to keep the tube stub plug against a fixture plate while also keeping the angular alignment of the tube stub plug and other seals (not shown) in a desired location and/or orientation while the tube stub plug is fixed to the manifold (e.g., welded, or secured in some other fashion).

[0023] The manifold (e.g., manifold 102) and the tube stub plug (e.g., tube stub plug 106) of the assembly 100 with tube stub plug exposed toward the welding process can be positioned for adding a weld 116A to add additional strength, and to further lock in the location and orientation of the tube stub plug, and seal the joint between the tube stub plug and the manifold (or a substrate (not shown)). The weld can either be a continuous weld (see, e.g., weld 116A in figs. 1D-E; weld 216A in fig. 2E) around the entire interface of the manifold and the tube stub plug (at the surface of the manifold) or one or more tack welds (see, e.g., welds 216B in figs. 2A-D and 2F) at various locations at the interface.

[0024] After welding of the tube stub plug, the alignment fixture from the other side of the manifold (or substrate) can be removed. The weld process can include, for example, Ebeam, laser, manual welding and other standard industry used welding processes appropriate for the application. Benefits of this embodiment include increased strength of the tube by using the whole body of substrate and manifold to support the tube and/or the tube-substrate joint as pressure is applied to the tube (e.g., as forces are applied to a portion of the tube). This embodiment can also result in a lower cost than a separately mounted body to the end of the substrate or manifold.

[0025] Figs. 2A-F show an exemplary manifold and a tube stub plug assembly and a second anti-rotation feature, consistent with embodiments of the present disclosure. The second embodiment can include a manifold and tube stub plug assembly 200 with a manifold 202 with a tube stub plug hole 204 and a round tube stub plug 206 with tube stub 208 on the one end and seal surface 210 on other end. The tube stub plug hole 204 can be machined through the manifold 202. Similar to embodiment 1, an anti-rotation hole 212 can be drilled through the tube stub plug body to keep the position of the seal port to other seal ports on the substrate and manifold. A fixture (not shown in figs. 2A-F) can be used to keep the seal surface aligned to the other seal surface on the substrate and manifold. It should be noted that this arrangement can also be applied to holes/tube stubs in substrates (e.g., the term "substrate" can be substituted for "manifold" for anything described herein) that can be connected to the manifold 202 (not shown in figs. 2A-F). In this embodiment, one or more countersunk holes 218 can be drilled (in figs. 2A there are two) on the top of the tube stub plug 206 and the manifold 202. The tube stub plug 206 can further be held in place by, for

example, a tack weld 216B of the joint between the tube stub plug 206 and the substrate or manifold 202 inside of the countersunk holes 218. The countersunk holes 218 can ensure that the weld beads of the weld 216 are not above a surface of the substrate or manifold 202 surface to prevent interference with mounting of components to the substrate surface of the manifold 202. A fixture (i.e., a positioning plate; tacking fixture; not shown in figs. 2A-F) can be mounted to a seal side of the substrate and manifold (e.g., manifold 202) to secure the planarity and angle of the tube stub plug (e.g., the tube stub plug 206) to the other seal surfaces during assembly. A weld process can be used to further secure the tube stub plug with the substrate. The weld can either be a continuous weld (see, e.g., weld 216A in fig. 2E) around the entire interface of the manifold and the tube stub plug (at the surface of the manifold) or one or more tack welds (see, e.g., welds 216B in figs. 2A-D and 2F) at various locations at the interface. The weld process can include, for example, Ebeam, laser, manual welding and other standard industry used welding processes appropriate for the application of the substrate and manifold.

[0026] Figure 2E shows another version of the second embodiment of a tube stub plug coupled with the substrate. This embodiment can have an anti-rotation pin 214 as shown in fig. 2E and the tube stub plug 206 can be welded to the manifold (e.g., a continuous weld 216A shown in fig. 2E).

[0027] Another variation of the second embodiment, shown in fig. 2F, can include the manifold and tube stub plug assembly 200 with the manifold 202 and the tube stub plug 206. The manifold 200 can include the anti-rotation pin 214 to prevent rotation and two tack welds 216B between the tube stub plug and the manifold. Other numbers of tack welds are possible (1, 3, 4, 5, 6, 7, etc.) depending on, for example, the size of the welds and the location of the welds. The manifold and the tube stub portion adjacent the manifold can each have a tack weld recessed portion that allows for the addition of the tack weld without adding material above the surface of the manifold (e.g., the seal surface side of the manifold). In other embodiments (not shown), the tack weld can be made without a tack weld recessed portion, allowing the tack weld to protrude above the manifold surface and the tube stub portion surface.

[0028] After tack welding of the tube stub plug at the countersunk holes 218, the assembly 200 can removed from the tacking fixture (not shown in figs. 2A-D).Benefits of this embodiment can include increased strength for the tube stub by using the whole body of substrate and manifold as pressure (e.g., force) is applied to the tube; use of a tack weld

CLAIMS

1. A fluid substrate comprising:

a manifold including a circular opening as a tube stub plug hole;

a tube stub plug comprising a seal surface, a tube stub, and a flow path, wherein the seal surface aligns with a top surface of the manifold, the flow path runs through the tube stub plug from the seal surface to the tube stub, wherein a portion of the tube stub extends beyond an outer surface of the manifold, and wherein the tube stub plug coupled with the manifold at the circular opening,

wherein an anti-rotation feature prevents the tube stub plug from rotating with respect to the manifold.

2. The fluid substrate of claim 1, wherein the anti-rotation feature is included in the tube stub plug.

3. The fluid substrate of claim 1, wherein the anti-rotation feature is included in the manifold.

4. The fluid substrate of claim 1, wherein the tube stub plug further comprises

a circular shape and a tube stub plug through hole, and

the anti-rotation feature comprises an element coupled with the tube stub plug through hole and couples the manifold and the tube stub plug.

5. The fluid substrate of claim 2, wherein the anti-rotation feature runs through the tube stub plug.

6. The fluid substrate of claim 1, wherein the tube stub projects from the manifold at a right angle.

7. The fluid substrate of claim 1, wherein the tube stub plug is secured to the manifold using a threaded connection.

8. The fluid substrate of claim 1, wherein the tube stub plug further comprises a stepped portion adjacent the tube stub.

9. The fluid substrate of claim 1, wherein the tube stub plug further comprises a plurality of countersunk holes.

10. The fluid substrate of claim 9, further comprising a tack weld in each of the plurality of countersunk holes.