

GUIDELINES FOR DUCTILE DETAILING USING EUROCODE 8

The Beam Detailing Norms for ductility:

Sl. No.	DESCRIPTON (read with Fig 1)	DUCTILE DETAILING NORMS	REFERENCES as per EN 1998-1
1	For beam at beam-column joint	Critical seismic region, $l_{cr}=h_w$	Cl.5.4.3.1.2.1
2	For beam at discontinued vertical elements.	Critical seismic region, $l_{cr}=2h_w$	Cl.5.4.3.1.2.2
3	Longitudinal reinforcement in a primary seismic beam.	Ductile compression reinforcement = Compression reinforcement + 0.5 x provided tension reinforcement	Cl.5.4.3.1.2.4.a)
4	Maximum tension reinforcement ratio	$\rho_{max} = \rho' + \frac{0,0018 \cdot f_{cd}}{\mu_{\phi} \epsilon_{yd} \cdot f_{yd}}$	Cl.5.4.3.1.2.4.b)
5	Minimum tension reinforcement ratio	$\rho_{min} = 0,5 \left(\frac{f_{cm}}{f_{yk}} \right)$	Cl.5.4.3.1.2.5
6	Diameter of hoops (in critical seismic region)	More than 6mm	Cl.5.4.3.1.2.6.a)
7	Spacing of hoops (in critical seismic region)	$s = \min \{h_w/4; 24d_{bw}; 225; 8d_{bL}\}$	Cl.5.4.3.1.2.6.b)
8	First hoop from beam end	Not more than 50mm	Cl.5.4.3.1.2.6.c)
9	Width of primary seismic beam	Not less than 200mm	Cl.5.5.1.2.1.1
10	Width to height ratio of the web of primary seismic beams	$\frac{l_{ct}}{b} \leq \frac{70}{(h/b)^{1/3}}$ and $h/b \leq 3,5$	EN 1992-1-1:1994 Cl.5.9.(3)
11	Eccentricity of centroidal axis of beam connecting to column	Eccentricity < $b/4$	Cl.5.4.1.2.1.(2)
12	Width of primary seismic beam	$b_w \leq \min \{b_c + h_w; 2b_c\}$	Cl.5.4.1.2.1.(3)



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13	Max diameter of longitudinal bars for anchorage for interior beam-column joints	$\frac{d_{bl}}{h_c} \leq \frac{7,5 \cdot f_{ctm}}{\gamma_{Rd} \cdot f_{yd}} \cdot \frac{1 + 0,8 \cdot v_d}{1 + 0,75k_D \cdot \rho' / \rho_{max}}$	Cl.5.6.2.2(2)
14	Max diameter of longitudinal bars for anchorage for exterior beam-column joints	$\frac{d_{bl}}{h_c} \leq \frac{7,5 \cdot f_{ctm}}{\gamma_{Rd} \cdot f_{yd}} \cdot (1 + 0,8 \cdot v_d)$	Cl.5.6.2.2(2)
15	For anchorage of longitudinal reinforcement of beams	See Fig-2a	Cl.5.6.2.2(3)
16	For anchorage of longitudinal reinforcement of beams	See Fig-2b	Cl.5.6.2.2(3)
17	For anchorage of longitudinal reinforcement of beams	Length of Bends $\geq 10 d_{bl}$ See Fig-2c	Cl.5.6.2.2(3)
18	Spacing of stirrups in the lap zone (See Fig-3)	$s = \min \{h/4; 100\}$	Cl.5.6.3(c)



