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Structural Design

Project:	Ground-mounted PV System Musselkanaal, Netherlands Zimmermann PV System
Client:	Groenleven
Project Location:	9581 GT, Ceresdorp
Prepared for:	Zimmermann PV-Stahlbau GmbH & Co. KG Petrusstraße 1 88436 Oberessendorf
Project Number:	18145
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Pages:	1 - 7

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1.0 General

1.1 Codes and Standards

EN 1090-2	Execution of steel structures and aluminum structures Technical requirements for the execution of steel structures
EN 1990	Basis of structural design
EN 1991-1-3	Actions on structures General actions – Snow loads
EN 1991-1-4	Actions on structures General actions – Wind loads
EN 1993-1-1	Design of steel structures General rules and rules for buildings
EN 1993-1-8	Design of steel structures Design of joints
EN 1998-1	Design of structures for earthquake resistance
EN 1999-1-1	Design of aluminum structures General structural rules

All of the above standards are applied with the associated national annexes.

The corrosion protection must be carried out in accordance with the applicable standards.

1.2 Project Location

1.3 Load Determination

project: **Musselkanaal, NL** client: GroenLeven
altitude of the site: 2 m
Construction: Solar panel arrangement
Consequence clase: CC1
Lifespan: 25 years

Dead Load

considered by programme

Steady Loads (modules)

		72 Cell		
L	=	2176	mm	length of module
B	=	1098	mm	width of module
t	=	35	mm	thickness of module
W	=	29	kg	weight of module
g	**=**	**0,121**	**kN/m²**	dead weight of modules from manufacturer´s data

Snow Loads according to EN 1991-1-3 + National Annex NL

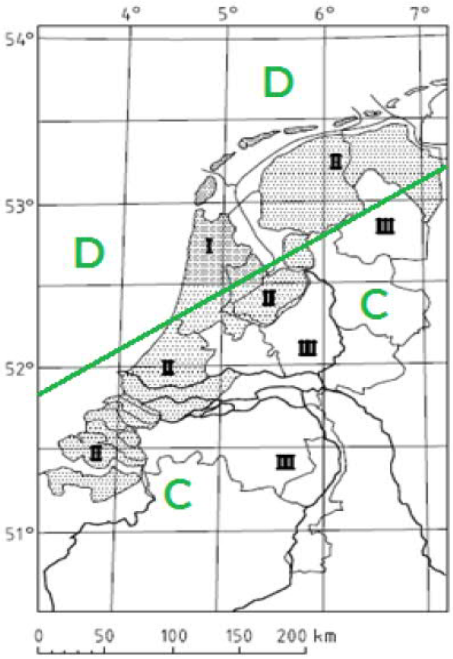
s_k = 0,70 kN/m²

$$s_n = s_k \left\{ \frac{1 - V\frac{\sqrt{6}}{\pi}\left[\ln\left(-\ln\left(1-P_n\right)\right) + 0{,}57722\right]}{\left(1 + 2{,}5923V\right)} \right\}$$

V	=	**0,80**		
		25		Durability assessment of building system (Return period)
P_n	=	0,04		
s_n	=	0,60	kN/m²	according to EN1991-1-3 annex D
μ	=	0,80		
s_i	**=**	**0,480**	**kN/m²**	= μ x s_n

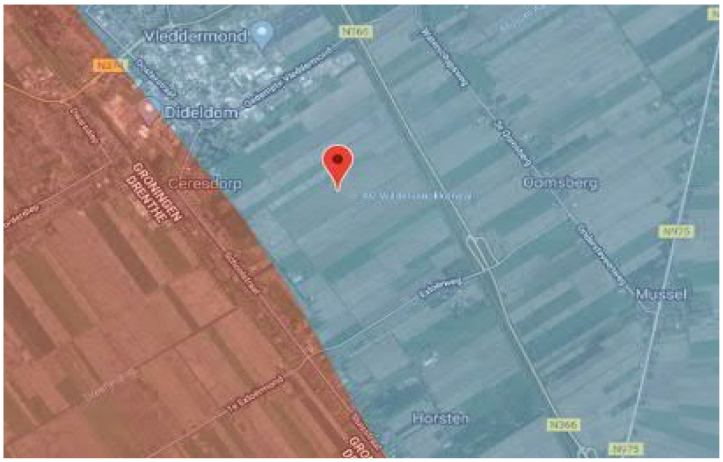
Wind Loads according to EN 1991-1-4 + National Annex NL

wind zone: II
terrain category: II



Figuur I Locaties van de fundamentele windsnelheden uit tabel I

Wind zone II



Terrain category II

4.3.1(1) Notes 1 and 2	*For $c_r(z)$ see 4.3.2(1)* *Orography factor $c_o(z)$ inputted by the user as a constant value*
4.3.2(1)	**Tabel 4.1 — Terreincategorieën voor toepassing in Nederland**

Terreincategorie		z_0 m	z_{min} m
0	Zee of kustgebied aan zee	0,005	1
II	Onbebouwd gebied	0,2	4
III	Bebouwd gebied	0,5	7

z	=	1,9	m	max. building height
$v_{b,0}$	=	27,00	m/s	
c_{prob}	=	0,956		
v_b	=	25,81	m/s	
v_m	=	16,19	m/s	
K	=	0,281		
n	=	0,50		
		25		Durability assessment of building system (Return period)
p	=	0,04		

z0,II	=	**0,05**	m	
z0	=	0,20	m	
zmin	=	4,00	m	
kr	=	0,209		
kI	=	1,00		
c_0	=	1,00		orography factor; according to EN 1991-1-4 annex A.3

$$I_v(z) = \frac{\sigma_v}{v_m(z)} = \frac{k_I}{c_o(z) \cdot \ln(z / z_0)} \quad \text{für} \quad z_{min} \le z \le z_{max}$$

$$I_v(z) = I_v(z_{min}) \quad \text{für} \quad z < z_{min}$$

IV	=	0,334		
cr	=	0,627		
r	=	1,25	kg/m³	

$$q_p(z) = \left[1 + 7 \cdot I_v(z)\right] \cdot \frac{1}{2} \cdot \rho \cdot v_m^2(z)$$

$q_p(z)$	**=**	**0,547**	**kN/m²**	peak velocity pressure
w_H	**=**	**0,022**	**kN/m²**	horizontal wind (friction)