ASME BPVC.III.1.NB-2015

Figure NB-4427-1
Fillet and Socket Weld Details and Dimensions

(a) Equal Leg Fillet Weld [Note (1)]

(b) Unequal Leg Fillet Weld [Note (2)]

Add shading to denote weld cross section

(c) Socket Welding Flange [Note (3)]

(d) Socket Welding Fittings [Note (4)]
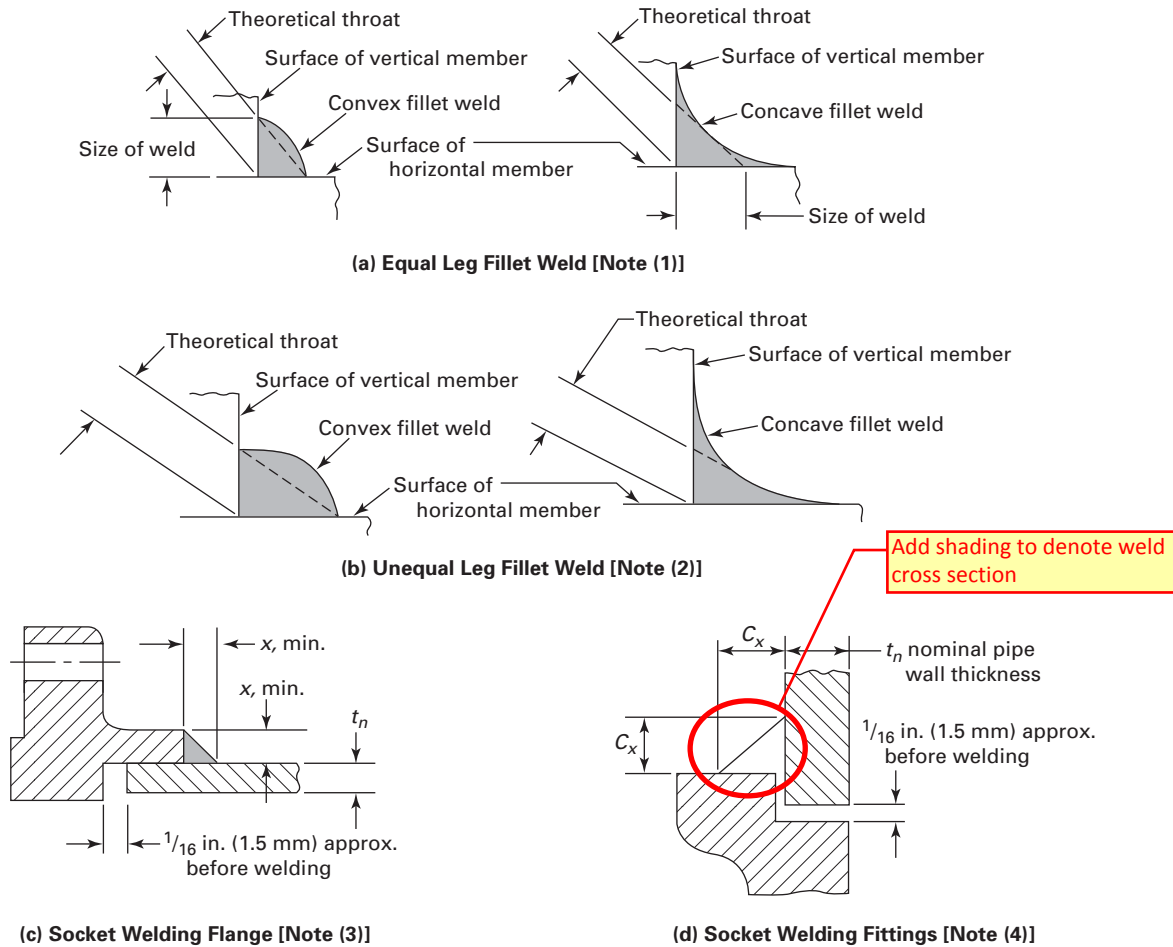
GENERAL NOTE: See NB-3661.2 for limitation on socket weld pipe size.

