CLAIMS

1. A safety joint comprising:

a first riser part and a second riser part overlapping in an axial direction and having end connections to be connectable as part of a riser,

a release unit, locking the two riser parts together in a not activated mode, the release unit having other modes comprising a partly activated mode and fully activated mode,

where the release unit comprises at least one axial extending tension rod connected between the two riser parts, which tension rod is configured to deform plastically before breaking, thereby activating the partly and fully activated modes.

2. Safety joint according to claim 1, wherein the safety joint comprises at least a cylinder arrangement, wherein the cylinder arrangement is arranged such that it compensates the safety joint and the at least one tension rod for internal pressure in the riser in the not activated mode and the partly activated mode, and the safety joint in the fully activated mode.

3. Safety joint according to claim 1 or 2, wherein the cylinder arrangement is adapted for increasing the forces acting against release of the first and second riser parts in the fully activated mode.

4. A safety joint according to claim 1, 2 or 3, wherein the cylinder arrangement comprises one cylinder set arranged such that it compensates the at least one tension rod for internal pressure in the riser in the not activated mode and the partly activated mode, and that the one cylinder set is adapted for increasing the forces acting against the release of the first and second riser parts in the fully activated mode.

5. A safety joint according to claim 1, 2 or 3, wherein the cylinder arrangement comprises a first set of cylinders and a second set of cylinders, and where the first set of cylinders is adapted for compensating the at least one tension rod for the internal pressure in the riser in the not activated mode, the second set of cylinders is adapted for compensating the at least one tension rod for the internal pressure in the riser in the partly activated mode, and wherein the second set of cylinders is adapted for increasing the forces acting against the release of the first and second riser parts in the fully activated mode.

6. A safety joint according to claim 5, wherein the first set of cylinders is shorter than the second set of cylinders.

7. A safety joint according to claims 1, 2, 4, 5 or 6, wherein the first set of cylinders is connected to the second set of cylinders through a mechanical link, and

that the pistons in the first and second set of cylinders are equally moved in the not activated mode and the fully activated mode.

8. A safety joint according to claims 1, 2, 4, 5, 6 or 7, wherein the cylinder arrangement comprises a third set of cylinders, which third set of cylinders is adapted to be activated during the fully activated mode of the release unit.

9. A safety joint according to claim 8, wherein the third set of cylinders is in communication with seawater on one side of the piston and a fluid on the other side of the piston, and wherein the third set of cylinders are adapted to contribute to the force acting against release of the first and second riser parts in the fully activated mode.

10. A safety joint according to any of the preceding claims, wherein the safety joint comprises a manifold adapted for distributing a fluid in order to compensate for the internal pressure within the riser to the different cylinders in the cylinder arrangement, and that the manifold comprises at least one flow regulating means, which flow regulating means is adapted for regulating to which of the cylinders the fluid is distributed.

11. A safety joint according to any of the preceding claims, wherein it comprises a manifold adapted for distributing the internal pressure within the riser to the different cylinders in the cylinder arrangement, having at least one of the bores in the manifold, leading to one cylinder comprising a floating piston.

12. A method of operating a safety joint in case of excessive tension in the riser, providing a riser with a safety joint comprising a first riser part and a second riser part overlapping in an axial direction and connecting the ends to make the safety joint form part of a riser, the safety joint further comprising a release unit with at least one axial extending tension rod connected between the two riser parts, wherein

in a not activated mode, the safety joint is keeping the riser parts as one unit and pressure compensates the tension rods for internal pressure within the riser,

increasing the tension in the riser to a partly activated mode, thereby creating plastic deformation of the tension rods allowing the riser parts to move relative each other over a small distance,

further increasing the tension in the riser to a fully activated mode thereby breaking the tension rods,

and in all modes, not activated, partly activated and fully activated, allowing controlled disconnection of the riser at another joint in the riser,

or in a fully release mode, when tension is further increased, release the two riser parts of the safety joint.

13. Method according to claim 12, wherein the method, after the step of increasing the tension in the riser to a fully activated mode thereby breaking the tension rods, further comprises activating a set of cylinders in a cylinder arrangement and creating a force in the safety joint acting against the release of the two riser parts, and allowing telescopic action in the safety joint.

