

ABSTRACT

Apparatus for testing of the water permeability of samples of building facades comprising a frame (3) on one side of which a sample of the facade to be tested (2) is fixed, and a grid (5) on which nozzles (1) which spray water on the sample of the facade to be tested (2) are arranged, characterized in that said apparatus is equipped with a movement system (4) of the grid (5) from a working position positioned in front of the facade sample to be tested (2) to a rest position positioned behind the frame (3) on the opposite side to that on which is located the sample (2) and that the grid (5) on which nozzles (1) are set up slides on elements of the frame placed at a predetermined distance from the sample to be tested (2).

Apparatus for testing of water permeability of samples of building facades

Technical Field of the invention

The present invention relates to an apparatus for the testing of the water permeability of samples of building facades, the tests which may be performed concern mainly, but not exclusively, water and wind tightness tests.

State of the art

The water permeability test equipment on samples of building facades used so far have basically made use of two systems:

- SYSTEM BUILT "ON SITE" ON THE SAMPLE

This system has several disadvantages such as long positioning times - small chance of total recovery of materials – long time of calibration of the fluxes and flow rates; number of tests/year strongly limited by the sequence of operations required, with the result of obtaining a limited productivity of the laboratory, the need for highly specialized workers, - the need to provide dedicated mounting devices, platforms, scaffolds.

- SYSTEM ASSEMBLED ON TRUCKS

This system has the following disadvantages; Dimensions of sample is limited by the size of vertical pipes; difficulties in the handling of cargo due to center of gravity positioned in a disadvantageous way; occupation of space for equipment storage when not in use; stability problems due to the influence of the wind, or

even of the wind simulator, due to the exposed surface, with the risk of overturning in the event of sudden gusts; long positioning times; high exposure of the workers to "residues" risks of the equipment, before, during and after the test; need for highly skilled workers.

A device that uses a system assembled on trucks is described in CN202770820.

Description of the invention

To overcome these and other disadvantages present in the equipment currently on the market has been realized an apparatus for the testing of the water permeability of samples of building facades comprising a frame on one side of which a sample of the facade to be tested is fixed, and a grid on which nozzles which spray water on the sample of the facade to be tested are arranged, characterized in that said apparatus is equipped with a movement system of the grid from a working position positioned in front of the facade sample to be tested to a rest position positioned behind the frame on the opposite side to that on which is located the sample and that the grid on which nozzles are set up slides on elements of the frame placed at a predetermined distance from the sample to be tested.

The apparatus object of the present invention allows to rapidly position the sample on said test apparatus, to position said sample at the right distance from the nozzles which have to spray the water to flood, to carry out the calibration of the fluxes and flow rates in times shorter compared to the systems currently in use.

Another characteristic is given by the fact that the nozzles are fed from parallel tubes placed at a predetermined distance from each other.

Another characteristic is given by the fact that the tubes are fed by a distribution column placed at one end of each tube.

Another characteristic is given by the fact that the tubes are interrupted at the center and each half tube is supplied from a distribution column placed at one end of each half tube.

With the apparatus object of the present invention can be put into test samples of different sizes by partializing the water supply system or it is possible to perform tests on multiple samples mounted on the same equipment.

Another characteristic is given by the fact that the tubes fed by a distribution column placed at one end of each tube or half tube are connected with a sleeve.

Another characteristic is given by the fact that said apparatus is equipped with a system of collection and recycling of water.

Another characteristic is given by the fact that the system of collection and recycling of water is composed of a collection well, of a collection tank of first rain coming from the open area on which said apparatus is positioned and a sedimentation and storage tank from which water is drawn to supply testing.

The apparatus object of the present invention has the advantage of re-use both the water used in the test and the rainwater that falls in the site where the tests are made and the waste water is practically reduced to a minimum.

Other features and advantages of the present invention will become clear from

the description hereinafter of an embodiment of the present invention given by way of non-limiting example in figures 1, 2, 3, 4 and 5.

Brief description of figures

Figure 1 is a longitudinal section of the apparatus object of the present invention with the grid that brings the nozzles in the working position;

Figure 2 is a longitudinal section of the apparatus object of the present invention with the grid that brings the nozzles in the rest position;

Figure 3 is a front view of the grid that carries the nozzles of the apparatus object of the present invention;

Figure 4 is a longitudinal section of the tanks of the water system of the apparatus object of the present invention;

Figure 5 is a schematic view of the water system of the apparatus object of the present invention.

Detailed description of an embodiment of the present invention

The apparatus object of the present invention, with reference to the figures, is composed of a frame 3 on one side of which is fixed a sample of the facade to test 2, and by a grid 5 on which the nozzles 1 are arranged which spray water on the facade sample to be tested 2. The apparatus is also equipped with a moving system 4 of the grid 5 from a working position located in front of the facade of the sample to be tested 2 to a rest position placed behind the frame on the opposite side to that on which the sample 2 is located. In a preferred

embodiment, but not exclusive, illustrated in detail in figures 1-4 and in the complex in figure 5, the grid 5 on which the nozzles 1 are arranged is showed, the movement system 4 of the grid 5 is constituted mainly, but not exclusively, by a chain transmission equipped with meshes with the knight 8 supporting pipes preferably, but not exclusively in light alloy. The grid 5 on which are arranged the nozzles 1 slides on the frame elements and, therefore, is obliged by the movement system 4 to be arranged at a predetermined distance from the sample 2 to be tested.