NOTES:
(1) The size of an equal leg fillet is the leg length of the largest inscribed right isosceles triangle. Theoretical throat = 0.7 × size of weld.
(2) The size of an unequal leg fillet weld is the shorter leg length of the largest right triangle that can be inscribed within the fillet weld cross section.
(3) x min. = 1.4 t_n or the thickness of the hub, whichever is smaller, but not less than $\frac{1}{8}$ in. (3 mm), where t_n = nominal pipe wall thickness
(4) C_x min. = 1.09 t_n where t_n = nominal pipe wall thickness

(1) The welding procedure and the welders have been qualified in accordance with NB-4321.

(2) The material is identified and is compatible with the material to which it is attached.

(3) The welding material is identified and compatible with the materials joined.

(4) The welds are postweld heat treated when required by NB-4620.

(b) Removal of nonstructural temporary attachments shall be accomplished as follows.

(1) The immediate area around the temporary attachment is marked in a suitable manner so that after removal the area can be identified until after it has been examined in accordance with (3) below.

(2) The temporary attachment is completely removed in accordance with the procedures of NB-4211.

(3) After the temporary attachment has been removed, the marked area is examined by the liquid penetrant or magnetic particle method in accordance with the requirements of NB-5110, and meets the acceptance standards of NB-5340 or NB-5350, whichever is applicable.

(4) As an alternative to (a)(4), postweld heat treatment may be deferred until after removal of the attachment.

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ceed 2 in. (51 mm) in length. In making socket welds, a gap as shown in Fig. NB-4427-1 shall be provided prior to welding. The gap need not be present nor be verified after welding. For sleeve type joints without internal shoulder, the gap shall be between the butting ends of the pipe or tube.

(b) Socket welds smaller than those specified in Fig. NB-4427-1 may be used provided the requirements of NB-3000 are met.

NB-4428   Seal Welds of Threaded Joints

Where seal welding of threaded pipe joints is performed, the exposed threads shall be either removed entirely or covered with weld metal.

NB-4429   Welding of Clad Parts[2]

The joint types and welding procedures used for cladding shall be such as to prevent the formation of brittle weld composition.

NB-4430   WELDING OF ATTACHMENTS

NB-4431   Materials for Attachments

Nonpressure-retaining attachments (NB-1132.1) welded to pressure-retaining components shall be of materials which meet the requirements of NB-2190. Materials for pressure-retaining attachments shall meet the requirements of NB-2120.

NB-4432   Welding of Structural Attachments

The rules of NB-4321 governing welding qualifications shall apply to the welding of structural attachments to pressure-retaining material.

NB-4433   Structural Attachments

Structural attachments shall conform reasonably to the curvature of the surface to which they are to be attached and shall be attached by full penetration, fillet, or partial penetration continuous welds. When fillet and partial penetration welds are used on components, the requirements of NB-3123.2 shall be met. Attachments to the internal surfaces of reactor vessels shall be made

only with full penetration welds. Figure NB-4433-1 illustrates some of the typical details for attaching structural attachments to a component using full penetration welds. Valve seats may be attached to the pressure boundary part by fillet or partial penetration welds provided the valve seat is shouldered against the pressure boundary part.

NB-4434   Welding of Internal Structural Supports to Clad Components

Internal structural supports on clad components shall be welded to the base metal and not to the cladding, except for weld overlay cladding.

NB-4435   Welding of Nonstructural and Temporary Attachments and Their Removal

(a) Nonstructural attachments (NB-1132.1) welded to the pressure-retaining portion of the component need not comply with NB-2000 and may be welded with continuous or intermittent fillet or partial penetration welds, provided the requirements of (1) through (4) below are met.

(1) The welding procedure and the welders have been qualified in accordance with NB-4321.

(2) The material is identified and is compatible with the material to which it is attached.

(3) The welding material is identified and compatible with the materials joined.

(4) The welds are postweld heat treated when required by NB-4620.

(b) Removal of nonstructural attachments, when temporary, shall be accomplished as follows.

(1) The immediate area around the temporary attachment is marked in a suitable manner so that after removal the area can be identified until after it has been examined in accordance with (3) below.

