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im. Prof. F. Stauba w Katowicach sp. z o.o.
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PRZEDSIĘBIORSTWO FAIR PLAY

Testing and Calibration Laboratory

TEST REPORT

Number: B/2016/226 of 08.09.2016

Subject: Research of mechanical properties of the PE-HD blocks – compression strength.

Research were executed for: **PGB-EUROPE NV,** Gontrode Heirweg 170, 9090 Melle, Belgium.

Research were executed in: Institution for Research and Certification „ZETOM" ltd. in Katowice
Testing and Calibration Laboratory. Mechanical and Length & Angle Laboratory.

Index of client's order: **Order the implementation of research** of **16.08.2016**

The order was registered in laboratory under the number: B/2016/236

Research began: 16.08.2016 **Research finished:** 08.09.2016

The report include: 7 pages

3 copies was given, which receive:

1. PGB-EUROPE NV, Gontrode Heirweg 170, 9090 Melle, Belgium.
2. PGB-EUROPE NV, Gontrode Heirweg 170, 9090 Melle, Belgium.
3. LT

Supervision of test was performed by: Dr Katarzyna Hadam

Research and tests was performed by: Eng. Tomasz Gruszczyński in laboratory: WM

MSc Eng. Krzysztof Szyjkowski in laboratory: WM

The report was prepared by: MSc Eng. Krzysztof Szyjkowski

Authorized:

PRACOWNIA MECHANICZNA
inż. Tomasz Gruszczyński

Confirmed:

Zakłady Badań i Atestacji "ZETOM" im. Prof. F. Stauba ZETOM Katowice w Katowicach sp. z o.o.

p.o. Z-ca Dyrektora
ds. Badań i Wzorcowań
Kierownik Laboratorium
Badawczego i Wzorcującego
dr Katarzyna Hadam

Institution for Research and Certification„ZETOM"
named after. Prof. F. Stauba in Katowice sp. z o.o.
Institutions for Research and Certification "ZETOM" Ltd.
Notified Body in the European Union No 1436,
In the scope of low voltage, machinery and construction
Ks. Bpa H. Bednorza 17; 40-384 Katowice
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ARRANGEMENTS

A. Obligatory:

1. Testing report is a property of a client for whom the research was done.
2. Testing report and information which it includes can be used with the report owner's consent only.
3. research report can be used as a whole only.
4. all testing and measure results, listed in the report, refer only to the tested objects and aren't synonymous with object's quality approval.
5. The work was done according to the its quality plan and to quality system requirements in accordance with Quality Manual of Testing and Calibration Laboratory.
6. Once referring to the objective report a following (or equivalent) sentence must occur (be applied):

Tested by Testing and Calibration Laboratory in Katowice, accredited by Polish Accreditation Center, Warsaw in the scope which conforms with the attachment to the certificate Nr AB 024.

B. Additionally (listed in the report content) paragraph

C. Special cases (listed in the report content) paragraph

Reports owner, using its content is obligated to quote information, that he use results obtained by Testing and Calibration Laboratory of Institutions for Research and Certification „ZETOM" Ltd, accredited by Polish Accreditation Centre.

1. BASIC RESEARCH

1.1. The name of document of order: order for the execution of research in Testing and Calibration Laboratory "ZETOM" Ltd. Katowice by PGB-EUROPE NV Melle Belgium.

1.2. Document identification of order : Order the implementation of research of 16.08.2016

1.3. Concerning: research of compression strength.

2. RESEARCH AIM

Determine of compression strength.

3. RESEARCH OBJECT

3.1. The name of object: PE-HD blocks , thickness: 2, 3, 5 and 10 mm.

Quantity: Σ12 pieces = 4x 3 pieces

3.2. Customer/Producer: PGB-EUROPE NV, Gontrode Heirweg 170, 9090 Melle, Belgium.

3.3. Supplier: PGB-EUROPE NV, Gontrode Heirweg 170, 9090 Melle, Belgium..

3.4. Production plant: —

3.5. The way of the research object delivery: through producer

3.6. Objects collected from: —

3.7. Sampling protocol: without protocol

3.8. Date of object receipt for research: 16.08.2016

3.9. Extra marking through receiver: —

3.10. The packing specification of object: foil bag, paper-board envelope

3.11. The marking of objects in laboratory:

The marking of objects in laboratory:

Object marking	Objects marking executed in laboratory [1)]	Remarks
PE-HD blocks of thickness:	**Mechanical properties**	
2 mm blue Samples no.: 1, 2, 3.	2016/236/ $\mathbf{2}_{1\div3}$	- test samples for research in "ZETOM" Ltd. Katowice
3 mm red Samples no.: 1, 2, 3.	2016/236/ $\mathbf{3}_{1\div3}$	
5 mm green Samples no.: 1, 2, 3.	2016/236/ $\mathbf{5}_{1\div3}$	
10 mm black Samples no.: 1, 2, 3.	2016/236/ $\mathbf{10}_{1\div3}$	
[1)] determine still sample index		

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4. RESEARCH PROGRAM.

4.1. Tests of compression strength by
Instructions for Research QL_{iB} – 1310 edition 01 of 15.11.2012.

5. THE TEST EQUIPMENT.

5.1. To test mechanical properties:

- testing machine - Id. No.: 1004002

6. DESCRIPTION AND RESULTS.

6.1. Tasting machine

The tests were carried out on the testing machine ZD-40 with a modernized measurement system of extension and load. Max load 400 kN. The testing machine fulfils requirements according to the first class of the PN-EN ISO 7500-1 standard. A resolution of the measurement system of load is 0,01kN.

A resolution of the measurement system of extension is 0,001mm.

6.2. Samples

According to information from client the blocks were made of PE-HD. The dimensions of the blocks were thickness x width x length = 2, 3, 5, 10 x 50 x 100 mm (Fig. 1).

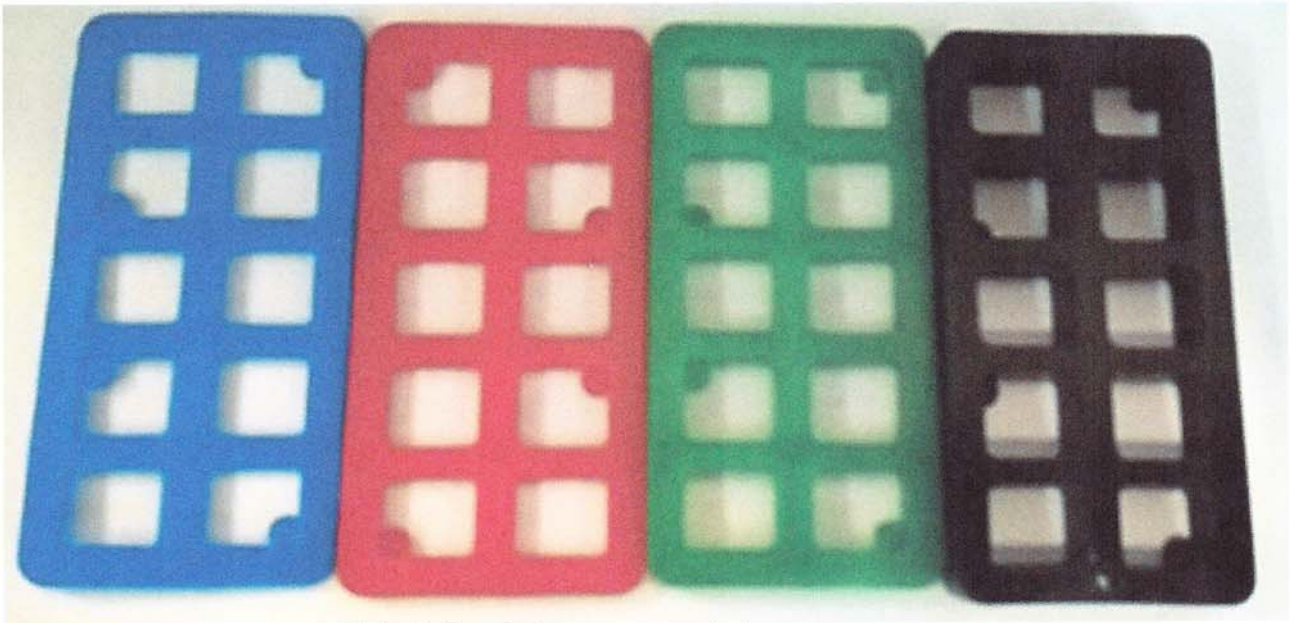

Fig. 1. Samples to compression tests.

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6.3. Run of the compression tests.

The run of the compression tests are presented as load-extension graphs, figures no. 2, 3, 4 and 5.

