



## PLASTICIZERS FOR CONCRETE dry matter content determination

Plasticizers for concrete are mixtures of natural and synthetic resins whose task is to improve working properties of cement mortars. The use of the plasticizer results in increase in the fresh mortar aeration, reduction of the amount of make-up water, rise in waterproof quality and resistance to frost after the mortar gets hard. The quality of the plasticizer comes from precise mixing of many solid and liquid ingredients in suitable proportions. The dry matter of the plasticizer, that is mass of the substance after evaporating all liquid ingredients of the product is one of ways of checking if the plasticizer production has been correct. The method of measuring the dry matter content to be used in testing must guarantee accurate and highly precise results, which can be achieved with the use of MA/R and MA/X2 moisture analyzers by Radwag.



The application note includes basic information for validation of the plasticizers for concrete drying method with the use of MA/R and MA/X2 moisture analyzers series by Radwag Wagi Elektroniczne. The application note may be the basis for elaborating own drying method with special regard to distinctive features of the product in question.



## Plasticizers for concrete – dry matter content determination

The method with the use of IR radiation

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### TERMS

ACCURACY of determining water / dry matter content is the difference between the result of the water / dry matter content received in the moisture analyzer method and the result of the water / dry matter content received while drying the same sample through a reference method.

PRECISION is a degree of compliance between independent results of the test, received in specific conditions. The measure of precision is a standard deviation from a series of several measurements.

### REFERENCE METHOD

The dry matter of plasticizers substance has been specified as per PN-EN 480-8 “Additives to concrete, mortar and cement slurry – Testing methods – Part 8: Determination of the contractual dry matter content”.

### SAMPLE PREPARATION

Before testing, samples must be stored in sealed packaging. Fluid and semi-fluid products must be mixed before testing.

### ACCESSORIES

Dryer, quartz sand, weighing vessels with a lid, rods, AS 220.X2 balance, laboratory spoon.

### METHOD DESCRIPTION

Weigh glass vessels with a glass rod and pre-dried quartz sand in the amount of ca. 15 g. Mix the sample with a mass of ca. 2 g and put into glass weighing vessels on pre-dried quartz sand. Mix the sample with sand by means of the glass rod that must be left in the vessel. The use of sand as a foundation is aimed at eliminating creation of the shell on the surface of the sample in question. Weigh vessels again and specify the real mass of the sample in question with the use of the balance whose weighing accuracy is 0.1 mg (AS 220.X2). Place weighing vessels with the sample and lids in the temperature-controlled laboratory dryer. Dry samples at the temperature of 105°C for 3 hours. After this period, remove vessels and put into the desiccator to let them cool down and weigh afterwards. Place samples in the laboratory dryer again and keep on drying them for 30 minutes. Cool them down and weigh again. Repeat the procedure until you obtain a stable sample mass or record the sample mass growth after drying. Calculate the dry matter content as a quotient of the post-drying sample mass ( $m_2$ ) and pre-drying sample mass ( $m_1$ ).

### RESULTS

Sample name	Qmix Forte	Qproof	Qmix Plus	Qmix Max	Qmix DH winter
Dry matter (%)	2.56	6.81	2.47	24.78	15.25
Standard deviation (%)	0.01	0.05	0.01	0.03	0.02

## DRY MATTER CONTENT OF THE PLASTICIZER FOR CONCRETE – MOISTURE ANALYZER METHOD

The water content testing with the use of the moisture analyzer (IR radiation) entails two phenomena: convection and radiation. The sample temperature rises from outer layers to the bottom of the sample. The temperature gradient in the sample structure minimizes through optimization of the thickness of the dried sample and drying temperature.

### SAMPLE PREPARATION

Before testing, samples must be stored in sealed packaging. Fluid and semi-fluid products must be mixed before testing.

### ACCESSORIES

MA/R or MA/X2 moisture analyzer, glass weighing vessels with a lid, laboratory spoon, pipette.

### METHOD DESCRIPTION

Set drying parameters presented below. Semi-fluid samples – place the sample in the amount of ca. 1 ÷ 2 g on the weighing pan. Dose the sample with the use of a pipette. Lock the drying chamber manually or automatically.

### DRYING PARAMETERS / RESULTS

Sample name	Qmix Forte	Qproof	Qmix Plus	Qmix Max	Qmix DH winter
Drying profile	Standard				Mild /10 min
Drying temperature	120°C	140°C	120°C		130°C
Sample mass (g)	~ 1 ÷ 1.5				~ 2
End of analysis	Auto 3	Auto 5	Auto 3		Auto 3
Dry matter (%)	2.55	6.90	2.42	24.78	6.81
Standard deviation (%)	0.07	0.08	0.10	0.07	0.04
Analysis time $\bar{x}$ (min)	~ 15	~ 17	~ 17	~ 10	~ 27

### ACCURACY OF THE MA/R ÷ MA/X2 METHOD

Sample name	Qmix Forte	Qproof	Qmix Plus	Qmix Max	Qmix DH winter
Dry matter Ref. (%)	2.56 ± 0.01	6.81± 0.05	2.47 ± 0.01	24.78 ± 0.03	15.25 ± 0.02
Dry matter MA R/X2 (%)	2.55 ± 0.07	6.90 ± 0.08	2.42 ± 0.10	24.78 ± 0.07	15.37 ± 0.04
Analysis accuracy (%)	0.01	0.09	0.05	0.00	0.12

### RESERVATION

The method in question has been verified by the Research Laboratory, yet the results do not include factors arising from diversity of tested samples, operators' personal skills as well as measuring capability used by moisture analyzer users. For this reason Radwag shall not be held responsible for drying parameters but they can be used to elaborate own drying method.

