CLAIMS

1. A wellhead system (30), comprising:

a wellhead body; and

a cylindrical locking end (44) coupled to the wellhead body for locking onto a wellhead connector (32), the locking end comprising:

an exterior surface comprising an exterior locking profile (38), the exterior locking profile (38) comprising an exterior groove (48) formed between exterior stab and load flanks (64, 62) on the exterior surface; and

an interior surface comprising an interior locking profile (40), the interior locking profile comprising an interior groove formed between interior stab and load flanks on the interior surface,

wherein at least one of the exterior groove or the interior groove is a relief groove (58) that undercuts at least one of the respective stab or load flank (64, 62), the relief groove (48) corresponding to a portion of the contour of an ellipse (54) intersecting at least a portion of the respective stab or load flank (64, 62), and wherein an axis of the ellipse (54) is at a tilted angle with respect to an axis of the wellhead (34).

2. The wellhead system (30) of claim 1, wherein the exterior groove includes the relief groove (58) that undercuts the load flank (62) on the exterior surface.

3. The wellhead system of claim 1, wherein the interior groove includes the relief groove (58) that undercuts the load flank (62) on the interior surface.

4. The wellhead system (30) of claim 1, wherein the relief groove (62) includes 10% to 50% of the contour of the ellipse (54).

5. The wellhead system (30) of claim 1, wherein the locking end (44) comprises two adjacent relief grooves (102, 104).

6. The wellhead system (30) of claim 5, wherein the two adjacent relief grooves (102, 104) have different sizes, angles, or positions relative to the wellhead (34).

7. A wellhead (34), comprising:

a wellhead body; and

a locking end (44) coupled to the wellhead body for locking onto a wellhead connector (32), the locking end (44) comprising a locking profile (36), the locking profile (36) comprising:

a stab flank (64);

a load flank (62);

a first relief groove (48) formed between the stab flank (64) and the load flank (62) on a cylindrical surface, wherein the first relief groove (48) undercuts at least one of the stab flank (64) or load flank (62) and corresponds to a portion of the contour of an ellipse (60) intersecting at least a portion of the stab flank (64) or load flank (62); and

a second relief groove (46) adjacent the first relief groove (48), wherein the second relief groove (46) has a curvature intersecting at least a portion of the stab flank (64) or load flank (62).

8. The wellhead (34) of claim 7, wherein the locking end (44) comprises an exterior surface and an interior surface, and the locking profile (36) is formed on the exterior surface or the interior surface.

9. The wellhead (34) of claim 7, wherein an axis of the ellipse (60) is aligned with an axis of the wellhead.

10. The wellhead (34) of claim 7, wherein an axis of the ellipse is at a tilted angle with respect to an axis of the wellhead (34).

11. The wellhead (34) of claim 7, wherein the relief groove (48) includes 10% to 50% of the contour of the ellipse (60).

12. The wellhead (34) of claim 5, wherein the second relief groove (46) corresponds to a portion of the contour of a second ellipse, the second ellipse overlapping with the ellipse of the first relief groove (48).

13. A wellhead system (30), comprising:

a wellhead connector (32) comprising a plurality of dogs (42) with grooves (46) formed on an interior surface;

a wellhead (34) comprising a locking end (44) for locking onto the wellhead connector (32), the locking end (44) comprising a locking profile (36), the locking profile (36) comprising:

a stab flank (64);

a load flank (62); and

a relief groove (48) formed between the stab flank (64) and the load flank (62) on the cylindrical surface, wherein the relief groove (48) undercuts at least one of the stab flank (64) or load flank (62) and corresponds to a portion of the contour of an ellipse (60) intersecting at least a portion of the respective stab or load flank, and wherein an axis of the ellipse (60) is at a tilted angle with respect to an axis of the wellhead (34).

14. The wellhead system (30) of claim 13, wherein the locking end (44) comprises an exterior surface and an interior surface, and the locking profile (36) is formed on the exterior surface.

15. The wellhead system (30) of claim 13, wherein the locking end (44) comprises an exterior surface and an interior surface, and the locking profile (36) is formed on the interior surface.