

Zehntner GmbH
Testing Instruments
Gewerbstrasse 4
CH-4450 Sissach
Switzerland
Tel +41 (0)61 953 05 50
Fax +41 (0)61 953 05 51
zehntner@zehntner.com
www.zehntner.com



Instruction manual

version 1.0 dated 17.10.2008

ZAM 5090

Flow measuring unit acc. to Moore



Index

Exclusion of liability	3
1. Description of apparatus	3
1.1 Summary	3
1.2 Application / Application areas	3
1.3 Features.....	3
2. Safety precautions and warnings	4
2.4 Dangers	4
2.5 Notes regarding safety at work.....	4
3. Delivery of apparatus.....	5
3.1 Transportation damages.....	5
3.2 Extent of delivery	5
3.3 Options	5
4. Outline of the instrument.....	5
5. Prepare for testing	7
6. Sampling / sample plan	7
7. Handling.....	8
8. Stopping the stop watch and getting the measuring result.....	9
9. Example for test report	10
10. Cleaning.....	11
11. Storage	11
12. Maintenance	11
13. Technical specification.....	11

Enclosures:

- Certificate of manufacturer

Exclusion of liability

Illustrations, descriptions as well as the technical specifications accord with the instruction manual in hand for the time of printing. Subject to change resulting from technical improvement, modified construction or similar changes.

This instruction manual has been written with the utmost care. Nevertheless, errors can not entirely be eliminated. The manufacturer shall not be liable for errors contained herein or for incidental or consequential damages resulting from possible errors.

We would therefore welcome any suggestions and references to errors.

© Zehntner GmbH Testing Instruments

1. Description of apparatus

1.1 Summary

The flow measuring unit is used for the determination of the macro texture of a pavement surface. Horizontal drainability is the capacity of the road surface to provide interconnecting voids through which water can be squeezed out by a moving tyre.

1.2 Application / Application areas

- For road construction companies, national road authorities, road laboratories, manufacturers of road marking materials, contractors and expert witness.
- For the assesment of the macro texture of all smooth, non porous pavement surfaces with an intermediate profile depth below 0.4 mm.
- Field and laboratory use.

1.3 Features

The instrument has the following special advantages:

- Convenient storage box with separate partitions for spare parts.

2. Safety precautions and warnings

2.1 Dangers




Attention!

This note is included in this instruction manual wherever it is warned about dangers which will arise to life and limb of persons if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in these instruction manual the generally applicable safety instructions and regulations for prevention of accidents have to be taken into account.

Caution

This note comprises instructions to be observed in order to comply with guidelines, instructions, notes and the proper procedure of the work, and to avoid damaging or destruction of the apparatus.

2.2 Notes regarding safety at work

-  The ZAM 5090 is exclusively designed for the determination of the macro texture of a pavement surface. Any other application is not in accordance with the regulations. The manufacturer is not liable for damage resulting from inappropriate application. The user bears the full responsibility.
-  Only spare parts and optional components provided by the manufacturer may be used in combination with the ZAM 5090. If components other than provided by ZEHNTNER are used with the ZAM 5090, there is no guarantee by ZEHNTNER for resulting damages, defects or malfunctions.
-  Unauthorised modifications and changes of the ZAM 5090 are not allowed. These will invalidate the guarantee. The manufacturer is not liable for damages resulting from unauthorised modifications; the user bears the full responsibility.

3. Delivery of apparatus

3.1 Transportation damages

After unpacking the instrument, please look for any transport damage in case of which we kindly ask you to inform the insurance company and **ZEHNTNER GmbH TESTING INSTRUMENTS** respectively.

3.2 Extent of delivery

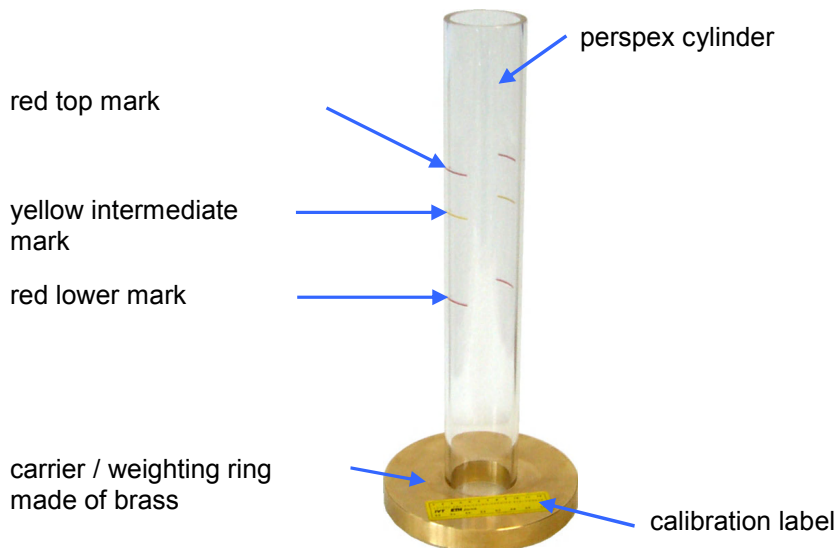
The following parts are included in the delivery:

