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설계:	태안 노유자시설 (1)	날짜:	2025. 10. 15.
고정 지점:			

1.4.3 Concrete edge failure in direction y+

$$V_{cbg} = \left(\frac{A_{Vc}}{A_{Vc0}} \right) \Psi_{ec,V} \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} \Psi_{parallel,V} V_b \quad \text{KDS 14 20 54:2021 Eq. (4.4-4)}$$

$$\phi V_{cbg} \geq V_{ua} \quad \text{KDS 14 20 54:2021 Table 4.2-1}$$

A_{Vc} see KDS 14 20 54:2021, section 4.4.2(1)

$$A_{Vc0} = 4.5 c_{a1}^2 \quad \text{KDS 14 20 54:2021 Eq. (4.4-5)}$$

$$\Psi_{ec,V} = \left(\frac{1}{1 + \frac{2e_v}{3c_{a1}}} \right) \leq 1.0 \quad \text{KDS 14 20 54:2021 Eq. (4.4-9)}$$

$$\Psi_{ed,V} = 0.7 + 0.3 \left(\frac{c_{a2}}{1.5c_{a1}} \right) \leq 1.0 \quad \text{KDS 14 20 54:2021 Eq. (4.4-11)}$$

$$\Psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0 \quad \text{KDS 14 20 54:2021 Eq. (4.4-12)}$$

$$V_b = 3.7 \lambda_a \sqrt{f_{ck}} c_{a1}^{1.5} \quad \text{KDS 14 20 54:2021 Eq. (4.4-7)}$$

매개변수

c_{a1} [mm]	c_{a2} [mm]	e_{cV} [mm]	Ψ_{cV}	h_a [mm]
200.0	-	0.5	1.000	600.0

l_e [mm]	λ_a	d_a [mm]	f_{ck} [N/mm ²]	$\Psi_{parallel,V}$
192.0	1.000	24.0	27.00	1.000

$\Psi_{parallel,V}$	2.0
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계산

A_{Vc} [mm ²]	A_{Vc0} [mm ²]	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{h,V}$	V_b [kN]
330,000	180,000	0.998	1.000	1.000	54.379

결과

V_{cbg} [kN]	$\phi_{concrete}$	ϕV_{cbg} [kN]	V_{ua} [kN]
99.533	0.750	74.650	153.902

When the input edge distance is set to "infinity", edge breakout verification is not performed in that direction

1.5 인장 및 전단하중 조합

β_N	β_V	ζ	Utilization β_{NV} [%]	상태
1.419	2.062	1.000	291	권장하지 않음

$$\beta_{NV} = (\beta_N + \beta_V) / 1.2 \leq 1$$