Errata for the first printing of CIDECT Design Guide No. 9 (Design Guide for Structural Hollow Section Column Conections)

In the following errata corrected parts are shown with bold face letters and also highlighted in yellow. Locations (page, line, etc) where corrections are made are shown with bold faces.

Page 25; 2nd line:

moments at the connections M_j are given for different **connection** stiffnesses S_j.

Page 31; 3rd and 4th line:

k_3: column web (tension) k_4: column flange (**bending**)
k_5: bolt (tension) k_7: **end** plate (bending)

Page 31; 18th line:

various types of semi-rigid connections between open sections**, but the principles can also be used for connections with hollow section members.** Later on, the actual

Page 38; 2nd line:

$V^* = \phi_1 A_g f_{p,y}$ **/√3** CSA Specification

= 0.9(340)(10)(0.300) **/√3**= **530** kN > 484 kN.

Page 46; 4th line below figure 5.11:

bolts of at least **M20** Grade 8.8 (ASTM A325) capacity, to account for prying action caused

Pages 55; figure 6.2, under Functions:

$f(n')=1+0.3 \cdot n'-0.3(n')^2$ **for n' < 0**

$f(n')=1.0$ **for n' ≥ 0**

Pages 67; figure 6.11, under Functions:

$f(n')=1+0.3 \cdot n'-0.3(n')^2$ **for n' < 0**

$f(n')=1.0$ **for n' ≥ 0**

Page 74; 6th line:

the following modified criterion for column face plastification of **uniplanar** I-beam to RHS

Page 74; 17th line:

η **≥** 2√(1-β), see Lu (1997).

Page 74; 19th line:

one flange and the other (if two separate flanges would be present). Thus for values $\eta < 2\sqrt{(1-\beta)}$ several strength criteria may have to be considered.

Page 74; 25th – 31st line:

- As shown in figure 6.20 for the investigated width ratios $0.15 < \beta < 0.75$ negative **multiplanar** load ratios (J < 0) decrease the connection capacity considerably, whereas positive **multiplanar** load ratios (J > 0) generally have a small beneficial effect. Simplified this effect is given by f(J) = 1+0.4J, but ≤ 1.0. This lower bound can also be used for axially loaded I-beam to RHS connections. Based on the work of Yu (1997), it is expected that for β ratios close to 1.0 that positive **multiplanar** load ratios may also have a negative effect on the load, therefore the validity range is limited to $0.2 \leq \beta \leq 0.8$

Page 77; 4th formula:

$$\mathbf{M_b^* \leq f_{b,y} \cdot t_{b,f} \cdot b_e \cdot (h_b - t_{b,f})}$$

Page 77; range of validity:

$0.2 \leq \beta \leq 0.8$, **15** $\leq 2\gamma \leq 37.5$, $0.3 \leq \eta \leq 2.0$

Page 79; 7th line:

ent on the thickness of the cap plates, the **stiffeners in** the beam and the bolts. Since

Page 80; 15 - 16th line:

Besides the bolted I-beam-to- RHS column connections with extended plates shown in **figure 6.26(b)**, nowadays it is also possible to connect directly to the face of the RHS column.

Page 87; 1st - 2nd line:

figure 6.31, gives for a conservative linear extrapolation from β = 0.8 to β = 1.0 an increase of **about 60%.**

Page 88; below figure 6.32:

From the design graph follows:

For $\frac{d_c}{t_c} = 29.85$ **and β = 1.0 (d_b=d_c)**: $C_{b,ip}$ = **0.67**

For $\frac{f_{c,y} \cdot t_c}{f_{b,y} \cdot t_b} = \frac{\mathbf{10}}{\mathbf{6.3}}$=1.6: $M^*_{b,ip}$ = **0.67**·1.6 · f(n') · $M_{b,pl}$ = **1.07** f(n') · $M_{b,pl}$

Suppose the compression stress in the column is 0.6 f_{yc} then n'= - 0.6 and with f(n') = 1+0.3n'-0.3(n')^2 = 0.71

$M^*_{b,ip}$ = **0.76** $M_{b,pl}$

Page 90; Figure 6.34 should be replaced by the following figure:

