

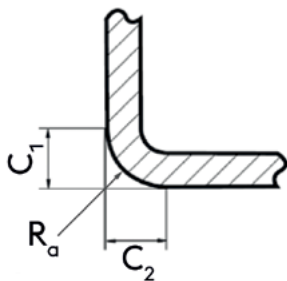
RADII AND EDGE DIMENSIONS

DEFINITION

The corner area of square or rectangular tubes forms into a circular arc segment due to the manufacturing technology. The shape of the circular arc segment is referred to in simplified terms as the outer radius and, by definition, begins at the deviation from the flat side surface of the hollow profile.

DISTINCTION

The outer radius can be determined using the edge dimensions C_1 or C_2 , or by measuring the radius contour R_a .



Sketch of radius profile



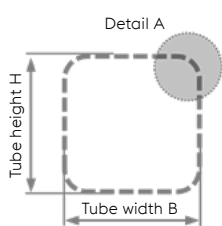
Measurement of the radius using a radius gauge Result: R_a



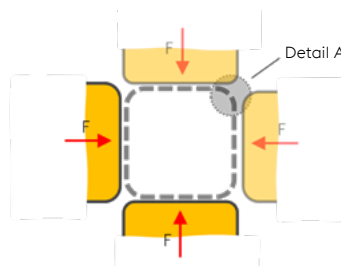
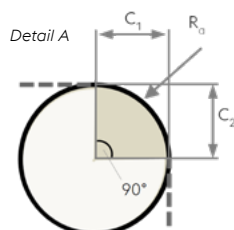
Measurement of the radius contour using a caliper Result: C_1, C_2

TECHNOLOGICAL INFLUENCING FACTORS ON THE RADIUS PROFILE

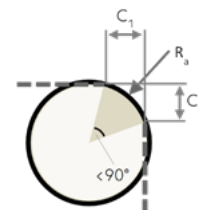
The shape of the radius is significantly influenced by the technological manufacturing process. To understand how the radius actually forms in practice, an idealized representation of the outer radius R_a and the edge dimensions C_1 and C_2 is helpful:



Idealized representation of R_a , C_1 , and C_2
The radius represents exactly one quarter of a circle
Result: $R_a = C_1 = C_2$



Calibration rolls in the roll forming system create the final tube cross-section. The lengths of the sides become larger, edge dimensions C_1 and C_2 become smaller. Tube width B , tube height H , and outer radius R_a remain unchanged.
Result: $C_1, C_2 \downarrow$ | R_a remains unchanged
 $R_a > C_1$ or C_2



ADVANTAGES OF SMALL EDGE DIMENSIONS C_1 AND C_2

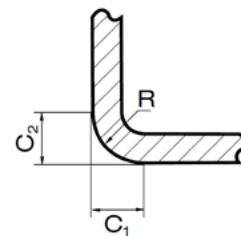
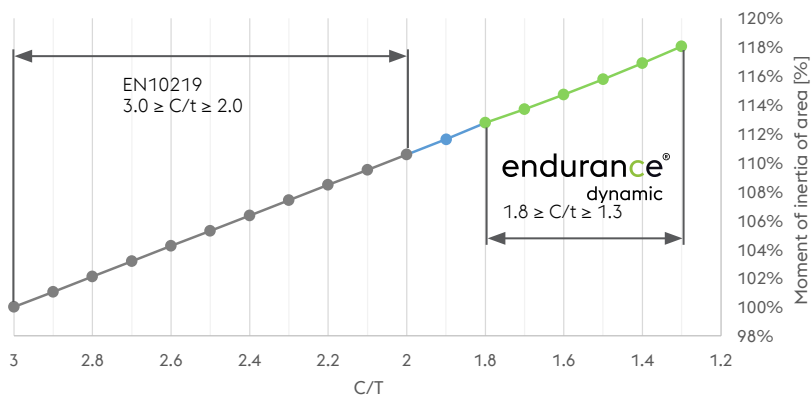
The formation of small edge dimensions C_1 and C_2 offers several advantages:

» Moment of inertia of area (I)

By reducing the edge dimensions (C_1, C_2) while keeping the outer radius R_o constant, the axial moments of inertia of area increase, and thus the tube stiffness of the tubes increases. The following relationship shows the influence of the edge dimensions C_1, C_2 :

Example: square tube 100/100 with wall thickness 10 mm

Moment of inertia of area in relation to the C/T ratio

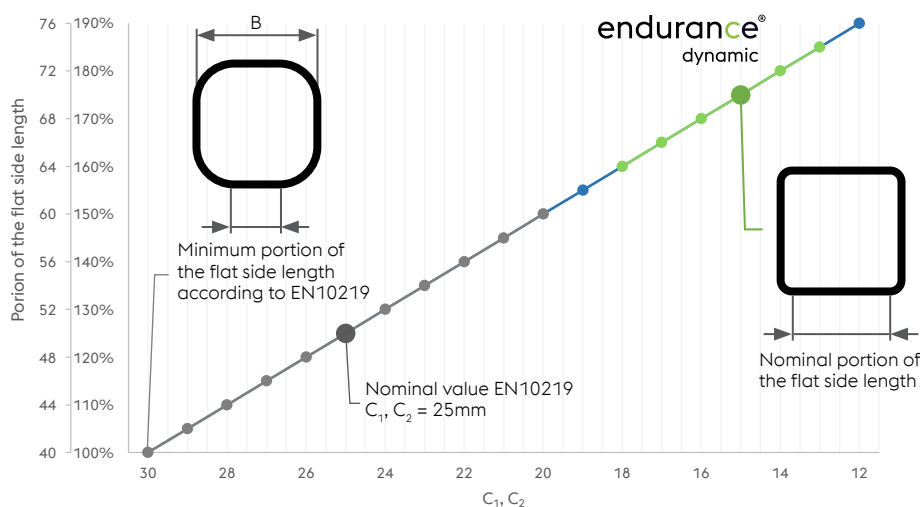


$$\frac{C}{T} = \frac{\emptyset(C_1, C_2)}{\emptyset(T_1, T_2)}$$

» Side lengths

By reducing the edge dimensions (C_1, C_2), the proportion of flat side length increases. This means, for example, that boreholes for necessary attachments can be placed closer to the radius.

Example: square tube 100/100 with wall thickness 10 mm



Example 100/100x10:

EN10219:

$C_{1,2_MIN} = 20$ mm, $C_{1,2_MAX} = 30$ mm

Side length_{MIN} = $100 - 2 \times 30 = 40$ mm

Side length_{MAX} = $100 - 2 \times 20 = 60$ mm

endurance dynamic

$C_{1,2_MIN} = 13$ mm, $C_{1,2_MAX} = 18$ mm

Side length_{MIN} = $100 - 2 \times 18 = 64$ mm

Side length_{MAX} = $100 - 2 \times 13 = 74$ mm