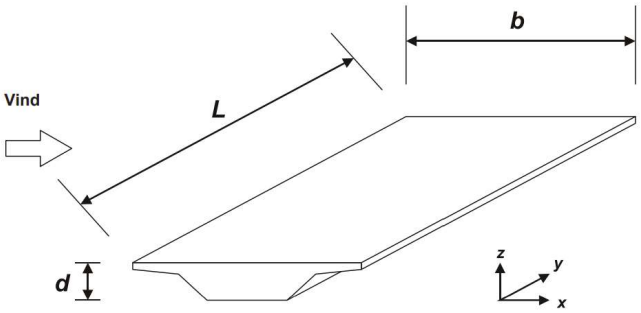
Vindlast - NS-EN 1991-1-4



(Figur 8.2)

Figur 8.2 – Retninger for vindpåvirkninger på bruer

1. Vindlast i x-retning, $F_{w,x}$

$F_{w,x} = 0{,}5\rho v_b{}^2 C A_{ref,x}$ *EK1 1-4, 8.3.2 (8.2)*

ρ = lufttetthet
v_b = basisvindhastighet
$A_{ref,x}$ = referanseareal x-retning
C = vindlastfaktoren

ρ (kg/m^3)	1,25		*EK1 1-4, NA.4.5*
v_b	26	$= c_{dir}c_{season}c_{alt}c_{prob}v_{b,0}$ (1.1)	*EK1 1-4, NA.4.2 (NA.4.1)*
$A_{ref,x}(m^2)$	161,19441	$= d_{tot}l$ (1.2)	*EK1 1-4, 8.3.1*
C	3,6	1.3	
$F_{w,x}$(kN)	245,176698		
$F_{w,x}$(kN/m)	**3,03**		

1.1 Basisvindhastighet, v_b

$v_b = c_{dir}c_{season}c_{alt}c_{prob}v_{b,0}$
c_{dir} = retningsfaktoren
c_{season} = årstidsfaktoren
c_{alt} = nivåfaktor
c_{prob} = faktor for returperiode ulik 50 år
$v_{b,0}$ = referansevindhastighet

c_{dir}	1	*EK1 1-4, NA.4.2*
c_{season}	1	*EK1 1-4, NA.4.2*
c_{alt}	1	*EK1 1-4, NA.4.2*
c_{prob}	1	*EK1 1-4, NA.4.2*
$v_{b,0}(m/s)$	26	*EK1 1-4, tabell NA.4(901.1)*
$v_b(m/s)$	26	

1.2 Referanseareal x–retning, $A_{ref,x}$

$A_{ref,x} = d_{tot} l$

d_{tot} = d + 0,6 *EK1 1-4, tabell 8.1*

d = dybde topp asfalt til bunn stålbjelke *EK1 1-4, figur 8.5*

l = lengde

d (m)	1,3935
d_{tot} (m)	1,9935
l (m)	80,86
$A_{ref,x}$ (m^2)	161,19441

1.3 Vindlastfaktor, C

b (m)	10,45
b/d_{tot}	5,24203662
z_e (m)	≤ 20
C	3,6

EK1 1-4, tabell 8.2

2. Vindlast i z-retning, $F_{w,z}$

$F_{w,z} = c_s c_d \, c_{f,z} \, q_p(z_e) A_{ref,z}$ *EK1 1-4, 5.3 (5.4)*

$c_s c_d$ = konstruksjonsfaktor
$c_{f,z}$= kraftfaktor i z-retning
$q_p(z_e)$ = vindkasthastighetstrykket
$A_{ref,z}$ = referanseareal z-retning

$c_s c_d$	1		EK1 1-4, 6.2(1)
$c_{f,z}$	± 0,9		EK1 1-4, NA.8.3.3
$q_p(z_e)$	881,055873	$= 0{,}5\rho v_m^2(z)\left[1 + 2k_p I_v(z)\right]$ (2.1)	EK1 1-4, NA.4.5 (NA.4.8)
$A_{ref,z}(m^2)$	844,987	$= bl$ (2.2)	EK1 1-4, 8.3.3
$F_{w,z}$(kN)	670,032683		
$F_{w,z}(kN/m^2)$	**0,79**		

2.1 Vindkasthastighetstrykk, $q_p(z_e)$

$q_p(z_e) = 0{,}5\rho v_m^2(z)\left[1 + 2k_p I_v(z)\right]$

ρ = lufttetthet
$v_m(z)$ = stedsvindhastighet
k_p = toppfaktor
$I_v(z)$ = turbulensintensitet

ρ (kg/m^3)	1,25		*EK1 1-4, NA.4.5*
$v_m(z)$	24,0456202	$= c_r(z)c_o(z)v_b$ (2.1.1)	*EK1 1-4, 4.3.1 (4.3)*
k_p	3,5		*EK1 1-4, NA.4.5*
$I_v(z)$	0,20544282	$= k_I/(c_o(z)\ln(z/z_0))$ (2.1.2)	*EK1 1-4, 4.4 (4.7)*
$q_p(z_e)$	881,055873		

2.1.1 Stedsvindhastighet, $v_m(z)$

$v_m(z) = c_r(z)c_o(z)v_b$

$c_r(z)$ = ruhetsfaktor
$c_o(z)$ = terrengformfaktor
v_b = basisvindhastighet

$c_r(z)$	0,92483155	$= k_r \ln(z/z_o)$ (2.1.1.1)	*EK1 1-4, 4.3.2 (4.4)*
$c_o(z)$	1		*EK1 1-4, 4.3.1*
v_b	26		
$v_m(z)$	24,0456202		

2.1.1.1 Ruhetsfaktor, $c_r(z)$

$c_r(z) = k_r \ln(z/z_o)$

k_r = terrengruhetsfaktor

z = høyde over terreng = høyde DOM - høyde DTM

z_0 = ruhetslengde

k_r	0,19	*EK1 1-4, tabell NA 4.1*
z (m)	6,5	hoydedata.no
z_0(m)	0,05	*EK1 1-4, tabell NA 4.1*
$c_r(z)$	0,92483155	

2.1.2 Turbulensintensitet, $I_v(z)$

$I_v(z) = k_I/(c_o(z)\ln(z/z_0))$

k_I = turbulensfaktor

k_I	1	*EK1 1-4, NA.4.4*
$I_v(z)$	0,20544282	

2.2 Referanseareal z-retning, $A_{ref,z}$

$A_{ref,z} = bl$

b (m)	10,45
l (m)	80,86
$A_{ref,z}(m^2)$	844,987

3. Vindlast i y-retning, $F_{w,y}$

$F_{w,y}$ = 25 % av $F_{w,x}$ *EK1 1-4, 8.3.4*

$F_{w,y}$(kN/m)	**0,76**