

POS. 19.3: S.329, STREIFENLAST

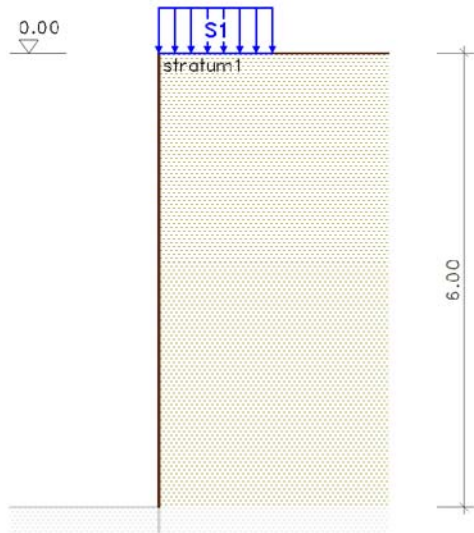
calculation of earth pressures

According to DIN 4084:2017-08 and associated standard specifications

calculation of the active earth pressure

1. system

scale 1:100



wall friction

for a rough wall surface,
angle of wall friction $\delta = 2/3 \cdot \varphi'_k$

cohesion

cohesion is fully taken into account
calculated tensile stress from cohesion are not applied
minimum earth pressure is checked in all cohesive strata

soil strata

stratum	notation	soil type	d m	γ kN/m ³	γ' kN/m ³	φ' °	c' kN/m ²
1	stratum1	cohesive	---	20,00	10,00	27,50	25,00

d - stratum thickness γ - unit weight of soil γ' - unit weight of submerged soil φ' - angle of internal friction of drained soil
c' - cohesion of the drained soil

2. loading

p - load a - distance wall head l - length \perp to the wall

2.1. strip loads

Nr.	notation	p'	a m	l m	introduction m	earth pressure distribution
S1	Streifenlast1	45,00 kN/m ²	0,00	1,50	surface	DIN 4085 1)

1) acc. to [1], table C.2 (shape dependent on wall movement)

2.2. load combinations

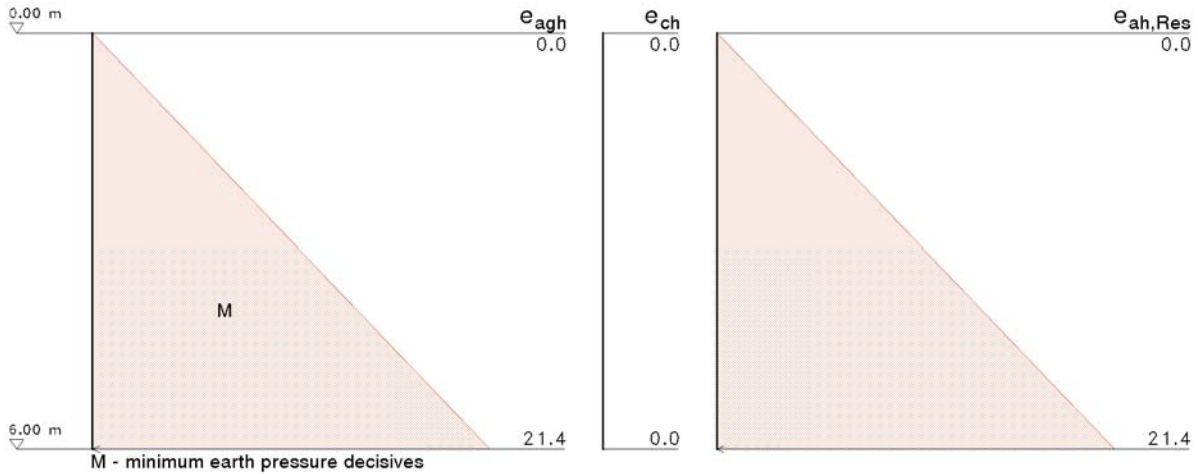
from dead load of the soil (G), water pressure (W) and the external types of loads: distributed (F), strip (S), line (L) or block (B)

LK	notation	factorization
1	load combination1	G

3. active earth pressure

3.1. from dead load of the soil

e_{agh} horiz. earth pressure due to soil weight
 e_{ch} horiz. relief due to cohesion
 $e_{ah,Res}$ resulting horiz. earth pressure



soil

$\Sigma(\gamma \cdot h)$ total soil weight at the depth considered
 K_{agh} coefficient of earth pressure acc. to [1] section 6.2.1, eqn.(7) (approach acc. to Müller-Breslau)
 c_{cal} computationally effective cohesion
 K_{ach} coefficient of earth pressure due to cohesion acc. to [1] section 6.2.1, eqn.(10)
 $K_{agh,min}$ coefficient of earth pressure for consideration of the minimum pressure according to [1] section 6.2.5
 e_{ah}/e_{av} horiz. and vertical ordinate of earth pressure
 e_{ares} res. ordinate of earth pressure from horizontal and vertical proportion

