Claims

1. A threaded connection having a straight central axis, the connection comprising:

a pin, the pin comprising a plurality of pin threads, each pin thread having a root, a crest, a stab flank, and a load flank, a depth of each pin thread determined by a distance between the root and the crest, and a width of each pin thread determined by a distance between the stab flank and the load flank, wherein stab flank angles of the stab flanks of the pin threads are between about positive 6° and positive 11° relative to a 90° angle and extending toward an external end of the pin, and wherein load flank angles of the load flanks of the pin threads are between about negative 3° and negative 7° relative to a 90° angle and extending toward the external end of the pin;

the roots of adjacent pin threads aligned along a pin root taper plane that is angled radially outwardly relative to the straight central axis of the connection from an internal end of the pin to the external end of the pin; and

the crests of adjacent pin threads aligned substantially parallel to the straight central axis; and

a box, the box having a plurality of box threads, each box thread having a root, a crest, a stab flank, and a load flank, a depth of each box thread determined by a distance between the root and the crest, and a width between each box thread determined by a distance between the stab flank and the load flank of adjacent box threads, wherein stab flank angles of the stab flanks of the box threads are between positive 6° and positive 11° relative to a 90° angle and extending toward a center of the box and wherein load flank angles of the load flanks of the box threads are between about negative 3° and negative 7° relative to a 90° angle and extending toward the center of the box;

a portion of the crests of adjacent box threads aligned along a box crest taper plane that is angled radially outwardly relative to the straight central axis of the connection from the center of the box to an external end of the box;

the roots of adjacent box threads aligned substantially parallel to the straight central axis;

wherein the pin threads and the box threads are arranged such that when the connection is fully made up, the pin roots and box crests come into interference substantially in line with the pin root taper plane and box crest taper plane between the stab flanks of the box crests and midpoints of the box crests without interference between the midpoints of the box crests and the load flanks of the pin threads due to different shape profiles between the pin roots and box crests, and wherein the angles of the pin root taper plane and box crest taper plane allow for reduction of axial

compressive forces on the plurality of pin threads and plurality of box threads along the straight central axis, and further reduce compression on at least the load flanks of the connection.

2. The threaded connection according to claim 1, wherein the pin root taper plane and box crest taper plane are angled radially outwardly toward the external end of the pin at about between 1° and about 6° relative to the straight central axis.

3. The threaded connection according to claim 1, wherein the pin root taper plane and box crest taper plane are angled radially outwardly toward the external end of the pin at about 4° relative to the straight central axis.

4. The threaded connection according to claim 1 further comprising a pin internal seal surface and a box internal seal surface, such that when the connection is fully made up an internal metal-to-metal seal comes into interference.

5. The threaded connection according to claim 4, wherein the pin root taper plane and box crest taper plane are angled radially outwardly toward the external end of the pin at about ± 2° relative to an angle of the metal-to-metal seal relative to the straight central axis.

6. The threaded connection according to claim 1, wherein upon makeup of the connection, one or more voids suitable for placement of doping exists between at least one location selected from the group consisting of: between the pin crests and box roots; and between the stab flanks.

7. The threaded connection according to claim 1, wherein upon makeup of the connection, voids suitable for placement of doping exist between at least one pin crest and box root, and between at least one pair of the stab flanks.

8. A method for machining a threaded connection having a straight central axis, the method comprising the steps of:

machining a pin, the pin comprising a plurality of pin threads, each pin thread having a root, a crest, a stab flank, and a load flank, a depth of each pin thread determined by a distance between the root and the crest, and a width of each pin thread determined by a distance between the stab flank and the load flank, wherein stab flank angles of the stab flanks of the pin threads are machined to be between about positive 6° and positive 11° relative to a 90° angle and extending toward an external end of the pin, and wherein load flank angles of the load flanks of the pin threads are machined to be between about negative 3° and negative 7° relative to a 90° angle and extending toward the external end of the pin;

the roots of adjacent pin threads aligned along a pin root taper plane that is angled radially outwardly relative to the straight central axis of the connection from an internal end of the pin to the external end of the pin; and

the crests of adjacent pin threads aligned substantially parallel to the straight central axis; and

machining a box, the box having a plurality of box threads, each box thread having a root, a crest, a stab flank, and a load flank, a depth of each box thread determined by a distance between the root and the crest, and a width between each box thread determined by a distance between the stab flank and the load flank of adjacent box threads, wherein stab flank angles of the stab flanks of the box threads are machined to be between about positive 6° and positive 11° relative to a 90° angle and extending toward a center of the box, and wherein load flank angles of the load flanks of the box threads are machined to be between about negative 3° and negative 7° relative to a 90° angle and extending toward the center of the box;

a portion of the crests of adjacent box threads aligned along a box crest taper plane that is angled radially outwardly relative to the straight central axis of the connection from the center of the box to an external end of the box;

the roots of adjacent box threads aligned substantially parallel to the straight central axis;

wherein the pin threads and the box threads are arranged such that when the connection is fully made up, the pin roots and box crests come into interference substantially in line with the pin root taper plane and box crest taper plane between the stab flanks of the box crests and midpoints of the box crests without interference between the midpoints of the box crests and the load flanks of the pin threads due to different shape profiles between the pin roots and box crests, and wherein the angles of the pin root taper plane and box crest taper plane allow for reduction of axial compressive forces on the plurality of pin threads and plurality of box threads along the straight central axis, and further reduce compression on at least the load flanks of the connection.

9. The method according to claim 8, wherein the pin root taper plane and box crest taper plane are machined to be angled radially outwardly toward the external end of the pin at about between 1° and about 6° relative to the straight central axis.

10. The method according to claim 8, wherein the pin root taper plane and box crest taper plane are machined to be angled radially outwardly toward the external end of the pin at about 4° relative to the straight central axis.

11. The method according to claim 8, further comprising a step of machining a pin internal seal surface and a box internal seal surface, such that when the connection is fully made up an internal metal-to-metal seal comes into interference.

12. The method according to claim 11, wherein the pin root taper plane and box crest taper plane are machined to be angled radially outwardly toward the external end of the pin at about ± 2° relative to an angle of the metal-to-metal seal relative to the straight central axis.

13. The method according to claim 8, further comprising the step of machining one or more voids suitable for placement of doping between at least one location selected from the group consisting of: between the pin crests and box roots and between the stab flanks.

14. The method according to claim 8, further comprising the step of machining one or more voids suitable for placement of doping between at least one pin crest and box root, and between at least one pair of the stab flanks.