

### 3.5. REQUIREMENTS FOR ANCHORAGE AND SPLICING OF REBARS

#### 3.5.1. General

**3.5.1.1** – EN 1992-1-1:2004, Section 8 for the detailing of reinforcement applies, with the additional rules of the following sub-clauses.

**3.5.1.2** – For hoops used as transverse reinforcement in beams, columns or walls, closed stirrups with 135° hooks and extensions of length  $10d_{bw}$  shall be used.

**3.5.1.3** – The anchorage length of beam or column bars anchored within beam-column joints shall be measured from a point on the bar at a distance  $5d_{bL}$  inside the face of the joint, to take into account the yield penetration due to cyclic post-elastic deformations.

#### 3.5.2. Anchorage of rebars

**3.5.2.1** – When calculating the anchorage or lap length of column bars which contribute to the flexural strength of elements in critical regions, the ratio of the required area of reinforcement over the actual area of reinforcement shall be assumed to be unity.

**3.5.2.2** – If, under the seismic design situation, the axial force in a column is tensile, the anchorage lengths shall be increased to 50% longer than those specified in EN 1992-1-1:2004.

**3.5.2.3** – The part of beam longitudinal reinforcement bent in joints for anchorage shall always be placed inside the corresponding column hoops.

**3.5.2.4** – To prevent bond failure the diameter of beam longitudinal bars passing through beam-column joints,  $d_{bL}$ , shall be limited in accordance with the following expressions:

(a) For interior beam-column joints:

$$d_{bL} = \frac{7.5 f_{ctm}}{f_{yd}} \frac{(1 + 0.8 v_d)}{1 + 0.5 \rho' / \rho_{max}} \quad (3.24)$$

(b) For exterior beam-column joints:

$$d_{bL} = \frac{7.5 f_{ctm}}{f_{yd}} (1 + 0.8 v_d) \quad (3.25)$$

Eq.(3.24) and Eq.(3.25) are not applicable to diagonal bars crossing joints.

**3.5.2.5** – If the requirement specified in **3.5.2.4** cannot be satisfied in exterior beam-column joints because the depth,  $h_c$ , of the column parallel to the bars is too shallow, the following additional measures may be taken to ensure anchorage of the longitudinal reinforcement of beams.

(a) The beam or slab may be extended horizontally in the form of exterior stubs.

(b) Headed bars or anchorage plates welded to the end of the bars may be used.

(c) Bends with a minimum length of  $10d_{bL}$  and transverse reinforcement placed tightly inside the bend of the bars may be added.