CLAIMS

WHAT IS CLAIMED

1. A method for controlling fitting bore distortion when welding a seam (20) located between two sleeve halves (11, 13) of a fitting (10) located on an in-service carrier pipe where the seam (20) after welding must remain in its as-welded condition, the seam (20) being at least 1-1/4 inches (32 mm) thick, the method comprising:

first welding a middle third section (31) of the seam (20) in multiple weld layers using only an inward progression starting from an end of the middle third section (31) along a profile of a seam bevel (19), each weld layer having a different length than that of an adjacent weld layer, the weld layers decreasing in length from a root gap of the seam to an upper end of the seam; and,

after welding the middle third section, welding a left and a right outer third section (37) of the seam (20) using only an outward progression from an end adjacent to the middle third section (31) along a profile of the seam bevel (19);

wherein the welding of each of the three sections includes a controlled temper bead welding technique applied only to a first two weld layers using a first diameter size welding electrode; and

wherein at least one second diameter size welding electrode having a diameter larger than that of the first diameter size welding electrode is used on remaining weld layers.

2. The method according to claim 1 wherein the fitting (10) is a hot-tap fitting.

3. A method for controlling fitting bore distortion when welding a seam (20) located between two sleeve halves (11, 13) of a fitting (10) located on an in-service carrier pipe where the seam (20) after welding must remain in its as-welded condition, the seam (20) being at least 1-1/4 inches (32 mm) thick, the method comprising:

welding a middle third section (31) of the seam (20) in multiple weld layers beginning along a profile of a seam bevel (19), each weld layer being made in only one welding direction and having a different length than that of an adjacent weld layer, the weld layers decreasing in length from a root gap of the seam to an upper end of the seam; and, after welding the middle third section (31) of the seam (20),

welding a left and a right outer third section of the seam (20) beginning along a profile of the seam bevel (19), each of the left and right outer third sections being welded, respectively, in only one welding direction;

wherein the welding of each of the three sections includes a controlled temper bead welding technique of only a first two weld layers of the multiple weld layers; and

wherein the only one welding direction used in each section is selected from the group consisting of (i) an inward to outward progression and (ii) an outward to inward progression.

4. The method according to claim 3 further comprising a welding progression of the middle third section (31) being an inward progression starting from an end of the middle third section (31).

5. A fitting (10) located on an in-service carrier pipe, the fitting comprising:

a seam (20) on one side of the in-service-carrier pipe and another seam on an opposite side of the in-service carrier pipe, each seam being at least 1-1/4 inches (32 mm) thick and including a middle third section and a left and a right outer third section,

the middle third section (31) of the seam including a weld extending from the root gap of the seam to an upper end of the seam and containing multiple weld layers welded using an inward progression starting from an end of the middle third section (31) along a profile of a seam bevel (19), each weld layer having a different length than that of an adjacent weld layer, the weld layers decreasing in length from a root gap of the seam to the upper end of the seam; and

the left and right outer third sections of the seam being in an unwelded state from the root gap of the seam to the upper end of the seam;

wherein only a first two weld layers (47, 49) of the middle third section includes a controlled temper bead; and

wherein no post-weld heat treatment is applied to the welded seam; and

wherein a total distortion of the fitting bore in an axial direction of the in-carrier service pipe, in a direction perpendicular to the axial direction, and in a direction at 45° to the axial direction, is no greater than 1/8".

6. The fitting (10) of claim 5, wherein a bead overlap of the first two weld layers (47, 49) is in a range of 25% to 75%.

7. The fitting (10) of claim 5, wherein the first two weld layers (47,49) result in a weld deposit of about 3/16”.

8. The fitting (10) of claim 5, further comprising, the left and right outer third sections transitioning between the unwelded state and a welded state, wherein only a first two weld layers of each outer third section includes a controlled temper bead, and wherein the welded seam of each outer third section is welded in a single welding direction.

9. The fitting (10) of claim 5 wherein the fitting is a hot-tap fitting.

10. The method of claim 1, wherein after the welding of the three sections the fitting bore distortion in an axial direction of the in-carrier service pipe, in a direction perpendicular to the axial direction, and in a direction at 45° to the axial direction, is no greater than 1/8”.

11. The method of claim 1, wherein after the welding of the three sections the fitting bore distortion in an axial direction of the in-carrier service pipe, in a direction perpendicular to the axial direction, and in a direction at 45° to the axial direction, is in a range of – 12% to + 12% of a total tolerance.

12. The method of claim 3, wherein after the welding of the three sections the fitting bore distortion in an axial direction of the in-carrier service pipe, in a direction perpendicular to the axial direction, and in a direction at 45° to the axial direction, is no greater than 1/8".

13. The method of claim 3, wherein after the welding of the three sections the fitting bore distortion in an axial direction of the in-carrier service pipe, in a direction perpendicular to the axial direction, and in a direction at 45° to the axial direction, is in a range of – 12% to + 12% of a total tolerance.