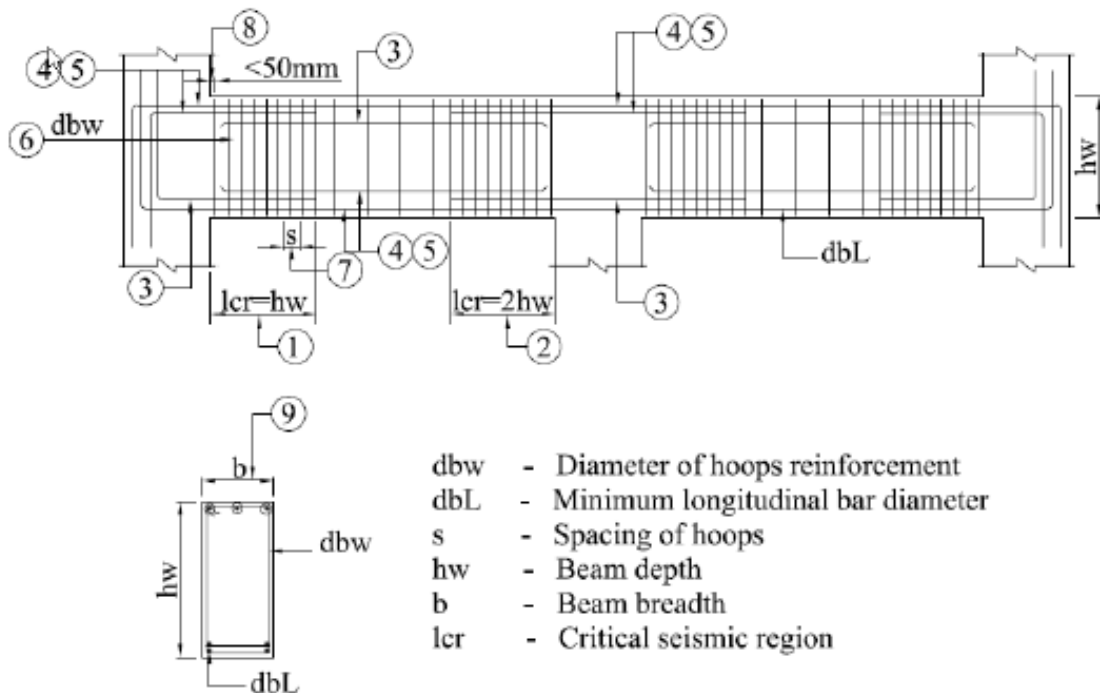
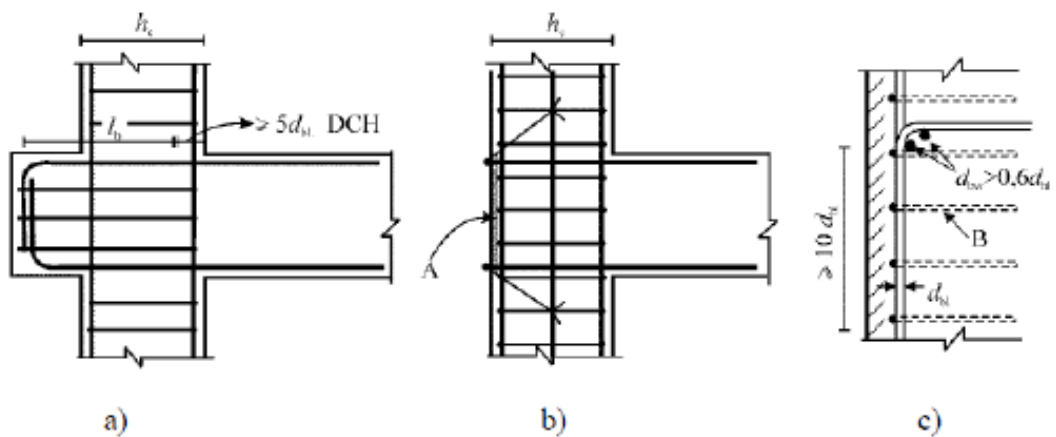


Fig.1 Transverse reinforcement in critical regions of beams



Key

- A anchor plate;
- B hoops around column bars

Fig.2 Additional measures for anchorage in exterior beam-column joints



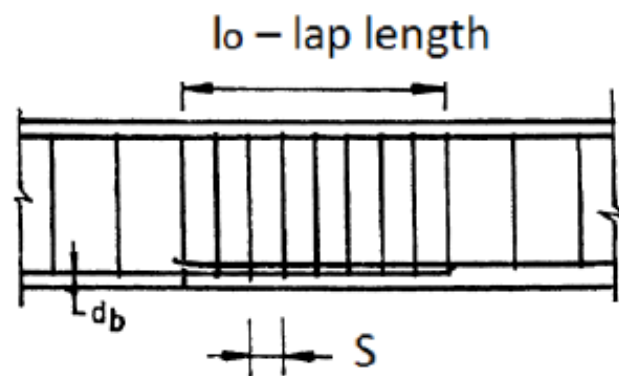


Fig.3 Lap, splice in beam

REFERENCES

1	EN 1998-1 Eurocode 8: Design of structures for earthquake resistance- Part 1: General rules, seismic actions and rules for buildings
2	BS EN 1992-1-1:2004 Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings