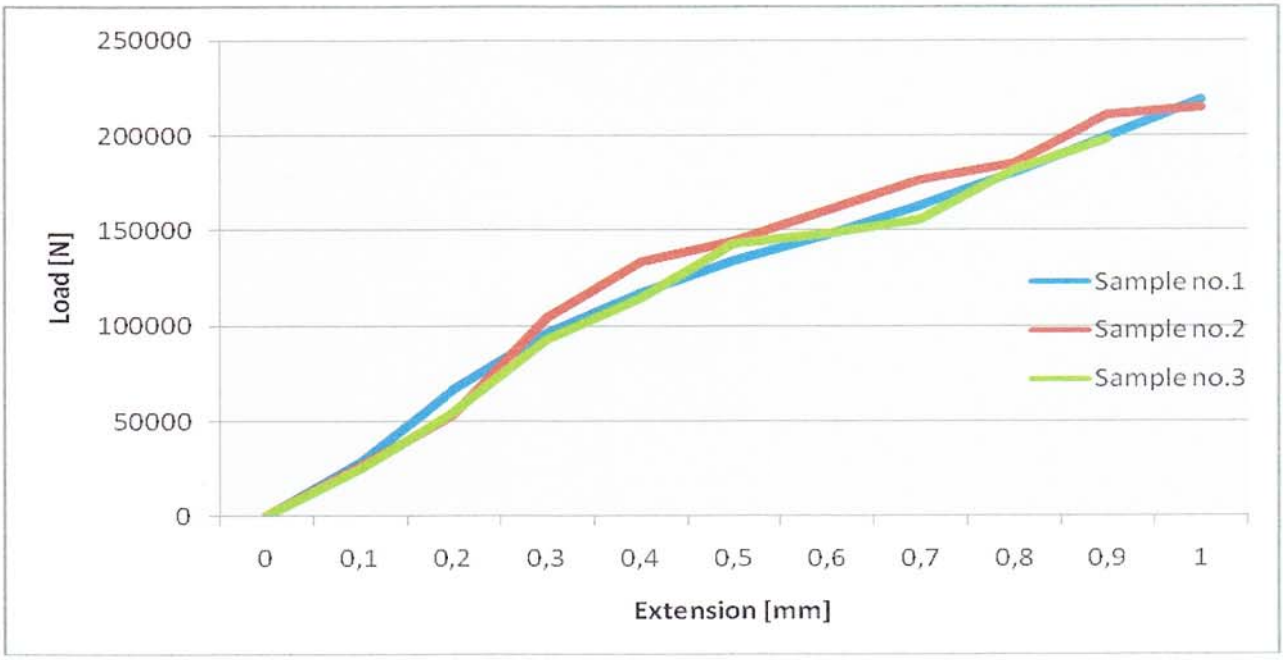

Fig. 2. Compression test of the blocks – thickness 2 mm.

