"LvivbudNDI Project" Lviv Research and Project Institute

Testing Center of "LvivbudNDI Project" Institute
Protocol N13/155

"Confirm"
Head of Testing Center of
"LvivbudNDI Project" Institute
I.S.Ivasiv

Translation of the seal:
State Enterprise Lviv Scientific Research
"LvivbudNDI Project" Institute
Ukraine
05516406

"ЗАТВЕРДЖУЮ"
Керівник випробувального
центру інституту
"ЛьвівбудмНДІпроект"

І.С.ІВАСІВ

"6" листопада 2013 р.

November, 6, 2013

Resulting from research results on chemical additives for concrete of "Nanotechnocom" Limited Liability Company

November 6, 2013

EXECUTOR: Testing Center of "LvivbudNDI Project" Institute
accreditation certificate N 211539 from July, 10, 2012.
Ternopils'ka str., 10, L'viv, 79034

APPLICANT: "Nanotechnocom" Limited Liability Company
according to contract N 13/76 from 08.07.2013

1. Test Objective: to determine whether the concrete additives meet the requirements of State Standard (DSTU) Б 8.2.7-171:2008 (ГЛЧ 934-2:2001, ИЕС)) “Building Materials. Concrete Admixes and Mortars Additives. General Specifications” p.3.1.3 – 3.1.6
2. Time of Testing: September, 2 – November, 6, 2013.
3. Characteristics of Materials delivered for testing:
   - samples of chemical additives ГЕ №1, ГЕ №2 та ГЕ №3 each in 1 l;
   - cement M400;
   - crushed fractions 5-10 mm;
   - crushed fractions 10-20 mm;
4. List of Regulations:
   - State Standard B. 8.2.7-171:2008 (EIM 934-2:2001, N£0) “Building Materials. Concrete Admixes and Mortars Additives. General Specifications”;
   - State Standard B. 2.7-43-96 “Building Materials. Heavy Concrete. General Specifications”;
   - State Standard B. 8.2.7-47-96 (DSTU 10060.0-95) “ Building Materials. Concrete. Methods for Determining Frost Resistance ”;
   - State Standard B. 8.2.7-48-96 (GOST 10060.1-95) ” Concrete. Basic Method for Determining Frost Resistance ”;
   - State Standard B..2.7-69-98 (GOST 30459-96) “ Building Materials. Concrete Admixtures. Methods for Determining Efficiency ”;
   - State Standard B. 8.2.7-46-96 “ Cements for general purpose. Specifications”;
   - State Standard B. 13.2.7-239:2010 (Г24 1015-11:1999, N£0) “ Building Materials. Mortars. Testing Methods.”
   - State Standard B. B.2.7-170:2008 “ Building Materials. Concrete. Methods for determining the Average Density, Humidity, Water Absorbability, Porosity and Water Resistance ”;
   - State Standard B. B.2.7-114-2002 (GOST 10181-2000) “ Building Materials. Mortars. Testing Methods”;
   - State Standard B. B.2.7-214:2009 (GOST 10180-90) “ Building Materials. Concrete. Methods for Determining the Strength *by (using)* Test Specimen ”.

5. Testing equipment and measuring instruments:

Table 5.1

№	Name	Type, model, marking	Accuracy class, measure of inaccuracy
1	2	3	4
1	Pyroscope TUZU 1407481.001-92	VIT-2	(16-40 °C); ±0,2 °C (20 - 93 %); ± 5 %
2	Thermometer GOST 2823-73	Tm (0-50) °C	±0.5°C
	Electronic Weighing Apparatus of General-Constructive- Duty	\URT 10	±750 mg
4	Hydraulically operated compression apparatus DSTU 9905	PSU-10	±2%
5	“AGAT” Mechanical Watchstop TU 25-1819-021-92	MW-2a-3-000	±0,2c
6	Beam compasses DSTU GOST 166:2009	BC-1-150-0,05	±0,05 mm

1	2	3	4
7	Ruler DSTU GOST 427:2009	LM-1000	±0,5 mm
8	Freezer compartment	-18°C	±2°C
9	Cone-shape	Dн=Ю0 мм; Dв=70 мм	±1 mm
10	Device for measuring movability of dissolved mix	ПГР № 19	±1 mm
11	Measuring cylinder	500 ml	±2 ml
12	Drying oven	100°C	±1°C
13	Vibrating table	СНЖ-739	±0,03 mm
14	Device for determining water-repellency	DSTU Б В.2.7-170	±0,2 MI 1a

Testing equipment is examined; means of measurement technique are checked.

Test conditions:

- ambient temperature 20-22 °C
- atmospheric humidity 60-65 %

1 Additives testing results according to DSTU (State Standard) Б В.2.7-171:2008 (E14 934- -2:2001,1ЧЕС>):

Table 7.1

Indices name, characteristics and sizes according to State Standard Б В.2.7-171:2008 (ЕМ 934-2:2001, N£0)	Indices, characteristics & sizes value according to НД	True indices, characteristics & sizes value			Permissable variation	Testing equipment & measuring tools
		ГЕ №1	ГЕ №2	ГЕ №3		
1	2	3	4	5	6	7
p.4.1.3 (characteristic. 1, table. 10) Shelf life of concrete mix placeability at 20 ± 2 °C: Storage efficiency index of concrete mix placeability ($П_{зл}$)	>1,5	3,2	3,5	3,9	±1 mm ±0,2 s ±0,05 mm	Cone-shape, stopwatch, metal ruler
p.4.1.3 (characteristic.2, table. 10) Compressive strength of main formula concrete in relation to check formula, %, at least in: - 7 days; 28 days	80 90	84 91	94 98	87 100	±2%	Hydraulically operated compression apparatus

1	2	3	4	5	6	7
p.4.1.3 (char. 1, table. 11) Concrete compressive strength at 1 day at 20 °C. kgf/cm :						Hydraulically operated compression apparatus ***hydraulic press***
- of main formula	Without regulations	33.3	41.2	63.3	±2%	
- of check formula;	-"-	78.3	78.3	78.3		
at 7 days at 20 °C, kgf/cm^2:						
- of main formula		236.7	266.7	246.7		
- of check formula;	-"-	281.7	281.7	281.7		
at 28 days at 20 °C, kgf/cm^2:						
- of main formula		320.0	343,3	348,9		
- of check formula;		350.0	350,0	350,0		
- Compressive strength of main formula concrete in relation to check formula, %. at least:	70					
- in 7 days;	90	84	94	87		
- in 28 days		91	98	100		
p .4.1.3 (char. 1, table. 15) Frost-resistance (brand): freeze-thaw cycle:	Without regulations				±2°C	Freezer compartment, Hydraulically operated compression apparatus, **electronic scales**
- of main formula		200	228	187	±2% ±750 mg	
- of check formula;		183	183	183		

8 Heavy concrete testing results according to State Standard (DSTU) Б В.2.7-43-96:

Table 8.1

Indices name, characteristics and sizes according to State Standard Б В.2.7-43-96	Indices, characteristics & sizes value according to ІІІЦ	True indices, characteristics & sizes value				Permissible variation	Testing equipment and measuring tools
		Without add.	ГЕ №1	ГЕ №2	ГЕ №3		
1	2	3	4	5	6	7	8
p.3.1.3 Average density of - heavy-weight concrete	from 2200 to 2500 inclusively	2358	2392	2342	2370	±750 мг ±1 °C	**electronic scales.** drying oven
p.3.1.4 Concrete compressive strength at a project stage, kgf/cm^2:	327,4	337	371	283	355	±2%	**hydraulic press**
p.3.1.4 Concrete grade according to compressive strength	B 25	B 25	B 25	B20	B 25	±2%	**hydraulic press**
strength quality of concrete	M350	M350	M350	M250	M350		