(2) The temporary attachment is completely removed in accordance with the procedures of NB-4211.
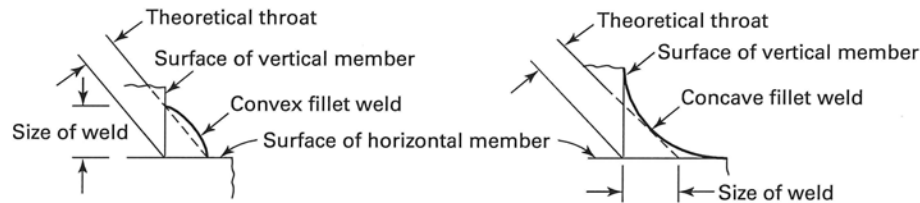
(3) After the temporary attachment has been removed, the marked area is examined by the liquid penetrant or magnetic particle method in accordance with the requirements of NB-5110, and meets the acceptance standards of NB-5340 or NB-5350, whichever is applicable.

(4) As an alternative to (a)(4) above, postweld heat treatment may be deferred until after removal of the attachment.

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[2] Welds that are exposed to corrosive action should have a resistance to corrosion that is not substantially less than that of the cladding. The use of filler metal that will deposit weld metal which is similar to the composition of the cladding material is recommended. If weld metal of different composition is used, it should have properties compatible with the application.
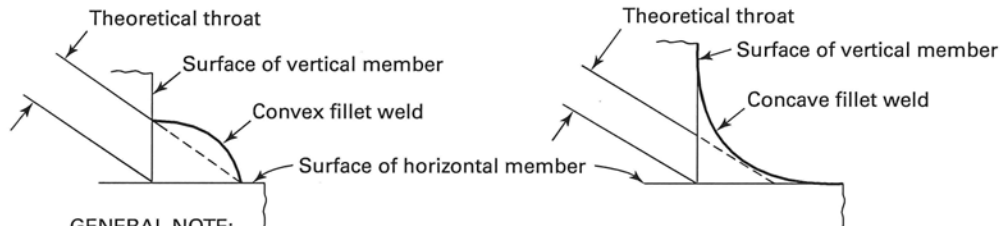
GENERAL NOTE:
The size of an equal leg fillet weld is the leg length of the largest inscribed right isosceles triangle. Theoretical throat = 0.7 × size of weld.
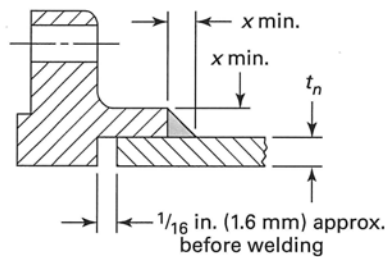
**(a) Equal Leg Fillet Weld**

GENERAL NOTE:
The size of an unequal leg fillet weld is the shorter leg length of the largest right triangle which can be inscribed within the fillet weld cross section.

(b) Unequal Leg Fillet Weld

x min. = $1.4t_n$ or the thickness of the hub, whichever is smaller, but not less than $1/8$ in. (3.2 mm) where
t_n = nominal pipe wall thickness

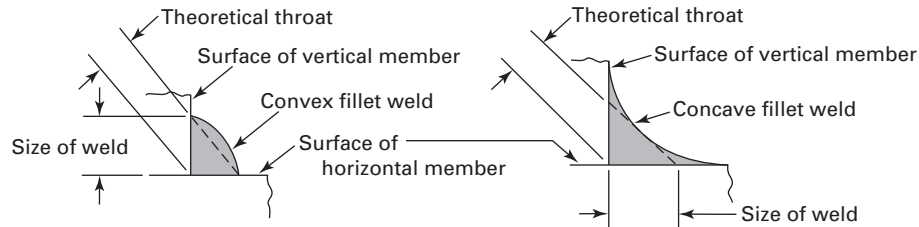**(c) Minimum Welding Dimensions for Socket Welding Flanges**
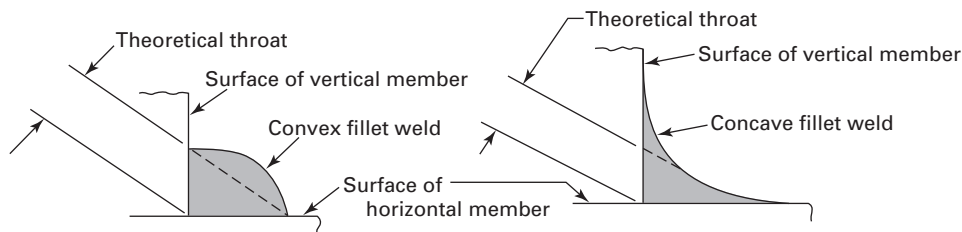
C_x min. = $1.09t_n$
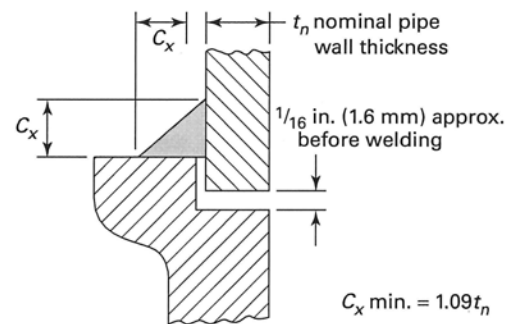
(d) Minimum Welding Dimensions for Socket Welding Fittings

