an intermediate outer shell element with lengths in excess of $0.5 \sqrt{R_f}$ shall satisfy all the requirements of UG-27 where

$R = \text{inside radius of expansion joint straight flange at the point of consideration}$

$= R_a$ or $R_b$

$t_f = \text{uncorroded thickness of expansion joint straight flange}$

### 5-4 FABRICATION

(a) The flexible element is the flanged-only head, the flanged-and-flued head, the annular plate, or the flued-only head, as appropriate to the expansion joint configuration per Figure 5-1. The flexible element may be fabricated from a single plate (without welds) or from multiple plates or shapes welded together. When multiple plates or shapes are used to fabricate the flexible element, the following requirements apply:

(1) Welds shall be butt-type full penetration welds, Type (1) of Table UW-12.

(2) Welds shall be ground flush and smooth on both sides. For flexible elements to be formed, this shall be done prior to forming.

(b) The circumferential weld attaching the flexible element to the shell, mating flexible element, or outer shell element, as appropriate to the expansion joint configuration per Figure 5-1, shall be as follows:
Butt joints shall be full penetration welds, Type (1) of Table UW-12.

Corner joints shall be full penetration welds with a covering fillet and no backing strip. The covering fillet shall have a throat at least equal to the lesser of 0.7 times the thickness of the thinner of the elements joined, or \( \frac{1}{4} \) in. (6 mm) (note that a fatigue evaluation may require a larger weld). It is permitted for the corner weld to penetrate through either of the elements being joined.

Nozzles, backing strips, clips, or other attachments shall not be located in highly stressed areas of the expansion joint, i.e., inner torus, annular plate, and outer torus.

(1) Butt joints shall be full penetration welds, Type (1) of Table UW-12.

(2) Corner joints shall be full penetration welds with a covering fillet and no backing strip. The covering fillet shall have a throat at least equal to the lesser of 0.7 times the thickness of the thinner of the elements joined, or \( \frac{1}{4} \) in. (6 mm) (note that a fatigue evaluation may require a larger weld). It is permitted for the corner weld to penetrate through either of the elements being joined.

(3) Nonreinforced nozzle on straight flange

(4) Reinforced nozzle on straight flange

(5) Nonreinforced nozzle on outer shell element

(6) Reinforced nozzle on outer shell element

Legend:
- \( R_b \) = inside radius of expansion joint straight flange
- \( t_f \) = uncorroded thickness of expansion joint straight flange
- \( t_o \) = uncorroded thickness of expansion joint outer shell element

Figure 5-2
Typical Nozzle Attachment Details Showing Minimum Length of Straight Flange or Outer Shell Element

As an exception, a thin cylindrical liner, having approximately the shell inside diameter, may be attached to an inner torus or an annular plate inner corner. A liner is considered thin when its thickness is no more than \( \frac{t}{3} \); however, it need not be thinner than \( \frac{1}{16} \) in. (1.6 mm). This liner shall be attached to only one side. The weld attaching the liner shall have a maximum dimension (groove depth or either fillet leg) no larger than the liner thickness. Nozzles or other attachments located in the outer straight flange or outer shell element shall satisfy the axial spacing requirements of Figure 5-2.