



Research article

Seismic profiling of the sea-bottom in recognition of geotechnical condition

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Appendix

Table 1. Geotechnical parameters of seabed of the Polish Baltic Sea [1].

Geotechnical units	Lithological types	Origin	Geological age	Approximate values				
				I_D	I_L	Φ [°]	τ_f [kPa]	Mo [MPa]
1 Very favourable sea-bottom for marine constructions	rock soil	different	different	-	-	-	> 1000	
2	2a-gravels and sands	marine	Eemian Interglacial (Pleistocene)	0.4–0.6	-	30–33	200–400	130–200
Favourable sea-bottom for marine constructions	2b-gravels and sands	glaciofluvial	late Pleistocene	0.5–0.7	-	32–35	250–500	150–200
	2c-gravels and sands	fluvial	late Pleistocene	0.4–0.6	-	30–33	200–400	80–120
	2d-gravels and sands	fluvial	late Pleistocene and early Holocene	0.4–0.6	-	30–33	200–400	80–120
	2e-gravels and sands	marine	middle Holocene	0.4–0.5	-	30–32	200–350	80–100
3	3a-glacial tills	glacial	Vartanian Glaciation and older glaciations (Pleistocene)	-	0.1–0.3	20–15	100–300	60–80
Sufficient sea-bottom for marine constructions	3b-glacial tills	glacial (subaquatic)	Vistulian Glaciation (Pleistocene)	-	0.2–0.4	15–12	100–200	40–50
4	4a-silts and clays	glaciolimnic	late Pleistocene	-	0.2–0.5	15–10	80–150	8–15
Unfavourable sea-bottom for marine structures	4b-silts and clays	glaciolimnic and glacio-marine	late Pleistocene and early Holocene	-	0.2–0.5	15–10	80–150	8–15
	4c-sands	eolian	late Pleistocene and early Holocene	0.1–0.3	-	15–20	90–150	40–50
	4d-muds and silty-sands	limnic	early Holocene	-	0.2–0.6	5–10	50–100	5–10
	4e-sands	eolian-marine	late Holocene	0.1–0.3	-	15–20	90–150	40–50
5 Very unfavourable sea-bottom for MC	5-muds and organic muds	marine	late Holocene	-	0.5–1.0	0–5	0–50	<5

Table 2. Geotechnical parameters of the Polish Baltic soil substrate at a depth of 10 m below sea-bottom [2].

Geotechnical units	Lithologicaall types	Genesis	Age	Aproximal values					
				I_D	I_L	$\Phi [^\circ]$	$c [kPa]$	$\tau_f [kPa]$	$R_c [MPa]$
1	1a-clayey slates	marine	Silurien	-	-	-	-	-	50–150
Very favourable substrate for marine constructions	1b-limestones	marine	Devonian	-	-	-	-	-	10–100
	1c-sandstones	marine	Permian	-	-	-	-	-	15–150
	1d-siltstones and claystones	marine	Triassic	-	-	-	-	-	20–60
	1e-limestones	marine	Jurassic	-	-	-	-	-	10–100
	1fa-siltstones and claystones	marine	Cretaceous	-	-	-	-	-	20–60
	1fb-limestones	marine	Cretaceous	-	-	-	-	-	10–100
	2a'-sands	fluvial	Neogene	0.6–0.8	-	32–36	-	400–600	-
Favourable substrate for marine constructions	2a-sands and gravels	marine	Eemian Interglacial Pleistocene	0.5–0.7	-	30–35	-	300–500	-
	2b			0.5–0.7	-	32–35	-	350–500	-
	2c-sands and gravels	fluvial	late Pleistocene	0.4–0.6	-	30–33	-	300–400	-
	2d-sands and gravels	fluvial	late Pleistocene and early Holocene	0.4–0.6	-	30–33	-	300–400	-
	2e-sands and gravels	marine	middle and late Holocene	0.4–0.5	-	30–32	-	300–350	-
	3a'-silts and clays	limnic	Neogene		0.1–0.2	23–20	55–45	250–350	-
Sufficient substrate for marine constructions	3a-glacial tills	glacial	Pleistocene Vartanian Glaciation	-	0.1–0.3	20–15	45–35	200–300	-
	3b-glacial tills	glacial	Pleistocene Vistulian Glaciation	-	0.2–0.4	15–12	31–25	100–200	-