Z m	$\Sigma(\gamma \cdot h)$ kN/m ²	K_{agh} -	C_{cal} kN/m ²	K_{ach} -	$K_{agh,min}$ -	E_{ah} kN/m ²	E_{av} kN/m ²	E_{ares} kN/m ²
0.00	0.00	0.311	25.00	0.981	0.179	0.00*	0.00*	0.00*
6.00	240.00	0.311	25.00	0.981	0.179	21.43*	10.76*	23.98*

* minimum earth pressure decisive

horizontal component of the earth pressure force $E_h = 64.29$ kN/m
 vertical component of the earth pressure force $E_v = 32.29$ kN/m
 earth pressure force $E = 71.95$ kN/m
 point of application of the earth pressure force $z_E = 4.00$ m

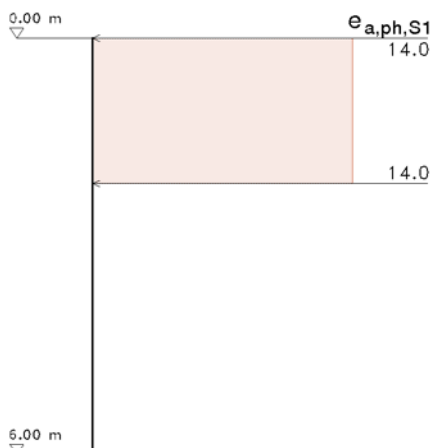
resulting earth pressure from soil

Z m	E_{ah} kN/m ²	E_{av} kN/m ²	E_{ares} kN/m ²
0.00	0.00	0.00	0.00
6.00	21.43	10.76	23.98

horizontal component of the earth pressure force $E_h = 64.29$ kN/m
 vertical component of the earth pressure force $E_v = 32.29$ kN/m
 earth pressure force $E = 71.95$ kN/m
 point of application of the earth pressure force $z_E = 4.00$ m

3.2. from external loads

$e_{a,ph,S1}$ horiz. earth pressure from Streifenlast1



S1: Streifenlast1

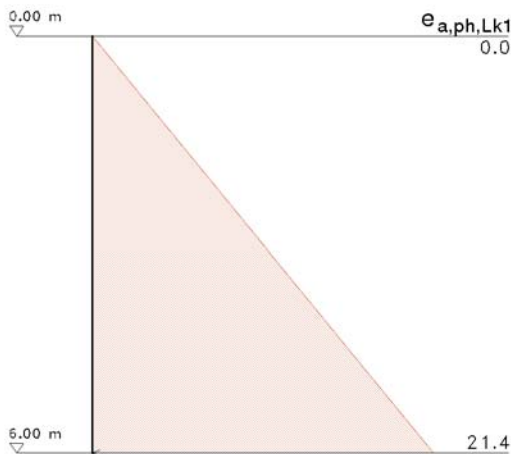
earth pressure distribution: acc. to [1], table C.2

$p(z)$ effective proportion of superimposed load at the depth considered
 K_{aph} coefficient of earth pressure acc. to [1] section 6.2.6, eqn.(15)
 e_{ah}/e_{av} horiz. and vertical ordinate of earth pressure
 e_{ares} res. ordinate of earth pressure from horizontal and vertical proportion

z m	$p(z)$ kN/m ²	K_{aph} -	e_{ah} kN/m ²	e_{av} kN/m ²	e_{ares} kN/m ²
0.00	32.10	0.436	13.99	4.64	14.74
2.10	32.10	0.436	13.99	4.64	14.74

horizontal component of the earth pressure force $E_h = 29.42$ kN/m
 vertical component of the earth pressure force $E_v = 9.75$ kN/m
 earth pressure force $E = 31.00$ kN/m
 point of application of the earth pressure force $z_E = 1.05$ m

3.3. Infolge load combinations



LK 1: G

z m	e_{ah} kN/m ²	e_{av} kN/m ²	e_{ares} kN/m ²
0.00	0.00	0.00	0.00
6.00	21.43	10.76	23.98

horizontal component of the earth pressure force $E_h = 64.29$ kN/m
 vertical component of the earth pressure force $E_v = 32.29$ kN/m
 earth pressure force $E = 71.95$ kN/m
 point of application of the earth pressure force $z_E = 4.00$ m

4. summary

kind of earth pressure	earth pressure force			
	E_h kN/m	E_v kN/m	E kN/m	z_E m
soil	64.29	32.29	71.95	4.00
res. earth pressure from soil	64.29	32.29	71.95	4.00
Streifenlast1	29.42	9.75	31.00	1.05
LK 1: G	64.29	32.29	71.95	4.00

literature and standard specifications:

[1] DIN 4085: Baugrund, Berechnung des Erddrucks, August 2017