CLAIMS

We claim:

Claim 1. A reinforced seal for maintaining a pressure differential in a well bore, the reinforced seal comprising:

an elastomeric layer;

a backup layer between a drill pipe and the elastomeric layer, the backup layer having:

a first end portion and a second end portion, the first end portion having a larger inner diameter than the second end portion,

a tapered portion connecting the first end portion and second end portion, and

a plurality of slats arranged circumferentially about the perimeter of the drill pipe along an internal surface of the elastomeric layer such that a portion of each slat underlies a portion of an adjacent slat.

Claim 2. The reinforced seal of claim 1, wherein each of the plurality of slats comprises two approximately flat segments separated by a jog.

Claim 3. The reinforced seal of claims 1 or 2, wherein the elastomeric layer extends into a wellhead than the backup layer at the second end of the backup layer.

Claim 4. The reinforced seal of claims 1 or 2, wherein the backup layer and elastomeric layer are fixed, relative to one another, by a bond that is proximate a distal end of the first end portion.

Claim 5. The reinforced seal of claim 4, wherein the backup layer and elastomeric layer are bonded to a common substrate.

Claim 6. The reinforced seal of claims 1 or 2, further comprising a non-metallic, lubricating layer formed from ceramic, glass, or a polymer attached to an inner surface of the backup layer to prevent unwanted sticking between the backup layer and the drill pipe.

Claim 7. The reinforced seal of claims 1 or 2, wherein the backup layer further comprises an expandable mesh layer.

Claim 14. A method for sealing a drill pipe in a managed pressure drilling environment, the method comprising:

providing an elastomeric layer adjacent a wellhead in a wellbore;

providing a backup layer adjacent the elastomeric layer, wherein the backup layer comprises:

a first end portion and a second end portion, the first end portion having a larger inner diameter than the second end portion,

a tapered portion connecting the first end portion and second end portion, and

a plurality of slats arranged circumferentially about the perimeter of the drill pipe along an internal surface of the elastomeric layer such that a portion of each slat underlies a portion of an adjacent slat; and

inserting a portion of the drill pipe into the wellbore.

Claim 15. The method of claim 14, wherein each of the plurality of slats comprises two curved segments separated by a jog.

Claim 16. The method of claims 14 or 15, wherein the elastomeric layer extends further into the wellhead than the backup layer at the second end portion of the backup layer.

Claim 17. The method of claims 14 or 15, further comprising fixing the backup layer and elastomeric layer relative to one another at a distal end of the first end portion.

Claim 18. The method of claim 17, wherein fixing the backup layer and elastomeric layer relative to one another comprises bonding the backup layer and elastomeric layer to a common substrate.

Claim 19. The method of claims 14 or 15, further comprising providing a non-metallic, lubricating layer adjacent an inner surface of the backup layer.

Claim 20. The method of claims 14 or 15 wherein the backup layer further comprises an expandable mesh layer.