FIG. NB-4427-1 FILLET AND SOCKET WELD DETAILS AND DIMENSIONS
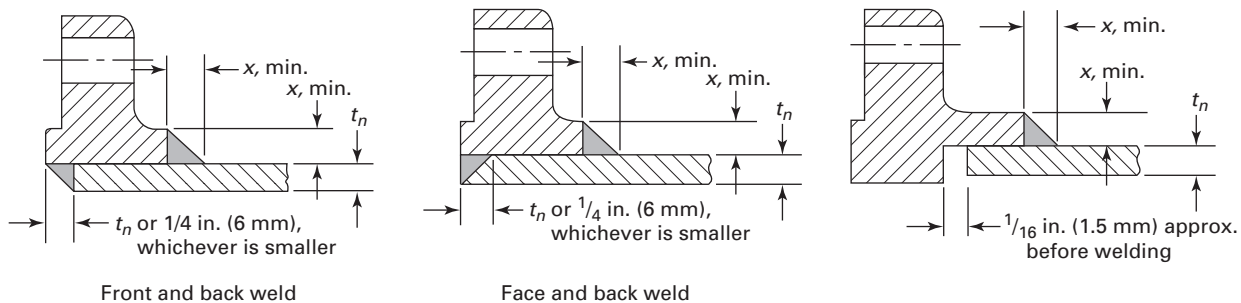(See NB-3661.2 for Limitation on Socket Weld Pipe Size.)

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Figure NC-4427-1
Fillet and Socket Weld Details and Dimensions

Theoretical throat
Surface of vertical member
Convex fillet weld
Size of weld
Surface of horizontal member

Theoretical throat
Surface of vertical member
Concave fillet weld
Size of weld

(a) Equal Leg Fillet Weld [Note (1)]

Theoretical throat
Surface of vertical member
Convex fillet weld
Surface of horizontal member

Theoretical throat
Surface of vertical member
Concave fillet weld

(b) Unequal Leg Fillet Weld [Note (2)]

x, min.
x, min.
t_n
t_n or 1/4 in. (6 mm), whichever is smaller
Front and back weld

x, min.
x, min.
t_n
t_n or $^1/_4$ in. (6 mm), whichever is smaller
Face and back weld

(c-1) Slip-On Flange [Note (3)]

x, min.
x, min.
t_n
$^1/_{16}$ in. (1.5 mm) approx. before welding

(c-2) Socket Welding Flange [Note (3)]

C_x
t_n nominal pipe wall thickness
$^1/_{16}$ in. (1.5 mm) approx. before welding
C_x

Add shading to denote weld cross section

(c-3) Socket Welding Fittings [Note (4)]

NOTES:
(1) The size of an equal leg fillet weld is the leg length of the largest inscribed right isosceles triangle. Theoretical throat = 0.7 × size of weld.
(2) The size of an unequal leg fillet weld is the shorter leg length of the largest right triangle that can be inscribed within the fillet weld cross section.
(3) x, min. = $1.4t_n$ or the thickness of the hub, whichever is smaller, but not less than $^1/_8$ in. (3 mm), where t_n = nominal pipe wall thickness.
(4) C_x, min. = $1.09t_n$ where t_n = nominal pipe wall thickness.