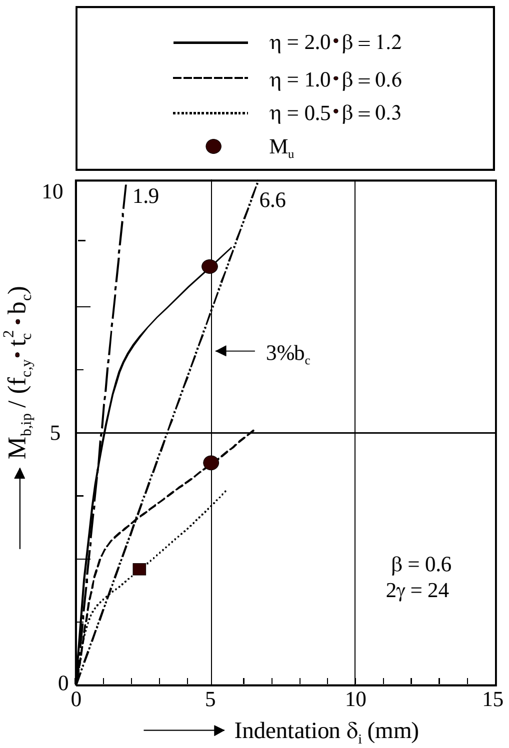

Figure 6.34 - Numerical results of Yu (1997) for X-connections loaded by in-plane bending moments

Page 90; at the bottom:

The parameters are nearly the same as for the connection being considered, only the dimensions **are** different i.e. b_0 = 150 mm instead of 200 mm. Thus, the influence of b_0 has to be incorporated in the results of Yu and the effect of η should be included by interpolation between η = 0.6 and η = 1.2. **The two straight lines in the figure show the initial stiffness and the stiffness at the capacity of the connection (at 3% b_0), interpolated at η = 1.0.**

As shown in the figure the moment rotation curve is strongly bi-linear. The initial **rotation** ϕ_i is given by:

$\phi_i = 2\delta_i/h_b$

For η = 1.67β =1.0 and for $M_{b,ip}=10 \cdot f_{c,y} \cdot t_c^2 \cdot b_c$: δ_i = **1.9** mm

Page 91; up to line 18:

thus, ϕ_i = 2x**1.9**/150 = **0.025** for

$M_{b,ip}$ =10x355x(6.25)^{2}x150 = 20.8x10^6 Nmm =20.8 kNm

$C_{ip} = M_{b,ip} / \phi_i$ = **821** kNm/rad

The local indentation is **proportional to b_c^4 and reciprocal to t_c^3 (compare with a beam under a uniformly distributed load). Thus, the local indentation in this example turns out to be (200/150)^4(6.3/8)^3 times larger. For the rotation the indentation is divided by half the beam depth ($h_c=\eta b_c$), thus the rotation is a function of b_c^3/η. Note that in both cases the rotation is related to η=1.**

Consequently **for the example** the initial stiffness is given by:

$$\mathbf{C_{ip}} = \mathbf{821}\left(\frac{\mathbf{150}}{\mathbf{200}}\right)^4\left(\frac{\mathbf{8}}{\mathbf{6.25}}\right)^3\frac{\mathbf{200}}{\mathbf{150}} = \mathbf{709} > 542 \text{ kNm/rad}$$

Thus, it can be concluded that according to Eurocode 3 the **connection** cannot be assumed as being pin-ended.

Considering the **stiffness when the moment capacity** of the connection (3% b_c) is reached gives:

δ_i = **6.6** mm instead of **1.9** mm for η = 1.67β =1.0 and for $M_{b,ip}=10 \cdot f_{c,y} \cdot t_c^2 \cdot b_c$

Consequently the rotational stiffness drops to:

$$\frac{\mathbf{1.9}}{\mathbf{6.6}} \cdot \mathbf{709} = \mathbf{204 \text{ kNm/rad}} < 542 \text{ kNm/rad}$$

This is **lower than the limit and based on stiffness, the connection can be classified as a pin-ended connection, provided the connection has sufficient rotation capacity.**

Delete: Note

Page 93; insert below the 8th line:

This shows that both chord stress functions give about the same result.

Page 123; the last line of the 2nd paragraph:

which are equal to 2x242 + 4x211 = 1328 kN. Thus, the block shear failure is less critical.

Page 180; equation 11.14:

tube bearing $Bc^* = \mathbf{3}\phi_3 \, d_n t_c \, n \, f_{c,u}$ 11.14

Page 181; 3) Determine connection parameters, 4th equation:

$K_1 = \ln(r_2/r_3) = \ln(238.2/196.95) = 0.190$