

## Results Of Analysis Of Raw Material From Pałęgi Deposit (according to results obtained by prof. P.Wyszomirski from AGH University of Science and Technology)

sample 1 - S wall, exploitation level 267-271 m AMSL,

sample 2 - mudstone lying just under sandstone level, S part of W wall, exploitation level 267-271m AMSL,

próbka 3 - grey-yellow mudstone within the limits of sandstone, S part of W wall, lower part of exploitation level 271-275 m AMSL,

sample 4 - S part of W wall, from the roof of sandstone to the roof of the deposit,

sample 5 - loamy (clayey) raw material taken from the upper part of raw material heap,

sample 6 - waste-mantle clay from Pałęgi deposit's cap-stone.

### The list of raw-material's qualities

Parameter	Unit	Sample					
		1	2	3	4	5	6
SiO <sub>2</sub>	[%]	62.05	62.12	67.03	61.21	59.58	60.74
Al <sub>2</sub> O <sub>3</sub>	[%]	17.26	16.60	17.09	17.17	17.75	17.75
Fe <sub>2</sub> O <sub>3</sub>	[%]	7.28	7.20	3.35	7.44	7.74	7.94
TiO <sub>2</sub>	[%]	0.91	0.86	0.91	0.89	0.88	0.94
CaO	[%]	0.45	0.43	0.35	0.34	0.37	0.22
MgO	[%]	2.32	2.28	1.81	2.26	2.36	1.99
MnO	[%]	0.076	0.058	0.086	0.090	0.082	0.059
Na <sub>2</sub> O	[%]	0.17	0.15	0.09	0.15	0.14	0.09
K <sub>2</sub> O	[%]	2.90	2.83	2.54	2.90	3.08	2.89
P <sub>2</sub> O <sub>5</sub>	[%]	0.14	0.15	0.11	0.09	0.10	0.09
Ignition loss 1000°C	[%]	6.52	6.31	6.71	6.65	7.03	6.90
Specific surface	[m <sup>2</sup> /g]	15.03	14.74	16.72	18.60	17.69	35.48
Helium density	[g/cm <sup>3</sup> ]	2.776 ±0.007	2.765 ±0.005	2.788 ±0.008	2.782 ±0.009	2.717 ±0.007	2.782 ±0.009
Sintering temperature	[°C]	1140	1165	1165	1160	1160	1200
Softening temperature	[°C]	1395	1370	1400	1360	1361	1380
Melting temperature	[°C]	1510	1535	-	1530	1540	1575
Flow temperature	[°C]	1560	1560	-	1568	1570	1600

After drying bending strength	[MPa]	0.70 ±0.07	0.60 ±0.06	0.63 ±0.03	0.76 ±0.04	0.79 ±0.02	0.64 ±0.06
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### **Basic technological properties of fired clay material**

Temperature of firing [°C]	Sample	950	1000	1050	1100	1150	1200	1250
Bending strength [MPa]	1	2.45 ±0.24	3.05 ±0.25	4.02 ±0.29	5.37 ±0.36	7.14 ±0.25	7.95 ±0.70	6.68 ±0.45
	2	2.51 ±0.15	3.09 ±0.17	4.39 ±0.18	6.02 ±0.36	7.25 ±0.25	8.10 ±0.45	6.80 ±0.45
	3	1.64 ±0.15	2.17 ±0.17	2.82 ±0.18	4.03 ±0.36	6.64 ±0.25	7.34 ±0.76	6.65 ±0.45
	4	2.46 ±0.29	2.96 ±0.20	4.14 ±0.49	6.32 ±0.39	9.48 ±0.29	8.24 ±0.80	7.81 ±0.43
	5	2.43 ±0.08	3.12 ±0.15	4.65 ±0.38	7.10 ±0.53	9.88 ±0.53	8.25 ±0.47	6.91 ±0.67
	6	2.89 ±0.08	3.08 ±0.15	3.65 ±0.38	5.38 ±0.77	8.06 ±0.53	9.03 ±0.13	8.03 ±0.52
Compression strength Rc [MPa]	1	9.5	16.8	23.7	28.4	27.3	23.7	11.9
	2	8.0	16.1	26.1	30.1	28.7	25.9	22.5
	3	3.5	6.8	11.8	14.1	14.8	15.4	16.8
	4	4.1	6.2	9.3	17.0	26.7	21.4	13.5
	5	4.1	10.6	18.3	25.3	29.8	29.1	9.8
	6	13.1	17.1	19.8	21.3	28.0	29.5	26.8
Absorbability [%]	1	11.57	11.10	7.37	0.05	0.04	0.02	0.00
	2	10.07	9.82	9.00	4.50	0.10	0.00	0.90
	3	12.62	11.94	9.55	3.79	0.45	0.21	0.02
	4	10.72	10.94	5.99	0.20	0.05	2.00	0.04
	5	11.25	11.22	6.56	0.00	0.00	0.00	2.13
	6	10.40	10.20	8.40	3.50	0.10	0.00	0.85
Apparent density [g/cm <sup>3</sup> ]	1	2.15	2.17	2.18	2.46	2.58	2.56	2.17
	2	2.15	2.17	2.24	2.43	2.59	2.56	2.11
	3	2.01	2.04	2.14	2.35	2.51	2.48	2.47
	4	2.12	2.12	2.34	2.59	2.62	2.36	2.36
	5	2.10	2.10	2.32	2.64	2.58	2.50	2.31

	6	2.12	2.16	2.26	2.51	2.62	2.47	2.31
Open porosity [%]	1	21.4	20.9	19.8	10.8	0.3	0.0	1.9
	2	22.9	22.1	17.5	10.5	0.3	0.0	1.0
	3	25.4	24.4	20.5	8.9	1.1	0.5	0.0
	4	22.8	22.8	14.0	0.5	0.1	0.1	0.1
	5	23.6	23.6	15.2	0.0	0.0	0.0	2.1
	6	22.8	22.0	18.8	8.5	0.1	0.0	2.0