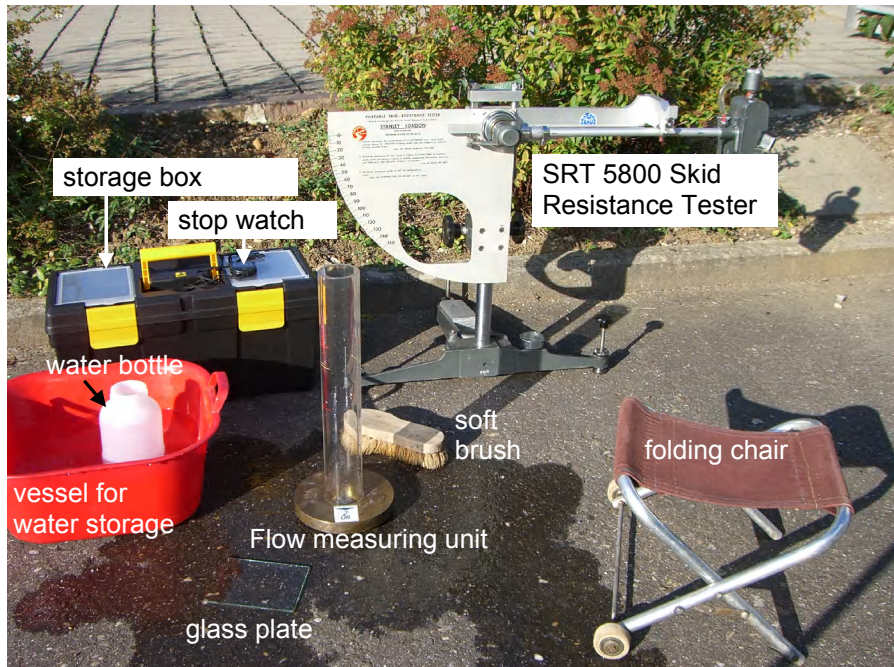
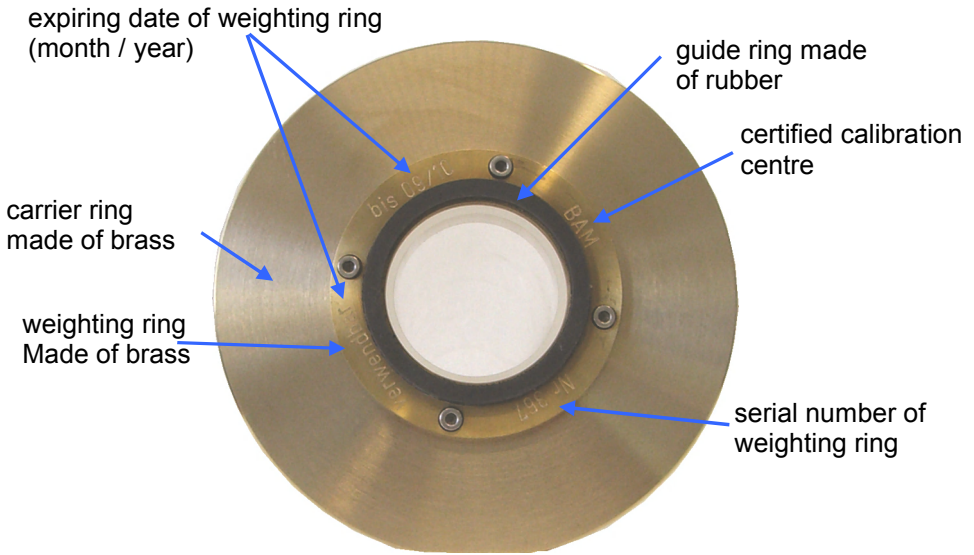
- 1 flow measuring unit according to Moore
- 1 certificate of manufacturer
- 1 storage box

3.3 Options

- SRT 5800 Portable Skid Resistance Tester
- ACC 152 glass plate

4. Outline of the instrument





5. Prepare for testing

Before each test the guide ring and seal on the carrier ring shall be checked for any incisions, cracks, surface damage or warpage and that it is clean.

The water tightness of the flow measuring unit under test conditions shall be checked on a level glass plate before starting and after completing a series of tests. For trials in accordance with EN 13036-3:2002 no fall in water level shall be exhibited during a period of 5 min.