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Figure ND-4427-1
Fillet and Socket Weld Details and Dimensions
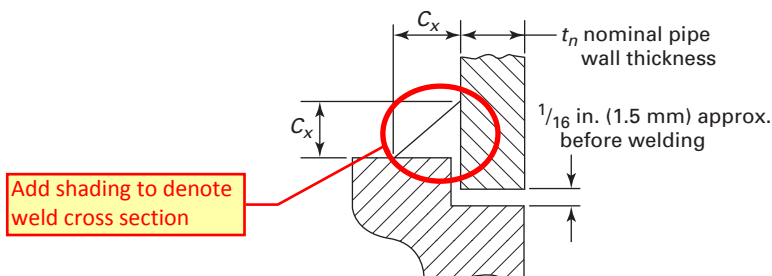
(a) Equal Leg Fillet Weld [Note (1)]

(b) Unequal Leg Fillet Weld [Note (2)]

(c-1) Slip On Flange [Note (3)]

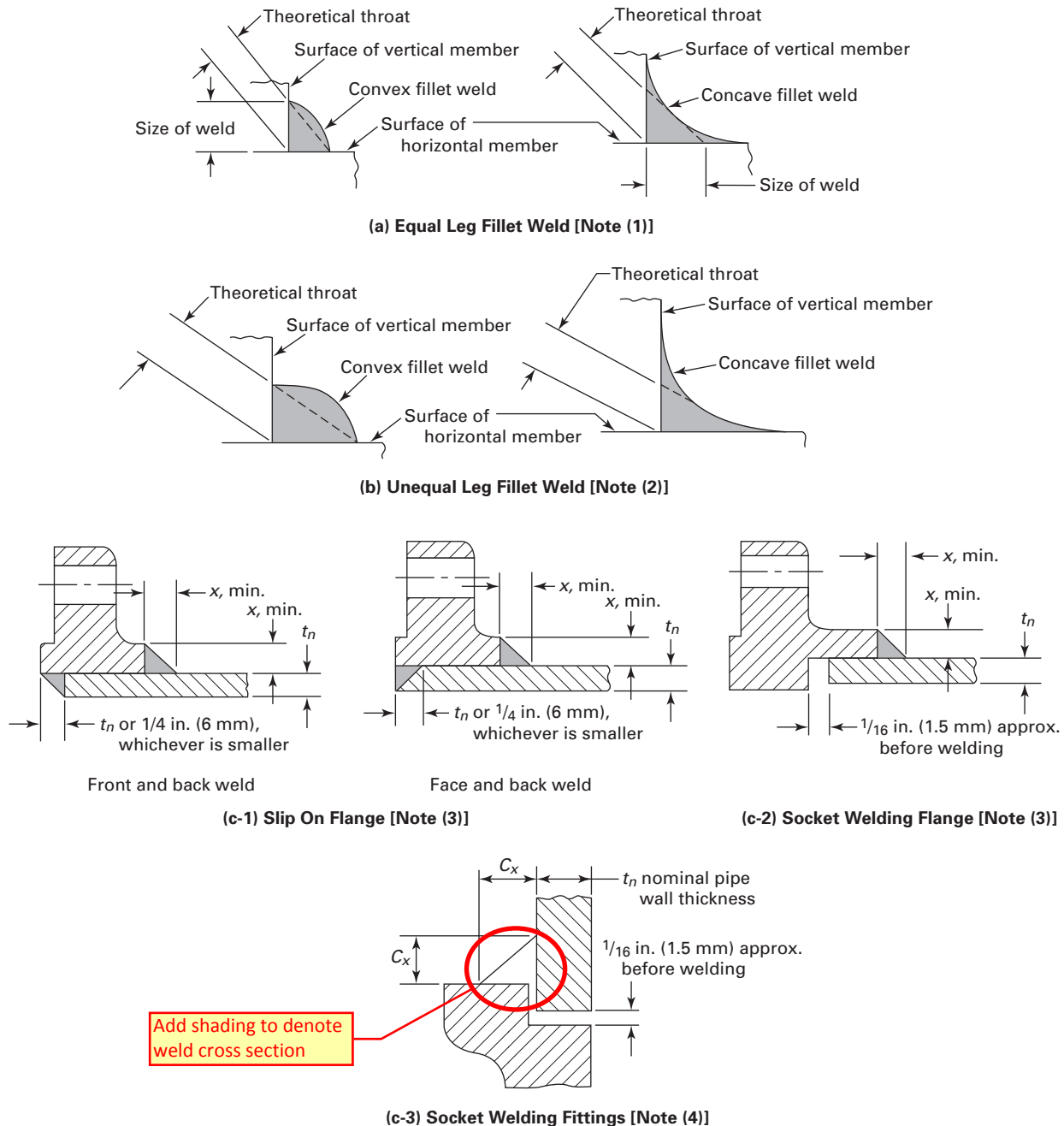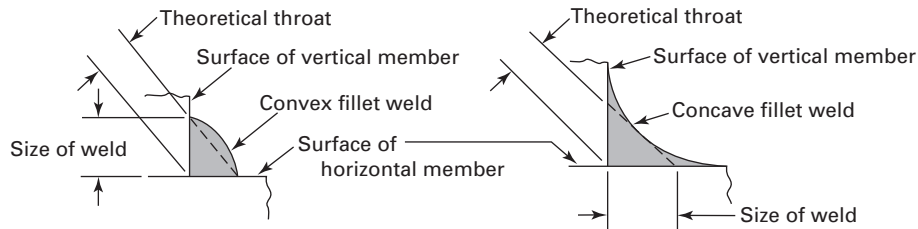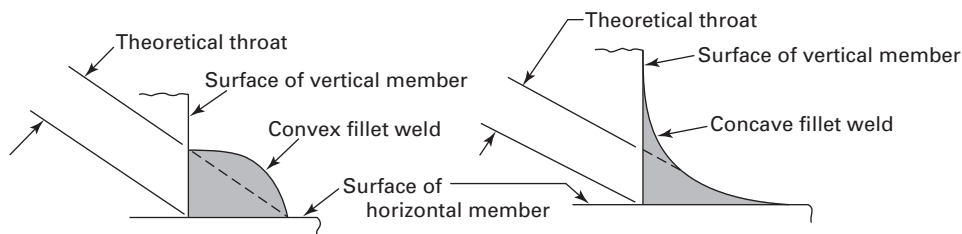**(c-2) Socket Welding Flange [Note (3)]**

