ECOLOGICAL IMPACT ASSESSMENT OF NEW CONCRETE MANUFACTURING TECHNOLOGIES WITH THERMAL PLANT ASH – CASE STUDY S.C. PREFATIM TIMISOARA -

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ABSTRACT: The paper presents monitoring of the noxious results resulting from the manufacture of concrete with the addition of power plant ash and the comparison of the results obtained with the legal maximum limits.

KEY WORDS: *Monitoring, ash, ecological impact, concrete*

1. INTRODUCTION

The main conditions in terms of environmental protection that S.C. Prefatim must comply with them while carrying out concrete / mortar manufacturing activities are:
• Ensure the maintenance and spraying of platforms, access roads and aggregate depots, with water, in order to reduce fugitive dust emissions;
• It is forbidden to exceed the noise level, above the value of 65 dB at the site limit.
Installations used in concrete/mortar preparation activities consist of:

a). Concrete plant comprising the following main equipment (Fig. 1.):
- the load-bearing structure of the concrete plant, consisting of the mixer platform, with walkways and grilles on both sides, access ladder, dump lift with winch, engine with braking device, engine protection;
- electromechanical cement dispenser consisting of: loading cell dosing device, cable panel that includes the cables of electronic weighing devices, cement dosing tank with electropneumatically activated control valve, vibrator with electric motor;
- electromagnetic water dispenser consisting of a dosing device with load cells, a panel with cables to the electronic weighing devices, a tin dosing tank;
- test dispenser for unloading test and calibration weights from the floor;
- paddle mixer;
- air compressor;
- air exhaust filter;
- unloading hopper;
- aggregate humidity measuring device.

Fig. 1. Concrete and mortar preparation station

b). Metal silos. For loading and storing cement (Fig. 2).

The silo is loaded pneumatically directly from the transport equipment. The bodies of cement silos are metal constructions, cylindrical in shape, finished at the bottom with a cone that takes the weight of the cement mass.

Fig. 2. Metal silos for cement storage

At the top, the silos are fitted with textile filters designed to retain cement dust which is discharged during the pneumatic loading of the silos.

c). Concrete pads with partitions (Fig. 3), for storing the aggregates used in the concrete and mortar manufacturing process.

Fig. 3. Pads for storing aggregates

2. DESCRIPTION OF THE MAIN PHASES OF THE TECHNOLOGICAL PROCESS OF MANUFACTURING CONCRETE/MORTAR WITH THE ADDITION OF POWER PLANT ASH

The mineral aggregates, stored in separate paddocks on aprons and the ash brought from the ash dump (Fig. 4) positioned at a distance of about 7 km, are loaded by a front loader with bucket in bunkers, being then discharged on the collection strips of the station of concrete, where they are dosed, according to the prescribed recipe, by means of automation systems ordered from the control cabin.

The collecting belts transport the aggregates to the belt-inclined conveyors. At the same time, the cement is weighed in the gravimetric cement dispensers, being taken together with the aggregates and the ash of the thermal power plant.

The dosing of water and additives is done at the same time as the cement and the aggregates / ash. The station mixers take over the aggregates, cement, water and ash through the unloading funnel, forcing them for at least 30 seconds. The unloading of the concrete from the mixers of the concrete station is done gravitationally, by means of unloading funnels, in the concrete mixers that transport the finished product to various beneficiaries.

Fig. 4. Ash sampling required for the preparation of experimental samples

3. MONITORING OF EMISSIONS

a). Monitoring of dust emissions

The method for determining the dust deposits on the ground in the areas adjacent to the storage and handling of raw materials consisted in aspirating a volume of air on membrane filters with an average pore size of 0.80 μm

Sampling was performed by aspirating air at a flow rate of 20 l / minute. Prior to sampling, the filters were conditioned for 24 hours by drying in a calcium chloride desiccator.

The filters were weighed to the nearest 0.0001 g, and after harvesting the powders they were reconditioned and then weighed with the same precision. The weighing operation was performed immediately after removal from the desiccator.

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The results of monitoring the dust concentration in the 2 sampling points are presented in Table 1.

Table 1. Dust concentration monitoring results

Nr. crt.	Powder concentration in suspension [mg / m3 / 30 minutes]	Maximum powder limit according to STAS 12574/1987 [mg / m3 / 30 minutes]
1	0,11	0,5
2	0,08	

b). Noise level monitoring

Noise measurement was performed in accordance with the requirements of standard SR 6161-1 / 2008 Acoustics in construction, Part 1: Measurement of noise in civil engineering - Measurement methods.

The standard SR 6161-1 / 2008 establishes the methods for measuring, in situ, the noise level inside the functional units of the civil constructions Li, ech and of the noise level outside them Le, ech.

The principle of the method consists in measuring the level of internal or external noise in order to equate the recorded noise in a certain period of time, with a noise characterized by a stationary level, which produces the same harmful effects as the recorded noise.

The measuring system (sound level meter) was located at a distance of 1 m from the building facade and 1.5 m from the ground.

Noise level monitoring was performed in 4 points with the Bruel & Kjae 2250L sound level meter. (Fig. 5)

Fig. 5. Location of the Bruel & Kjae 2250L sound level meter used to monitor the noise level

4. CONCLUSIONS

Consulting the values mentioned in Table no. 1 it can be concluded that during the storage and handling operations of the raw materials necessary for the experimental lots on the S.C. Prefatim platform, the powder

The results of monitoring the noise level in the 4 points are presented in Table 2.

Table 2. Noise level monitoring results

Code	Leq (A), [dB]	Maximum noise level [dB]
Z_1	57,3	65
Z_2	58,2	
Z_3	60,1	
Z_4	62,4	

concentration was within the maximum allowable limit established by the legislation in force.

From the values mentioned in Table 6.3 it can be concluded that the noise level falls within the maximum limit established by STAS 10009/2017 Acoustics. Permissible ambient noise levels.

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