

What is claimed is:

1. A pipe blocker (11) for blocking a pipe (39) comprising:
 - a tubular body (13) defining a central cavity (17) having an inlet (19), an outlet (23), and an axis (15);
 - a plurality of conical blocker rings (33) mounted to an inner diameter surface of the tubular body (13) within the cavity (17), at least some of the blocker rings (33) being rigid (35) and some of the blocker rings (33) being compliant (37);
 - the blocker rings (33) adapted to seal to a pipe end (39) inserted into the central cavity (17);
 - the rigid blocker rings (35) having an outer diameter joined to an inner diameter of the central cavity (17); and
 - the compliant blocker rings (37) having an inner diameter smaller than an inner diameter of the rigid blocker rings (35) and adapted to seal around an exterior of the pipe (39) when inserted from the inlet (19).
2. The pipe blocker (11) of Claim 1, wherein the blocker rings (33) are secured to the tubular body (13) so that an inner diameter of each blocker ring (33) is axially closer to the outlet (23) than the outer diameter of the blocker ring (33) where the blocker rings (33) secures to the tubular body (13).
3. The pipe blocker (11) of Claim 1, wherein the outer diameter of each rigid blocker ring (35) is secured to the inner diameter of the central cavity (17).
4. The pipe blocker (11) of Claim 1, wherein the rigid blocker rings (35) alternate with the compliant blocker rings (37).
5. The pipe blocker (11) of Claim 1, wherein the rigid blocker rings (35) are formed of a metal and the outer diameters of the rigid blocker rings (35) are welded to the inner diameter of the central cavity (17).
6. The pipe blocker (11) of Claim 1, wherein the compliant blocker rings (37) are formed of an elastomer.

7. The pipe blocker (11) of Claim 1, wherein a conical surface of each compliant blocker ring (37) seals against a conical surface of at least one rigid blocker ring (35).

8. The pipe blocker (11) of Claim 1, further comprising a downward facing annular shoulder (25) at the outlet (23) within the central cavity (17), the downward facing shoulder (25) adapted to be abutted by an end of the pipe (39) when the pipe (39) is inserted into the central cavity (17)

9. The pipe blocker (11) of Claim 8, wherein a closest one of the blocker rings (33) is axially spaced from the shoulder (25) to allow fluid in the pipe (39) to act against at least some of the blocker rings (33) in a direction toward the inlet (19).

10. The pipe blocker (11) of Claim 1, wherein a flange (21) is formed on an exterior upper end of the tubular body (13), the flange (21) adapted to secure the pipe blocker (11) to subsequent subsea devices.

11. The pipe blocker (11) of Claim 1, further comprising a manipulation member (29) secured to an end of the tubular body (13) and adapted to be interacted with by at least one of an operator or a remotely operated vehicle.

12. A pipe blocker (11) for blocking a pipe (39) comprising:

a tubular body (13) defining a central cavity (17) having an inlet (19), an outlet (23), and an axis (15);

a plurality of conical blocker rings (33) mounted to an inner diameter surface of the tubular body (13) within the central cavity (17), at least some of the blocker rings (33) being rigid and some of the blocker rings (33) being compliant;

the blocker rings (33) adapted to seal to a pipe (39) end inserted into the central cavity (17);

the rigid blocker rings (35) having an outer diameter joined to an inner diameter of the central cavity (17);

the compliant blocker rings (37) having an inner diameter smaller than an inner diameter of the rigid blocker rings (35) and adapted to seal around an exterior of the pipe (39) when inserted from the inlet (19);

the blocker rings (33) secured to the tubular body (13) so that an outer diameter of each blocker ring (33), where the blocker ring (33) secures to the tubular body (13), is axially lower than the inner diameter of the blocker ring (33);

the outer diameter of each rigid blocker ring (35) is secured to the inner diameter of the central cavity (17); and

the rigid blocker rings (35) alternate with the compliant blocker rings (37).

13. The pipe blocker (11) of Claim 12, wherein:

the rigid blocker rings (35) are formed of a metal and the outer diameters of the rigid blocker rings (35) are welded to the inner diameter of the central cavity (17); and

the compliant blocker rings (37) are formed of an elastomer.

