3.35 VERT – Polygon Vertices in Absolute Coordinates

See also: SECT, POLY, Parametric-Sections

VERT

Item	Description	Unit	Default
NO	Designation of the polygon vertex	*Lit4*	*
Y	Coordinates of the polygon vertex	$[mm]_{1011}$	0
Z	relative to YM, ZM	$[mm]_{1011}$	0
R	Radius	$[mm]_{1011}$	-
TYPE	Type of vertex O Outer perimeter TP Intersection of tangents	*LIT*	*
EXP	Literal of extra material constant record MEXT or degree of air contact (0.0 to 1.0) from that point	*Lit4/—*	*
	Explanations see Parametric-Sections		
REFP	Reference point	*Lit8*	*
REFD	Reference direction point	*Lit8*	*
REFS	Reference initial coordinates	*Lit8*	*

NO is used for identification during any output of stresses. If nothing is input, AQUA generates internal numbers in sequence.

The distances between adjacent polygon vertices must be at least 0.0001 m. The polygon is defined by the sequence of the vertices, not by their numbers. The number of points is limited to 255 per polygon.

If a radius is specified, there are two possibilities:

- For tangential points ('TYPE TP') a fillet is created at that vertex with the given radius. If the radius is defined negative, a chamfer is created instead with the value of R used as a distance along the edges (see picture below).
  Only this input option of a fillet is possible for a cross section interpolation with references along an axis.

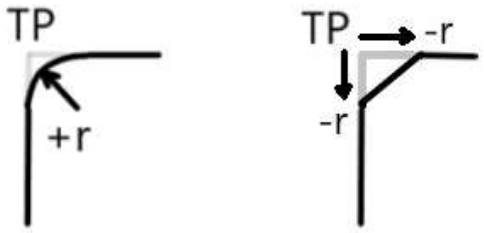

Figure 3.43: Sign of radius with TYPE TP

- Without 'TYPE TP' a tangential point (with a 'T' at beginning of the name) is inserted between this ('E') and the previously defined vertex ('A') (see picture below). With an angle > 120 degree two tangential points ('R' and 'T') and an additional midpoint ('S') are inserted. An additional start point ('Q') of rounding is inserted if the radius is less than the half distance between the original polygon points. The inserted points get the reference of the original polygon points. For this a new geometry point 'G' with the original reference is inserted. Then all new points are referenced to this geometry point.

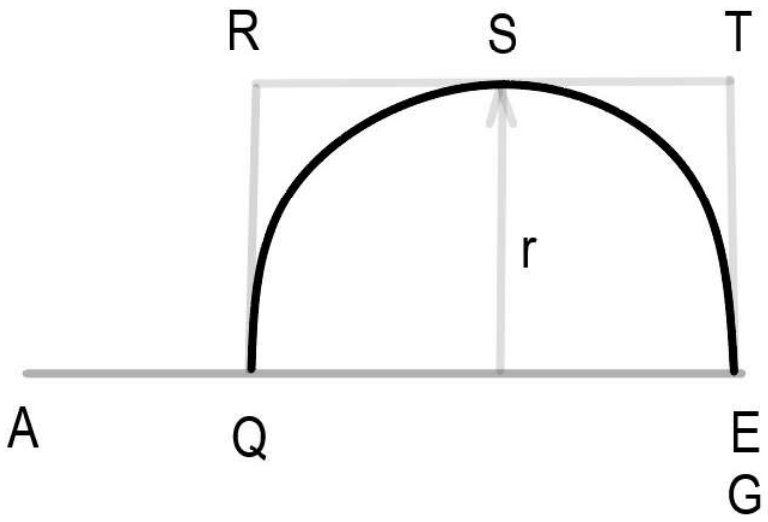

Figure 3.44: Adaption Radius to tangent point

If R is positive, the area of the polygon will be increased.

In both cases the radius of the inserted points will be adjusted to achieve exactly the same area as the circular arc.

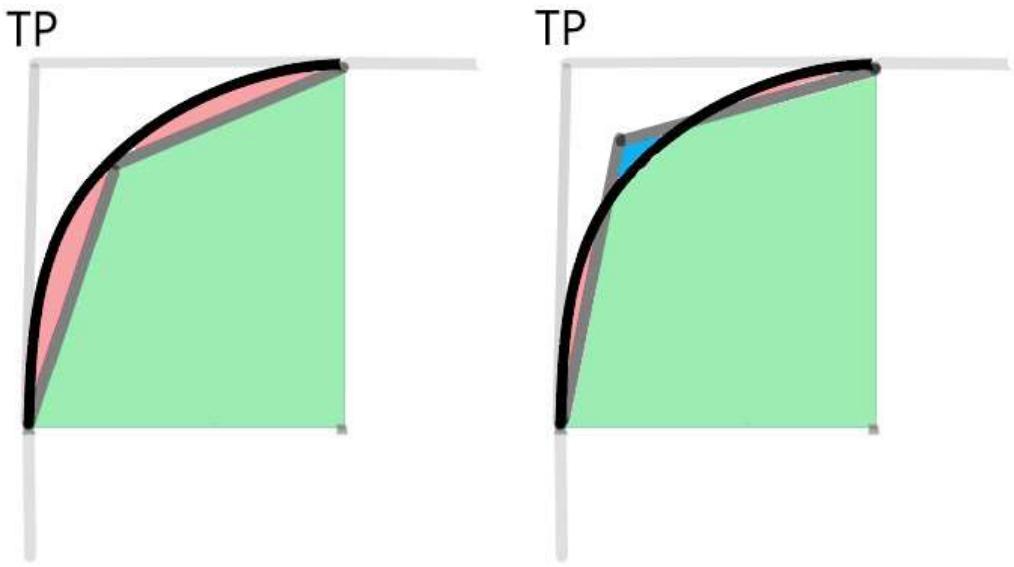

Figure 3.45: left = without compensation, right = with compensation
red = missing area, blue = compensation area

Thus, a full circle section should be defined via CIRC or an explicit loop with trigonometric functions.

Non effective areas can be defined by means of NEFF-areas, where parts of the polygons within those areas become non effective for selected forces by the internal introduction of deductional polygons.

The old method of short cuts within the polygon definition sohould not be used any more**.** There non effective points are specified either with the definition of NEFF or INEF for the TYPE of the vertex or by giving values for YEFF or ZEFF to introduce additional vertices at these limits automatically. Reinforcement keeps effective.

The sectional values of the total sections are only used for the calculation of the area as well as the torsional stress and the integral equation solution. All geometrical moments of inertia are computed based on the effective parts only (refer to the AQB manual). It is to be noted that the effective width is actually dependent on the load case and the on the purpose of design.

The input definition EXP allows the definition of special material parameters (e.g. air contact, temperature of environment, cover of reinforcement, ... see MEXT) to individual poygon edges. The input definition EXP is set at the first point of the edge.You can find further explanations and examples in our Online Help -> Tutorials

https://www.sofistik.de/documentation/2022/en/tutorials/listoftutorials/general-workflows/cross-sections-general/cross-section-air-mext/cross-section_air-contact-ratio.html

Instead of a literal at EXP, only the degree of air contact can be set. For the degree of air contact of the whole edge the geometric mean value is used. I.e. if one of the two vertices of an edge has the degree 0.0, the total edge will have this value. The values '0.0' and '1.0' are defaults for concrete materials which are redefined in AQUA. Inner edges and holes are get the value '0.0', outer edges are get the value '1.0'.