

Spreadsheet for calculating earth pressure force, sliding and tipping values of retaining wall profiles.

	Enter variables here				
profile type =	1		1, 2, 3, or 4: means: rectangle	definitions see Info	
height =	1.41	m	definition see info	1.41	retaining height
width =	0.70	m	definition see info	0.79	width at toe (m)
batter =	36.4	%	batter of front face	0.51	absolute batter (m)
β =	0	°	slope of retained terrace		
ϕ soil =	30	°	factor δ / ϕ = 0.67	20.00	δ (angle in ° from E_{ag} to right angle on α)
ϕ foundation =	30	°	angle of friction of foundation to soil	0.58	coefficient of friction μ of foundation to soil
γ wall =	15	kN/m ³	wall porosity = 25 %	20.00	specific gravity γ of stone (kN/m ³)
γ soil =	18	kN/m ³	specific gravity of soil	0.83	ratio γ wall / γ soil
ρ =	5	kN/m ²	assumed load on terrace (actual or e.g. 5 kN/m ² for people, 10 kN/m ² for vehicles).		

0.79 cope width

0.34909

α_L	20.00	°	inclination of foundation and stone layers		
α	20.00	°	angle of inner surface to vertical		
A	1.12	m ²	area of profile	lever (m)	moment (kNm)
G	16.77	kN/m	weight per m length	0.607	10.17

stabilising moment (approximation with very small error)

method Schmidt/SUS	
Kag	0.174
Kagh	0.174

earth pressure force			0.897	(Ld)
E_{ag}	-3.12	kN/m	0.215	-0.67
E_{ap}	-1.23	kN/m	0.450	-0.55
			sum g	9.50
			sum g+p	8.95

safety factor	safety factor
SF tipping	SF sliding
15.15	-3.463
8.31	-6.034

method FLL mod. Schmidt	
eagh	4.42
eagv	0.00
eaph	0.87
eapv	0.00

Eagh	-3.12	kN/m	0.215	-0.67			
Eagv	0.00	kN/m	0.871	0.00	eccentricity e (m)		
Eaph	-1.23	kN/m	0.450	-0.55	DIN	SIA	
Eapv	0.00	kN/m	0.957	0.00	actual	max. allowed	
			sum g	9.50	-0.170	0.132	0.264
			sum g+p	8.95	-0.137	0.264	0.264

Two methods each are shown for tipping and sliding. "a" means "active", "h" horizontal, "v" vertical, "g" component due to gravity, "p" component due to load pressure. Input values in orange cells. Main outputs are safety factors or position of force vector (distance from toe or eccentricity. If SF = 1 this means the profile is starting to tip or slide, less it has failed, more it is stable. Recommended safety factors range from 1.2 (CAPEB sliding case "g") to approx. 3 (DIN tipping case "g+p"). If in doubt use min. 1.5 for everything or 1.5 for sliding, 2 for tipping and always case "g+p".