14. The pipe blocker (11) of Claim 12, wherein:

a conical surface of each compliant blocker ring (37) seals against a conical surface of at least one rigid blocker ring (35); and

the conical surfaces of the compliant and rigid blocker rings (37, 35) are at the same angle.

15. The pipe blocker (11) of Claim 12, further comprising:

a downward facing annular shoulder (25) at the outlet (23) within the central cavity (17), the downward facing shoulder (25) adapted to be abutted by an end of the pipe (39) when the pipe (39) is inserted into the central cavity (17); and

an upper blocker ring (33) is axially spaced below the shoulder (25) to allow fluid in the pipe (39) to act against at least some of the blocker rings (33) in a direction toward the inlet (19).

16. The pipe blocker (11) of Claim 12, wherein:

a flange (21) is formed on an exterior upper end of the tubular body (13), the flange (21) adapted to secure the pipe blocker (11) to subsequent subsea devices; and

a manipulation member (29) is secured to an end of the tubular body (13) and adapted to be interacted with by at least one of an operator or a remotely operated vehicle.

17. A method for blocking an end of a subsea pipe (39), comprising:
- (a) providing a pipe blocker (11) having:
 - a tubular body (13) defining a central cavity (17) having an inlet (19), an outlet (23), and an axis (15);
 - a plurality of conical blocker rings (33) mounted to an inner diameter surface of the tubular body (13) within the central cavity (17), at least some of the blocker rings (33) being rigid (35) and some of the blocker rings (33) being compliant (37);
 - the blocker rings (33) adapted to seal to a pipe (39) end inserted into the central cavity (17);
 - the rigid blocker rings (35) having an outer diameter joined to an inner diameter of the central cavity (17); and
 - the compliant blocker rings (37) having an inner diameter smaller than an inner diameter of the rigid blocker rings (35) and adapted to seal around an exterior of the pipe (39) when inserted from the inlet (19);
 - (b) inserting the pipe blocker (11) over the pipe (39) end, causing the compliant blocker rings (37) to seal against an outer diameter of the pipe (39); then
 - (c) allowing fluid from the pipe (39) to enter an annular space between the pipe (39) and an inner diameter of the central cavity (17) to act against an upper surface of the uppermost compliant blocker ring (37).
18. The method Claim 17, wherein step (b) comprises:
- running the pipe blocker (11) from a surface location to a subsea location axially above the pipe (39) end; and
 - physically moving the pipe blocker (11) over the pipe (39) end.
19. The method of Claim 17, wherein step (c) comprises:
- providing a downward facing annular shoulder (25) at an upper end of the central cavity (17); and

step (b) comprises abutting an end of the pipe (39) against but not sealing to the downward facing shoulder (25).

20. The method of Claim 17, wherein step (c) causes conical surfaces of each compliant blocker ring (37) to seal against conical surfaces of adjacent rigid blocker rings (35).

CLAIMS

What is claimed is:

1. A pipe blocker for blocking a broken subsea pipe comprising:
a tubular body defining a central cavity having an inlet, an outlet, and an axis;

a plurality of conical blocker rings mounted to an inner diameter surface of the tubular body within the cavity, at least some of the blocker rings being rigid and some of the blocker rings being compliant;

the blocker rings adapted to seal to a pipe end inserted into the central cavity;

the rigid blocker rings having an outer diameter joined to an inner diameter of the central cavity;

the compliant blocker rings having an inner diameter smaller than an inner diameter of the rigid blocker rings and adapted to seal around an exterior of the pipe when inserted from the inlet; and wherein

a conical surface of each compliant blocker ring seals against a conical surface of at least one rigid blocker ring.
2. The pipe blocker of claim 1, wherein the outer diameter of each rigid blocker ring is secured to the inner diameter of the central cavity.
3. The pipe blocker of claim 1, wherein the rigid blocker rings alternate with the compliant blocker rings.
4. The pipe blocker of claim 1, wherein the rigid blocker rings are formed of a metal and the outer diameters of the rigid blocker rings are welded to the inner diameter of the central cavity.
5. The pipe blocker of claim 1, wherein the compliant blocker rings are formed of an elastomer.
6. The pipe blocker of claim 1, further comprising a downward facing annular shoulder at the outlet within the central cavity, the downward facing shoulder adapted to be abutted by an end of the pipe when the pipe is inserted into the central cavity.

