CLAIMS:

1. A can assembly having a vent test rating of at least 70 psi, the can assembly comprising:

a can body;

an easy open can end that is attached to the can body by a seam; the can end including:

a center panel;

a main score formed in the center panel;

a tab coupled to the center panel by a rivet; and

a non-arresting vent score formed in the center panel including (i) a central portion located rearward of a rivet centerline; (ii) a pair of lateral portions that extend transversely outwardly from the central portion and (iii) a pair of side portions that extend rearward from ends of the lateral portions opposite the central portion, the vent score forming a flap having a hinge formed between rear ends of the score side portions;

whereby, the vent score is configured to rupture in a non-arrested motion upon initial actuation of the tab such that the flap moves approximately about the hinge to vent the internal pressure.

2. The can assembly of claim 1 wherein the vent score has a substantially uniform score residual.

3. The can assembly of claim 1 wherein the lateral portions extend forwardly relative to the central portion.

4. The can assembly of claim 1 wherein the lateral portions extend to or forward of the rivet centerline.

5. The can assembly of claim 1 wherein the center panel includes moveable panel that is a removable.

6. An unseamed, easy open beverage can end comprising

a peripheral curl capable of seaming together with a can body flange;

a wall extending inwardly and downwardly from the peripheral curl;

a center panel;

a main score formed in the center panel, the score defining a removable panel;

a tab coupled to the center panel by a rivet; and

a non-arresting vent score formed in the center panel including (i) a central portion located rearward of a rivet centerline; (ii) a pair of lateral portions that extend transversely outwardly from the central portion and (iii) a pair of side portions that extend rearward from ends of the lateral portions opposite the central portion, the vent score is capable of rupture for forming a flap having a hinge formed between rear ends of the score side portions.

7. The can assembly of claim 6 wherein the vent score has a substantially uniform score residual.

8. The can assembly of claim 6 wherein the lateral portions extend forwardly relative to the central portion.

9. The can assembly of claim 6 wherein the lateral portions extend to or forward of the rivet centerline.

10. The can assembly of claim 6 wherein the average vent score residual at the central portion is at least as thick as the average vent score in the lateral portions.

11. A punch tool for forming a non-arresting vent score on a can end, the tool comprising:

a base surface;

a vent score punch surface extending from the base surface, the punch surface including (i) a curved central portion located rearward of a center point that corresponds to a rivet centerline location; (ii) a pair of lateral portions that extend transversely outwardly from the central portion and (iii) a pair of side portions that extend rearward from ends of the lateral portions opposite the central portion, the vent score capable of forming a flap having a hinge formed between rear ends of the score side portions.

12. The punch tool of claim 11 wherein the punch surface extends from the base surface by an approximately uniform dimension throughout the central portion, lateral portions, and at least most of the side portions.

13. A method of venting a can having internal positive pressure of greater than 70 psi comprising the steps of:

providing a can having an internal pressure rating of greater than 70 psi and including an end having a tab, a main score that defines a pour opening, and a flap score that defines a flap;

initiating rupture of the flap score to enable can internal pressure to propagate rupture of the flap score, wherein score propagation is not arrested, and to displace the flap, thereby enabling venting of the internal pressure.

14. The method of claim 13 wherein the initiating step includes the flap score pivoting upwardly about a hinge.

15. The method of claim 13 wherein initiating step is commenced by deflection of a rivet upon actuation of the score.

16. The method of claim 13 wherein the end of the can is made of 5000 series aluminum alloy.

17. The method of claim 13 wherein the flap score does not have a check slot, a gradually increasing score residual, or other feature that would tend to arrest score propagation.

18. The method of claim 13 wherein the end includes a center panel and the tab, the tab having a nose, a heel, and a longitudinal centerline extending from the nose to the heel, and the tab being affixed to the center panel by a rivet that defines a rivet center, wherein the rivet center and the longitudinal centerline of the tab define a primary reference line, and the rivet center also defines a traverse reference line that is perpendicular to the primary reference line; and

wherein the flap score includes a pair of side portions that extend rearwardly relative to the traverse reference line, away from the tab nose.

19. The method of claim 18, wherein the side portions are oriented at an angle relative to the primary reference line that is between -30 and + 30 degrees.

20. The method of claim 13, wherein the end has a tensile yield strength of 39-55 ksi.

21. The can end of claim 1 or 6 wherein the end of the can is made of 5000 series aluminum alloy.

22. The can end of claim 1 or 6 wherein the vent score does not have a check slot, a gradually increasing score residual, or other feature that would tend to arrest score propagation.

23. The can end of claim 1 or 6 wherein the side portions are oriented at an angle relative to the primary reference line that is between -30 and + 30 degrees.