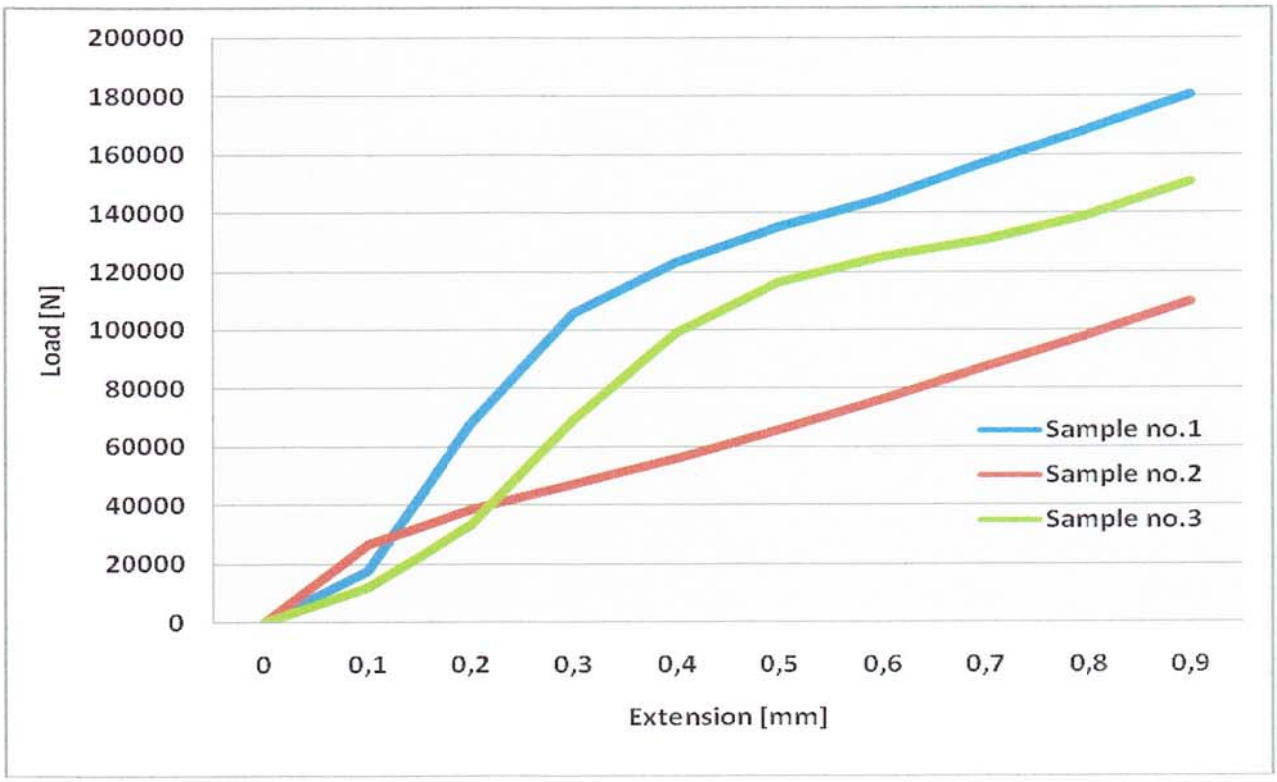

Fig. 3. Compression test of the blocks – thickness 3 mm.

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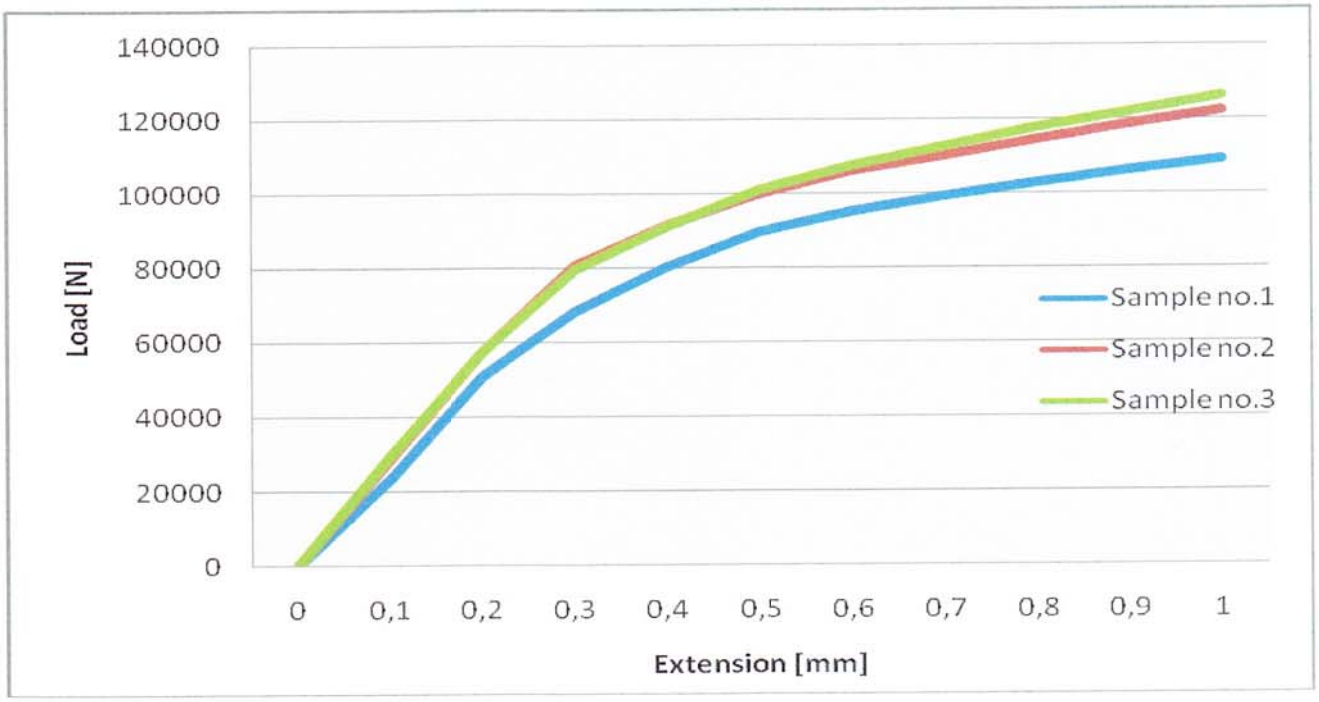

Fig. 4. Compression test of the blocks – thickness 5 mm.