Should the flow measuring unit not pass this test; the seal has to be replaced.

6. Sampling / sample plan

Define the location of the sample and the number of samples according to the chosen standard.

In General, as the horizontal drainability of a road surface varies considerably across the width of the road; tests shall be taken on representative parts on the most trafficked area (wheel track) and elsewhere if required.

7. Handling

- ❗ Protect the flow measuring unit against airstream of bigger vehicles.
- ❗ Do not carry out testing at heavy rain or at high choppy wind.
- Prepare for testing in accordance with chapter 5 „Prepare for testing“ on page 7.
- Before testing begins, immerse the lower part of the flow measuring unit completely in water to wet the guide ring.
- Immediately after, place the flow measuring unit vertically on the test surface.
 - Take particular care that the guide ring does not come into contact with an isolated protruding mineral particle or with an isolated depression in the road surface.
- Fill the flow measuring unit with potable water.
- Start the stop watch when the water passes the red top mark.
- Define the test results in accordance with chapter 8 „Stopping the stop watch and getting the measuring result“ on page 9.
- Raise the flow measuring unit from the surface immediately after the test and place it so that the guide ring is not compressed and can regain its initial form.
- in the meantime, a test can be carried out with a second flow measuring unit at the next test point. The test thereafter can be made with the first instrument.
- Upon completion of the test, clean and store the instrument in accordance with chapter 10 “Cleaning” on page 11 and chapter 11 „Storage“ on page 11.

8. Stopping the stop watch and getting the measuring result



Flow time of the water:

- a) time < than 3 min.
- b) time > than 3 min.

Variant a) It takes **less** than 3 min. for the water to reach the intermediate mark:

- Stop the stop watch when the water passes the lower red mark on the cylinder.
 - Measure the time ± 0.5 s and record it.
 - The reading is both the test value and the result for the test point.
 - A correction for the temperature shall not be made.

Variant b) It takes **more** than 3 min. for the water to reach the yellow intermediate mark:

- Stop the stop watch when the water passes the yellow intermediate mark.
 - Measure the time ± 0.5 s and record it.
 - The result for the test point is obtained by multiplying the test value by six.
 - A correction for the temperature shall not be made.

9. Example for test report

Test Institut												
Combined skid resistance and texture measurements								Orderer:				
								Order No.:				
Pendulum tester	No.		Last calibration:				Test section (Name, No. location)					
Outflow meter	No.		Last calibration:									
	No.		Last calibration:									
Date, Time									Test panel/Test line			
Weather conditions									Downgrade, slope	Longit. %	Cross %	
Air temperature	°C								Type of wearing courses			
Temperature of the wetted surface	Begin of test		End of test		Average		Surface structure					
	°C		°C		°C		Time of Laydown/ reconstruction					
Remarks												
Testpoint No.	1	2	3	4	5	6	7	8	9	10	Remarks	
Pendulum tester	1. reading											
	2. reading											
	3. reading											
	4. reading											
	5. reading											
	necessary further readings											
Average 1. to 5. reading ^a												
Average over all Testpoints						$\bar{y}_0 =$	Units					
Temperature compensation						$k =$	Units					
Result of test panel						$\bar{y} = \bar{y}_0 + k =$	Units					
Outflow meter	Readings											
	Average over all Testpoints						$\bar{z} =$	sec				
Operator:		Secretary:			Leader of Test group:							
^a In case of differences greater than 3 units in the 1 st to 5 th reading, the pendulum tests and readings have to be continued until three consecutive readings correspond and this result replaces the average over all testpoints.												

10. Cleaning

Upon completion of the test dry the flow measuring unit. Clean the cylinder and the guide ring and seal. Afterwards store it as described in chapter 11 „Storage“ on page 11.

11. Storage

During longer intervals between test programmes, the flow measuring unit shall be protected against light and air by storing in its storage box at a temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

12. Maintenance

The carrier and guide ring of the flow measuring unit shall be replaced when the expiry date is past. During the service life, the carrier ring shall be carefully protected from dirt, oil and grease.

The flow measuring unit has to be calibrated at least once a year. Please send the instrument to **Zehntner GmbH Testing Instruments** or to your authorized ZEHNTNER trader.

13. Technical specification

Material:	cylinder: perspex carrier / weighting ring: brass guide ring and seal: rubber
Dimension: (\varnothing x H):	\varnothing 160 mm x 410 mm storage box: 500 mm x 250 mm x 250 mm
Weight:	3.5 kg \pm 10 g 5.5 kg including storage box
Standards:	EN 13036-3, SN 640 511-3a
Warranty:	2 years