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Z_H : Section modulus of the Hat-type and H-shape combined sheet pile per pile at H-shape side.

Z_{Hat}: Section modulus of the Hat-type and H-shape combined sheet pile per pile at Hat-type side.

The calculation process is shown below for reference.

1) Weight W:

$$W = W_S + W_H$$

W: Weight of the Hat-type and H-shape combined sheet piles.

W_S: Weight of Hat-type sheet piles.

W_H: Weight of H-shape .

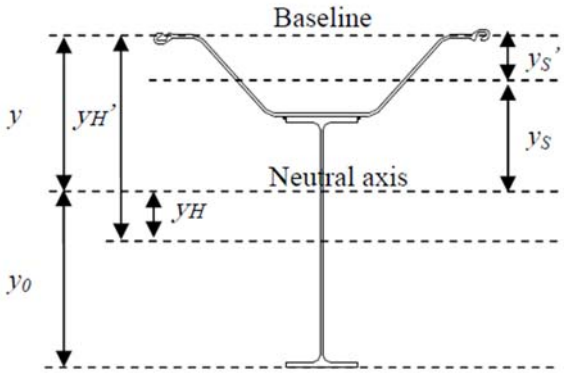

Figure 1

2) Section area A:

$$A = A_S + A_H$$

A : Section area of Hat-type and H-shape combined sheet piles.

A_S: Section area of Hat-type sheet piles.

A_H: Section area of H-shapes.

3) Moment of inertia I :

$$I = I_S + A_S \cdot {y_S}^2 + I_H + A_H \cdot {y_H}^2$$

$$I' = I/w$$

I: Moment of inertia of the Hat-type and H-shape combined sheet pile per pile.

I_S: Moment of inertia of the Hat-type sheet pile per pile.

I_H: Moment of inertia of the H-shape.

y_S: Distance from the neutral axis of the Hat-type and H-shape combined sheet pile to the neutral axis of the Hat-type sheet pile per pile.

y_H: Distance from the neutral axis of the Hat-type and H-shape combined sheet pile to the neutral axis of the H-shape.

I': Moment of inertia of the Hat-type and H-shape combined sheet pile per 1 m of pile wall width.

w: Effective width of the Hat-type and H-shape combined sheet pile (900 mm).

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4) Calculation method of the neutral axis

$$y = Q/A$$

y: Distance from the neutral axis of the Hat-type and H-shape combined sheet pile to the Hat-type sheet pile side outside end.

Q: Sum of the geometrical moment of the section of Hat-type sheet pile and H-shape about the baseline.

$$Q = Q_S + Q_H$$

Q_S: Geometrical moment of the section of Hat-type sheet pile about the baseline.

$$Q_S = A_S \cdot y_S'$$

y_S': Distance from the baseline to the center of gravity of the Hat-type steel sheet pile.

Q_H: Geometrical moment of the section of the H-shape about the baseline.

$$Q_H = A_H \cdot y_H'$$

y_H': Distance from the baseline to the center of gravity of the H-shape.

A: Section area of the Hat-type and H-shape combined sheet pile.

$$A = A_S + A_H$$

5) Section modulus Z:

$$Z_H = I/y_0$$
$$Z_{Hat} = I/y$$

Z_H: Section modulus of the Hat-type and H-shape combined sheet pile per pile at H-shape side.

Z_{Hat}: Section modulus of the Hat-type and H-shape combined sheet pile per pile at Hat-type side.

I: Moment of inertia of the Hat-type and H-shape combined sheet pile per pile.

y_0: Distance from the neutral axis of the Hat-type and H-shape combined sheet pile to the H-shape side outside end.

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