecting face to a second external conduit element, characterised in that the method further comprises providing at least one detent mechanism which engages a corresponding locating feature on the ball joint (15), whereby the through-passageways are maintained in alignment and the detent mechanism prevents the ball joint (15) from moving relative to the body until a predetermined bending moment is applied to the ball joint (15) across the axis of its through-passageway.

13. A method according to claim 12, wherein a plurality of detent mechanisms (20) are provided, spaced around the body to engage corresponding locating features on the ball joint (15).

14. A method according to either of claims 12 and 13, including the step of adjusting the force applied by the or each detent mechanism (20) to the corresponding locating feature for determining the predetermined bending moment required to trigger movement of the ball joint (15).

15. A method according to any of claims 12 to 14, wherein the or each detent mechanism (20) comprises a detent acted on by spring means.

16. A method according to claim 15 as dependent on claim 14, wherein the adjusting step comprises adjusting the spring rate of the spring means of the or each detent mechanism (20).