CLAIMS

1. A safety joint comprising:

a first riser part and a second riser part overlapping in an axial direction and having end connections to be connectable as part of a riser,

a release unit, locking the two riser parts together in a not activated mode, the release unit having other modes comprising a partly activated mode and fully activated mode,

where the release unit comprises at least one axial extending tension rod connected between the two riser parts, which tension rod is configured to deform plastically before breaking, thereby activating the release unit from the not activated mode to the partly and fully activated modes.

2. Safety joint according to claim 1, wherein the safety joint comprises at least a cylinder arrangement, wherein the cylinder arrangement is arranged such that it compensates the safety joint and the at least one tension rod for internal pressure in the riser in the not activated mode and the partly activated mode, and the safety joint in the fully activated mode.

3. Safety joint according to claim 1 or 2, wherein the cylinder arrangement is adapted for increasing the forces acting against release of the first and second riser parts in the fully activated mode.

4. A safety joint according to claim 1, 2 or 3, wherein the cylinder arrangement comprises one cylinder set arranged such that it compensates the at least one tension rod for internal pressure in the riser in the not activated mode and the partly activated mode, and that the one cylinder set is adapted for increasing the forces acting against the release of the first and second riser parts in the fully activated mode.

5. A safety joint according to claim 1, 2 or 3, wherein the cylinder arrangement comprises a first set of cylinders and a second set of cylinders, and where the first set of cylinders is adapted for compensating the at least one tension rod for the internal pressure in the riser in the not activated mode, the second set of cylinders is adapted for compensating the at least one tension rod for the internal pressure in the riser in the partly activated mode, and wherein the second set of cylinders is adapted for increasing the forces acting against the release of the first and second riser parts in the fully activated mode.

6. A safety joint according to claim 5, wherein the first set of cylinders is shorter than the second set of cylinders.

7. A safety joint according to claims 1, 2, 4, 5 or 6, wherein the first set of cylinders is connected to the second set of cylinders through a mechanical link, and that the pistons in the first and second set of cylinders are equally moved in the not activated mode and the fully activated mode.

8. A safety joint according to claims 1, 2, 4, 5, 6 or 7, wherein the cylinder arrangement comprises a third set of cylinders, which third set of cylinders is adapted to be activated during the fully activated mode of the release unit.

9. A safety joint according to claim 8, wherein the third set of cylinders is in communication with seawater on one side of a piston and a fluid on the other side of the piston, and wherein the third set of cylinders is adapted to contribute to the force acting against release of the first and second riser parts in the fully activated mode.

10. A safety joint according to any of the preceding claims, wherein the safety joint comprises a manifold adapted for distributing a fluid in order to compensate for the internal pressure within the riser to the different cylinders in the cylinder arrangement, and that the manifold comprises at least one flow regulating means, which flow regulating means is adapted for regulating to which of the cylinders the fluid is distributed.

11. A safety joint according to any of the preceding claims, wherein it comprises a manifold adapted for distributing the internal pressure within the riser to the different cylinders in the cylinder arrangement, having at least one of the bores in the manifold, leading to one cylinder comprising a floating piston.

12. A method of operating a safety joint in case of excessive tension in the riser, providing a riser with a safety joint comprising a first riser part and a second riser part overlapping in an axial direction and connecting the ends to make the safety joint form part of a riser, the safety joint further comprising a release unit with at least one axial extending tension rod connected between the two riser parts, wherein

in a not activated mode, the safety joint is keeping the riser parts as one unit and pressure compensates the tension rods for internal pressure within the riser,

increasing the tension in the riser to a partly activated mode, thereby creating plastic deformation of the tension rods allowing the riser parts to move relative each other over a small distance,

further increasing the tension in the riser to a fully activated mode thereby breaking the tension rods,

and in all modes, not activated, partly activated and fully activated, allowing controlled disconnection of the riser at another joint in the riser,

or in a fully release mode, when tension is further increased, release the two riser parts of the safety joint.

13. Method according to claim 12, wherein the method, after the step of increasing the tension in the riser to a fully activated mode thereby breaking the tension rods, further comprises activating a set of cylinders in a cylinder arrangement and creating a force in the safety joint acting against the release of the two riser parts, and allowing telescopic action in the safety joint.