7. The pipe blocker of claim 6, wherein a closest one of the blocker rings is axially spaced from the shoulder to allow fluid in the pipe to act against at least some of the blocker rings in a direction toward the inlet.

8. The pipe blocker of claim 1, wherein a flange is formed on an exterior upper end of the tubular body, the flange adapted to secure the pipe blocker to subsequent subsea devices.

9. The pipe blocker of claim 1, further comprising a manipulation member secured to an end of the tubular body and adapted to be interacted with by at least one of an operator or a remotely operated vehicle.

10. A pipe blocker for blocking a pipe comprising:

- a tubular body defining a central cavity having an inlet, an outlet, and an axis;
- a plurality of conical blocker rings mounted to an inner diameter surface of the tubular body within the central cavity, at least some of the blocker rings being rigid and some of the blocker rings being compliant;
- the blocker rings adapted to seal to a pipe end inserted into the central cavity;
- the rigid blocker rings having an outer diameter joined to an inner diameter of the central cavity;
- the compliant blocking rings having an inner diameter smaller than an inner diameter of the rigid blocker rings and adapted seal around an exterior of the pipe when inserted from the inlet;
- the blocker rings secured to the tubular body so that an outer diameter each blocker ring, where the blocker ring secures to the tubular body, is axially lower than the inner diameter of the blocker ring;
- the outer diameter of each rigid blocker ring is secured to the inner diameter of the central cavity; and
- the rigid blocker rings alternate with the compliant blocker rings.

11. The pipe locker of claim 10, when

- the rigid blocker rings are formed of a metal and the outer diameters of the rigid blocker rings are welded to the inner diameter of the central cavity; and
- the compliant blocker rings are formed of an elastomer.

12. The pipe blocker of claim 10, wherein:
a conical surface of each compliant blocker ring seals against a conical surface of at least one rigid blocker ring; and
the conical surfaces of the compliant and rigid blocker rings are at the same angle.
13. The pipe blocker of claim 10, further comprising:
a downward hieing annular shoulder at the outlet within the central cavity, the downward facing shoulder adapted to be abutted by an end of the pipe when the pipe is inserted into the central cavity; and
an upper blocker ring is axially spaced below the shoulder to allow fluid in the pipe to act against at least some of the blocker rings in a direction toward the inlet.
14. The pipe blocker of claim 10, wherein:
a flange is formed on an exterior upper end of the tubular body, the flange adapted to secure the pipe blocker to subsequent subsea devices; and
a manipulation member is secured to an end of the tubular body and adapted to be interacted with by at least one of an operator or a remotely operated vehicle.
15. A method for blocking an end of a subsea pipe, comprising:
(a) providing a pipe blocker having:
a tubular body defining a central cavity having an inlet, an outlet, and an axis;
a plurality of conical blocker rings mounted to an inner diameter surface of the tubular body within the central cavity, at least some of the blocker rings being rigid and some of the blocker rings being compliant;
the blocker rings adapted to seal to a pipe end inserted into the central cavity;
the rigid blocker rings having an outer diameter joined to an inner diameter of the central cavity; and
the compliant blocker rings having an inner diameter smaller than an inner diameter of the rigid blocker rings and adapted to seal around an exterior of the pipe when inserted from the inlet;
(b) inserting the pipe blocker over the pipe end, causing the complaint blocker rings to seal against an outer diameter of the pipe; then

(c) allowing fluid from the pipe to enter an annular space between the pipe and an inner diameter of the central cavity to act against an upper surface of the uppermost compliant blocker ring.

16. The method claim 15, wherein step (b) comprises:
running the pipe blocker from a surface location to a subsea location axially above the pipe end; and

physically moving the pipe blocker over the pipe end.

17. The method of claim 15, wherein step (c) comprises:
providing a downward facing annular shoulder at an upper end of the central cavity;
and

step (b) comprises abutting an end of the pipe against but not sealing to the downward facing shoulder.

18. The method of claim 15, wherein step (c) causes conical surfaces of each compliant blocker ring to seal against conical surfaces of adjacent rigid blocker rings.