Add shading to denote weld cross section

(c-3) Socket Welding Fittings [Note (4)]

NOTES:
(1) The size of an equal leg fillet is the leg length of the largest inscribed right isosceles triangle. Theoretical throat = 0.7 × size of weld.
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(4) C_x min. = $1.09t_n$ where t_n = nominal pipe wall thickness
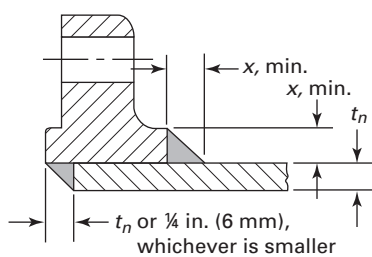
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Figure NE-4427-1
Fillet and Socket Weld Details and Dimensions
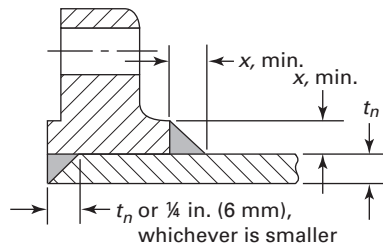
(a) Equal Leg Fillet Weld [Note (1)]
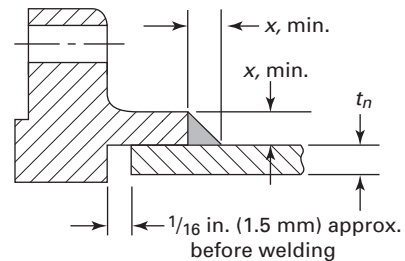
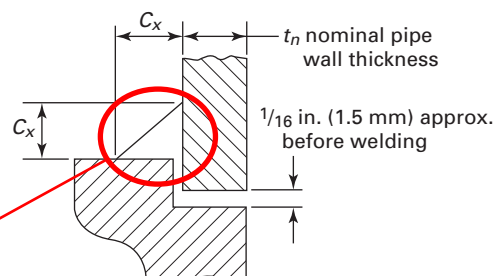**(b) Unequal Leg Fillet Weld [Note (2)]**

Front and back weld

Face and back weld

(c-1) Slip On Flange [Note (3)]

(c-2) Socket Welding Flange [Note (3)]

Add shading to denote weld cross section

(c-3) Socket Welding Fittings [Note (4)]

NOTES:
(1) The size of an equal leg fillet is the leg length of the largest inscribed right isosceles triangle. Theoretical throat = 0.7 × size of weld.
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