24. The can end of claim 1 or 6 wherein the end has a tensile yield strength of 39-55 ksi.

25. A method of opening a can having internal positive pressure of greater than 70 psi comprising the steps of:

initiating rupture of a flap score on a can end of the can;

propagating rupture of the flap score, wherein the step of propagating occurs without arresting;

forming a vent by using can internal pressure to actuate a flap defined by the flap score; and

initiating rupture of a main score of the can, wherein the step of rupturing the main score of the can occurs before the step of initiating rupture of the flap score of the can.

26. The method of claim 25, wherein the step of forming a vent includes pivoting the flap score upwardly about a hinge.

27. The method of claim 25, wherein the step of initiating rupture of the flap score is commenced by deflection of a rivet upon actuation of the score.

28. The method of claim 25 wherein the can end of the can is made of 5000 series aluminum alloy.

29. The method of claim 25 wherein the flap score does not have a check slot, a gradually increasing score residual, or other feature that would tend to arrest score propagation.

30. The method of claim 25 wherein the can end includes a center panel and a tab, the tab having a nose, a heel, and a longitudinal centerline extending from the nose to the heel, and the tab being affixed to the center panel by a rivet that defines a rivet center, wherein the rivet and the longitudinal centerline of the tab define a primary reference line, and the

rivet center also defines a traverse reference line that is perpendicular to the primary reference line; and

wherein the flap score includes a pair of side portions that extend rearwardly relative to the traverse reference line, away from the tab nose.

31. The method of claim 30, wherein the side portions are oriented at an angle relative to the primary reference line that is between -30 and + 30 degrees.

32. The method of claim 25, wherein the end has a tensile yield strength of 39-55 ksi.

CLAIMS:

1. A full aperture beverage can rated for internal pressure of over 70 psi, the beverage can comprising:

a can body;

an end formed from 5000 series aluminum alloy that is attached to the can body by a seam; the can end including:

a center panel;

a main score formed in the center panel and defining a removable panel;

a tab coupled to the center panel by a rivet having a rivet centre, the tab having a nose and a heel, the tab defining a primary reference line that extends from the nose to the heel and through the rivet center, the tab further defining a transverse reference line that is perpendicular to the primary reference line and extends through the rivet center, and; and

a vent score formed in the center panel, the vent score including a pair of lateral portions that extend parallel to the transverse reference line and are disposed forward of the transverse reference line towards the nose of the tab by a first distance that is between 0 and 0.050 inches (0 mm and 1.3 mm), the vent score further including a pair of side portions that extend from the lateral portions, such that each side portion extends inwardly towards the primary reference line and rearwardly relative to the transverse reference line towards the heel of the tab by a second distance that is between 0.15 and 0.4 inches (3.8 and 10.2 mm) and such that the side portions are oriented at an angle relative to the primary reference line that is between -30 and +30 degrees.

2. The can assembly of claim 1 wherein the vent score has a substantially uniform score residual.

3. A full aperture beverage can end comprising:

a center panel;

a countersink surrounding the center panel;

a main score formed in the center panel and arranged in proximity to the countersink to define a removable aperture panel;

a rivet, the rivet defining a rivet center;

a tab affixed to the center panel by the rivet, the tab having a nose and a heel, the tab defining a primary reference line that extends from the nose to the heel and through the rivet center, the tab further defining a transverse reference line that is perpendicular to the primary reference line and extends through the rivet center; and

a vent score formed in the center panel, the vent score including a pair of lateral portions that extend parallel to the transverse reference line and are disposed forward of the transverse reference line towards the nose of the tab by a first distance that is between 0 and 0.050 inches (0 mm and 1.3 mm), the vent score further including a pair of side portions that extend from the lateral portions, such that each side portion extends inwardly towards the primary reference line and rearwardly relative to the transverse reference line towards the heel of the tab by a second distance that is between 0.15 and 0.4 inches (3.8 and 10.2 mm) and such that the side portions are oriented at an angle relative to the primary reference line that is between -30 and +30 degrees,

whereby the end is formed of 5000 series aluminum and adapted for use with products that are pressurized to over 70 psi and such that during opening the vent score is adapted to sever first, controlling the pressure differential between the external surface and internal surface of the center panel, thereby allowing the main score to tear in a controlled and reliable manner.

4. The can assembly of claim 3 wherein the vent score has a substantially uniform score residual.

5. A punch tool for forming the vent score of claim 1 or claim 3.

6. A method of venting the can of claim 1 comprising the step of:

initiating rupture of the flap score to enable can internal pressure to propagate rupture of the flap score, wherein score propagation is not arrested, and to displace the flap, thereby enabling venting of the internal pressure.

7. The method of claim 6 wherein the initiating step includes the flap score pivoting upwardly about a hinge.

8. The method of claim 6 wherein initiating step is commenced by deflection of the rivet.

9. The can end of claim 1 or 3 wherein the vent score does not have a check slot, a gradually increasing score residual, or other feature that would tend to arrest score propagation.

