Calculations

Relative humidity of the ambient environment	RH	75.00		
Depth of the section	$h_{section}$	400.00	mm	
Width of the section	$b_{section}$	1000.00	mm	Consider 1000mm when working with slab
Cross-sectional area	A_c	400000	mm^2	

$$h_{section} \cdot b_{section} = 400 \cdot 1000 = 400000$$

Characteristic compressive cylinder strength of concrete at 28 days	f_{ck}	35.00	MPa	
Mean value of concrete cylinder compressive strength at 28 days	f_{cm}	43.00	MPa	BS EN 1992-1-1 Table 3.1

$$f_{ck} + 8 = 35 + 8 = 43$$

Perimeter of the member in contact with the atmosphere	u	1000.00	mm	The values is for a 1m slab
Age of concrete in days at the moment considered	t	2557.00	$days$	7 years is considered
Age of concrete at loading in days	t_0	28.00	$days$	Typically 28 days but may be 7 days for rapid construction
Coefficient to consider the influence of the concrete strength	α_1	0.87		B.8c

$$\left(\frac{35}{f_{cm}}\right)^{0.7} = \left(\frac{35}{43}\right)^{0.7}$$

Coefficient to consider the influence of the concrete strength	α_2	0.96		B.8c

$$\left(\frac{35}{f_{cm}}\right)^{0.2} = \left(\frac{35}{43}\right)^{0.2}$$

Coefficient to consider the influence of the concrete strength	α_3	0.90		B.8c

$$\left(\frac{35}{f_{cm}}\right)^{0.5} = \left(\frac{35}{43}\right)^{0.5}$$

Notional size of the member	h_0	800.00	mm	B.6

$$\frac{2 \cdot A_c}{u} = \frac{2 \cdot 400000}{1000}$$

Interim value for calculation below	$\beta_{H,interim1}$	1630.11		B.8a

$$1.5 \cdot \left(1 + (0.012 \cdot RH)^{18}\right) \cdot h_0 + 250 = 1.5 \cdot \left(1 + (0.012 \cdot 75)^{18}\right) \cdot 800 + 250$$

Interim value for calculation below	$\beta_{H,interim2}$	1605.66		B.8b

$$1.5 \cdot \left(1 + (0.012 \cdot RH)^{18}\right) \cdot h_0 + 250 \cdot \alpha_3 = 1.5 \cdot \left(1 + (0.012 \cdot 75)^{18}\right) \cdot 800 + 250 \cdot 0.90$$

Coefficient depending on the relative humidity (RH in %) and the notional member size	β_H	1353.29		B.8a & B.8b

$$\begin{cases} \min\left(\beta_{H,interim1}, 1500\right), & \text{if } f_{cm} \leq 35 \\ \min\left(\beta_{H,interim2}, 1500 \cdot \alpha_3\right), & \text{otherwise} \end{cases} = \begin{cases} \min\left(1630.11, 1500\right), & \text{if } 43 \leq 35 \\ \min\left(1605.66, 1500 \cdot 0.90\right), & \text{otherwise} \end{cases}$$

Coefficient to describe the development of creep with time after loading	$\beta_c(t, t_0)$	0.88		B.7

$$\left(\frac{t - t_0}{\beta_H + t - t_0}\right)^{0.3} = \left(\frac{2557 - 28}{1353.29 + 2557 - 28}\right)^{0.3}$$

Factor to allow for the effect of concrete age at loading on the notional creep coefficient	$\beta(t_0)$	0.49		B.5

$$\frac{1}{0.1 + {t_0}^{0.2}} = \frac{1}{0.1 + 28^{0.2}}$$

Factor to allow for the effect of concrete strength on the notional creep coefficient	$\beta(f_cm)$	2.56		B.4

$$\frac{16.8}{\sqrt{f_{cm}}} = \frac{16.8}{\sqrt{43}}$$

Interim value for calculation below	$\varphi_{RH,interim1}$	1.27	B.3a

$$1 + \frac{1 - \frac{RH}{100}}{0.1 \cdot h_0^{\frac{1}{3}}} = 1 + \frac{1 - \frac{75}{100}}{0.1 \cdot 800^{\frac{1}{3}}}$$

Interim value for calculation below	$\varphi_{RH,interim2}$	1.18	B.3b

$$\left(1 + \frac{1 - \frac{RH}{100}}{0.1 \cdot h_0^{\frac{1}{3}}} \cdot \alpha_1\right) \cdot \alpha_2 = \left(1 + \frac{1 - \frac{75}{100}}{0.1 \cdot 800^{\frac{1}{3}}} \cdot 0.87\right) \cdot 0.96$$

Factor to allow for the effect of relative humidity on the notional creep coefficient	φ_{RH}	1.18	B.3a & B.3b

$$\begin{cases} \varphi_{RH,interim1}, & \text{if } f_{cm} \leq 35 \\ \varphi_{RH,interim2}, & \text{otherwise} \end{cases} = \begin{cases} 1.27, & \text{if } 43 \leq 35 \\ 1.18, & \text{otherwise} \end{cases}$$

Notional creep coefficient	φ_0	1.48	B.2

$$\varphi_{RH} \cdot \beta(f_c m) \cdot \beta(t_0) = 1.18 \cdot 2.56 \cdot 0.49$$

The creep coefficient	$\varphi(t, t_0)$	1.30	BS EN 1992-1-1 Annex B (B.1)

$$\varphi_0 \cdot \beta_c(t, t_0) = 1.48 \cdot 0.88$$