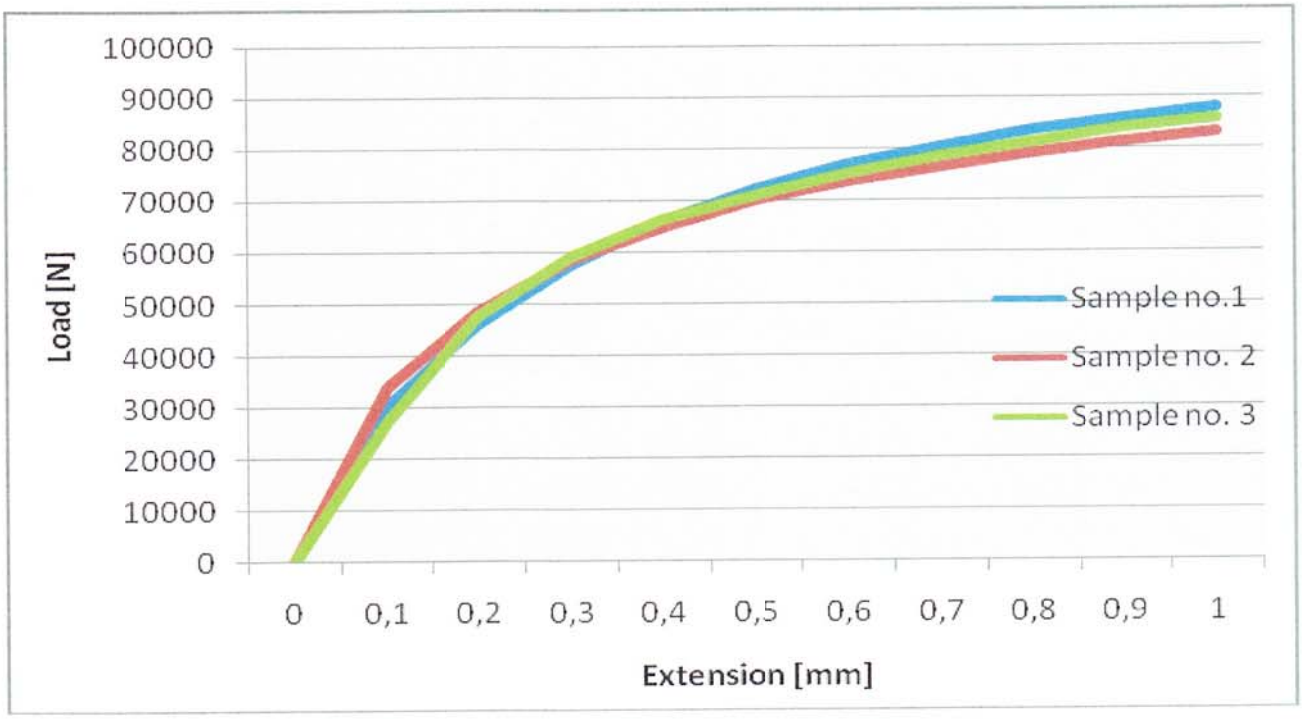

Fig. 5. Compression test of the blocks – thickness 10 mm.

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6.4. Results.

The results of the compression tests are given in table no.1.

Table 1. Results of compression tests.

Samples Identification		Mechanical properties – compression strength		
Product	Sample No.	Load	Area	Compression strength
		F	A_C	f_C
		[kN]	[mm^2]	[MPa]
HDPE blocks dimensions ~ thickness x width x length 2, 3, 5, 10 x 50 x 100 mm	*Blue blocks - thickness 2,0 mm*			
	2016/236/ 2_1	140,02	2809,95	**49,8**
	2016/236/ 2_2	123,19	2811,91	**43,8**
	2016/236/ 2_3	139,03	2812,56	**49,4**
			Mean value :	**47,7**
	Red blocks - thickness 3,0 mm			
	2016/236/ 3_1	117,40	2659,44	**44,1**
	2016/236/ 3_2	125,46	2661,40	**47,1**
	2016/236/ 3_3	120,04	2662,06	**45,1**
			Mean value :	**47,7**
	Green blocks - thickness 5,0 mm			
	2016/236/ 5_1	89,54	2651,40	**33,8**
	2016/236/ 5_2	93,42	2653,36	**35,2**
	2016/236/ 5_3	98,22	2654,02	**37,0**
			Mean value :	**35,3**
	Black blocks - thickness 10,0 mm			
	2016/236/ 10_1	71,87	2710,30	**26,5**
	2016/236/ 10_2	65,17	2712,26	**24,0**
	2016/236/ 10_3	66,71	2712,91	**24,6**
			Mean value :	**25,0**

NOTES:

1. The results are given as the maximum load which the blocks could resist before there was heavy deformation.

2. Pressure speed was approx. 5 mm/min.

THE END OF REPORT