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Geotechnical units	Lithologicaall types	Genesis	Age	Aproximal values					
				I_D	I_L	$\Phi [^\circ]$	$c [kPa]$	$\tau_f [kPa]$	$Rc [MPa]$
4	4a-silts and clays	glacio-limnic	late	-	0.2–0.5	15–10	18–10	80–100	-
Unfavourable			Pleistocene						
substrate for marine constructions	4b-silts and clays	glacio-limnic, glacio-marine and limnic	late Pleistocene and early Holocene	-	0.2–0.5	15–10	18–10	80–100	-
	4c-sands	aeolian	Pleistocene	0.1–0.3	-	15–20	-	90–130	-
	4d-silts and silty sands	limnic	early Holocene	-	0.2–0.6	10–5	50–30	50–100	-
5	5-clays, silts and organic muds	marine	middle and late Holocene	-	0.5–1.0	5–0	35–0	0–50	-
Very unfavourable									
substrate for marine constructions									

Table 3. Geotechnical parameters of the Polish Baltic soil substrate at a depth of 20 m below sea-bottom [3].

Geotechnical units	Lithological types	Genesis	Age	Aproximal values					
				I_D	I_L	$\Phi [^\circ]$	$c [kPa]$	$\tau_f [kPa]$	$R_c [MPa]$
1	1a-clayey slates	marine	Silurian	-	-	-	-	-	50–150
Very favourable	1b-limestones	marine	Devonian	-	-	-	-	-	10–100
substrate for marine	1c-sandstones	marine	Permian	-	-	-	-	-	15–150
constructions	1d-siltstones and claystones	marine	Triassic	-	-	-	-	-	20–60
	1e-limestones	marine	Jurassic	-	-	-	-	-	10–100
	1fa-siltstones and claystones	marine	Cretaceous	-	-	-	-	-	20–60
	1fb-limestones	marine	Cretaceous	-	-	-	-	-	10–100
2	2a'-sands	fluvial	Neogene	0.6–0.8	-	32–36	-	400–600	-
Favourable substrate for marine constructions	2a-sands and gravels	marine	Eemian Interglacial Pleistocene	0.5–0.7	-	30–35	-	300–500	-
	2d-sands and gravels	fluvial	late Pleistocene and early Holocene	0.4–0.6	-	30–33	-	300–400	-
3	3a'-silts and clays	limnic	Neogene		0.1–0.2	23–20	55–45	250–350	-
Sufficient substrate for marine constructions	3a-glacial tills	glacial	Pleistocene Vartanian Glaciation	-	0.1–0.3	20–15	45–35	200–300	-
4	4b-silts and clays	glacio-limnic, glacio-marine and limnic	late Pleistocene and early Holocene	-	0.2–0.5	15–10	18–10	80–100	-
Unfavourable substrate for marine constructions									

Table 4. Geotechnical parameters of the Polish Baltic soil substrate at a depth of 30 m below sea-bottom.

Geotechnical units	Lithological types	Genesis	Age	Aproximal values					
				I_D	I_L	$\Phi [^\circ]$	$C [kPa]$	$\tau_f [kPa]$	$R_c [MPa]$
1	1a-clayey slates	marine	Silurian	-	-	-	-	-	50–150
Very favourable	1b-limestones	marine	Devonian	-	-	-	-	-	10–100
substrate for marine	1c-sandstones	marine	Permian	-	-	-	-	-	15–150
constructions	1d-siltstones and claystones	marine	Triassic	-	-	-	-	-	20–60
	1e-limestones	marine	Jurassic	-	-	-	-	-	10–100
	1fa-siltstones and claystones	marine	Cretaceous	-	-	-	-	-	20–60
	1fb-limestones	marine	Cretaceous	-	-	-	-	-	10–100
2	2a'-sands	fluvial	Neogene	0.6–0.8	-	32–36	-	400–600	-
Favourable substrate for marine constructions	2a-sands and gravels	marine	Eemian	0.5–0.7	-	30–35	-	300–500	-
			Interglacial						
			Pleistocene						
	2d-sands and gravels	fluvial	late Pleistocene	0.4–0.6	-	30–33	-	300–400	-
		fluvial	and early Holocene						
3	3a'-silts and clays	limnic	Neogene		0.1–0.2	23–20	55–45	250–350	-
Sufficient substrate for marine constructions	3a-glacial tills	glacial	Pleistocene	-	0.1–0.3	20–15	45–35	200–300	-
			Vartanian						
			Glaciation						
4	4b-silts and clays	glacio-limnic,	late Pleistocene	-	0.2–0.5	15–10	18–10	80–100	-
Unfavourable substrate for marine constructions		glacio-marine and limnic	and early Holocene						

References

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