10. A method of opening a can having internal positive pressure of greater than 70 psi comprising the steps of:

initiating rupture of a flap score on a can end of the can;

propagating rupture of the flap score, wherein the step of propagating occurs without arresting;

forming a vent by using can internal pressure to actuate a flap defined by the flap score; and

initiating rupture of a main score of the can, wherein the step of rupturing the main score of the can occurs after the step of initiating rupture of the flap score of the can.

11. The method of claim 10, wherein the step of forming a vent includes pivoting the flap score upwardly about a hinge.

12. The method of claim 10, wherein the step of initiating rupture of the flap score is commenced by deflection of a rivet.

13. The method of claim 10 wherein the can end of the can is made of 5000 series aluminum alloy.

14. The method of claim 10 wherein the flap score does not have a check slot, a gradually increasing score residual, or other feature that would tend to arrest score propagation.

15. The method of claim 10 wherein the can end includes a center panel and a tab, the tab having a nose, a heel, and a longitudinal centerline extending from the nose to the heel, and the tab being affixed to the center panel by a rivet that defines a rivet center, wherein the rivet and the longitudinal centerline of the tab define a primary reference line, and the rivet center also defines a traverse reference line that is perpendicular to the primary reference line; and

wherein the flap score includes a pair of side portions that extend rearwardly relative to the traverse reference line, away from the tab nose.

16. The method of claim 15, wherein the side portions are oriented at an angle relative to the primary reference line that is between -30 and + 30 degrees.

17. The full aperture beverage can of claim 1 wherein the can is rated for internal pressure of at least 85 psi (586 kPa).

18. The full aperture beverage can of claim 1 wherein the can is rated for internal pressure of at least 90 psi (621 kPa).

19. The full aperture beverage can of claim 1, further including a countersink that surrounds the center panel, wherein a centerline of the main score is located between 0.000 inches and 0.020 inches (0.00 mm and 0.51 mm) from a center of a transition radius between the countersink and the center panel.

20. The full aperture beverage can of claim 1, further including a countersink that surrounds the center panel, wherein a centerline of the main score is located between 0.000 inches and 0.010 inches (0.00 mm and 0.25 mm) from a center of a transition radius between the countersink and the center panel.

21. The full aperture beverage can of claim 1, further including a countersink that surrounds the center panel, wherein a centerline of the main score is located between 0.000 inches and 0.006 (0.00 mm and 0.15 mm) inches from a center of a transition radius between the countersink and the center panel.

22. The full aperture beverage can of claim 1, further including a countersink that surrounds the center panel, wherein a centerline of the main score is located between 0.000 inches and 0.004 inches (0.00 mm and 0.10 mm) from a center of a transition radius between the countersink and the center panel.

23. The full aperture beverage can of claim 1, further including a countersink that surrounds the center panel, wherein a centerline of the main score is located between 0.000 inches and 0.002 inches (0.00 mm and 0.05 mm) from a center of a transition radius between the countersink and the center panel.

24. The full aperture beverage can of claim 1 wherein the nose of the tab in its rest state is radially inwardly spaced apart from an inner edge of the main score by between approximately 0.000 inches and 0.008 inches (0.00 mm and 0.20 mm), measured horizontally.

25. The full aperture beverage can of claim 1 wherein the nose of the tab in its rest state is radially inwardly spaced apart from an inner edge of the main score by between approximately 0.000 inches and 0.005 inches (0.00 mm and 0.13 mm), measured horizontally.

26. The full aperture beverage can of claim 1 wherein the nose of the tab in a partially actuated state, in which the tab nose contacts the center panel, is approximately between the centerline of the main score and 0.005 inches (0.13 mm) radially inboard from an inner edge of the main score.

27. The full aperture beverage can of claim 1 wherein the nose of the tab in a partially actuated state, in which the tab nose contacts the center panel, is within 0.002 inches (0.05 mm) of an inner edge of the main score.

28. The full aperture beverage end of claim 3 adapted for use with products held under pressure of between 70 and 90 psi.

29. The full aperture beverage end of claim 3, wherein a heel of the tab is configured to be lifted by a user to initiate sequential rupture of the vent score and then the main score.

30. The full aperture beverage end of claim 29, wherein the tab is solid and has no hinge.

31. The full aperture beverage end of claim 29, wherein the tab is positioned so that a nose is within the main score or proximate to the main score upon initial actuation of the tab.

32. The full aperture beverage end of claim 3, wherein the main score has an asymmetric score profile.

33. The full aperture beverage end of claim 3, wherein the asymmetric score profile is designed to ensure that a score land portion of the asymmetric score profile remains with the aperture panel after the aperture panel is detached.

34. The full aperture beverage end of claim 3, wherein the center panel further includes a second, anti-fracture score positioned radially inside the main score.

35. The full aperture beverage end of claim 3, wherein the height from the base of the countersink to the end panel is greater than 0.060 inches (1.5 mm).

36. The full aperture beverage end of claim 3 wherein main score is positioned to within 0.020 inches (0.5mm) radially of a panel fillet so as to maximize cut edge safety.