The nozzles 1 are fed by pipes 8 arranged parallel to one another at predetermined distance to meet the standards that rules the testing of tightness and the combined action of rain and wind. The pipes 8 are preferably, but not exclusively in light alloy but may be in any suitable material.

The pipes 8 are connected on each side by means of a distribution column 11 that has many branches as tubes 8 are to be fed by means of connecting sleeves 10. In this way it is possible to use the equipment for different surfaces, depending on whether they feed the two sides or only one or if one feeds a reduced number of tubes.

The pipes 8 are fed by a water system with a pumping system that provides for the collection and recirculation of the water for carrying out the tests and its reuse for other test cycles; The water system includes a collection sump 6 eventually covered by a grid positioned immediately below the sample of the test wall, a tub of first rain collection 7 of the yard and a sedimentation and storage tank 8 from which water is drawn for feeding the tests.

The apparatus object of the present invention allows to make water permeability tests on samples of facades without having to move the equipment on the wall to be tested.

The facade sample 2 may be of considerable size, also 10.00 x 20.00 meters, but also larger dimensions are possible, said facade sample 2 is easily installed on the frame 3, said sample is already located in this position at the distance planned to make the tests according to the standards laid down by European or international official regulations and subsequent adjustments are not required. The tests are repeatable in considerably shorter times than those that occur using the equipments currently available on the market.

Furthermore, the technical solution pertains not to the criteria with fixed test modules but it is constructed so as to be collected and housed on the same test structure.

The solution offers the possibility to carry out a greater number of tests, it can be made more flexible through a deferrable modularity, to ensure greater variability to the test conditions, to offer more opportunities to experiment on their own because of the different configuration of the nozzles for water permeability tests.

The invention provides a semi-automatic positioning solution of the nozzles on the front facade.

Briefly, the nozzles are lowered from the top down through a "gate" type system.

The grid 5 with the nozzles 1, in rest conditions, is made to slide in the rear part

of the frame 3, i.e. in a position free of interference with other equipment and without increasing the space necessary for admission of the test apparatus. The invention, it should be noted, is not limited to the representations given in the figures, but may be perfected and modified by those skilled in the art without, however, exceeding the limits of patent.

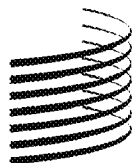
The invention permits numerous advantages, and to overcome difficulties that could not otherwise have been overcome with the systems on sale at present.

Claims

1. Apparatus for testing of the water permeability of samples of building facades comprising a frame (3) on one side of which a sample of the facade to be tested (2) is fixed, and a grid (5) on which nozzles (1) which spray water on the sample of the facade to be tested (2) are arranged, characterized in that said apparatus is equipped with a movement system (4) of the grid (5) from a working position positioned in front of the facade sample to be tested (2) to a rest position positioned behind the frame (3) on the opposite side to that on which is located the sample (2) and that the grid (5) on which nozzles (1) are set up slides on elements of the frame placed at a predetermined distance from the sample to be tested (2).
2. Apparatus for testing water permeability of samples of building facades according to claim 1 characterized in that the nozzles are fed by parallel tubes placed at a predetermined distance from each other.
3. Apparatus for testing water permeability of samples of building facades according to claim 2 characterized in that the tubes are fed by a distribution column placed at one end of each tube.
4. Apparatus for testing water permeability of samples of building facades according to claim 2 characterized in that the tubes are interrupted at the

center and each half tube is supplied from a distribution column placed at one end of each half tube.

5. Apparatus for testing water permeability of samples of building facades according to claim 3 or 4, characterized in that the tubes fed by a distribution column placed at one end of each tube or half tube are connected with a sleeve.
6. Apparatus for testing water permeability of samples of building facades according to any preceding claim characterized in that said apparatus is equipped with a system of collection and recycling of water.
7. Apparatus for testing water permeability of samples of building facades according to claim 6 characterized in that the system of collection and recycling of water is composed of a collection well (6), of a collection tank of first rain (7) coming from the open area on which said apparatus is positioned and a sedimentation and storage tank (8) from which water is drawn to supply testing.

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The Receiving Office (RO/IB) acknowledges the receipt of a PCT International Application filed using ePCT-Filing. An Application Number and Date of Receipt have been automatically assigned (Administrative Instructions, Part 7).

Submission Number:	050011	
Application Number:	PCT/IB2016/050011	
Date of Receipt:	04 January 2016	
Receiving Office:	International Bureau of the World Intellectual Property Organization	
Your Reference:	UNIRC01	
Applicant:	UNIVERSITÀ DEGLI STUDI "MEDITERRANEA" DI REGGIO CALABRIA	
Number of Applicants:	1	
Title:	APPARECCHIATURA PER PROVE DI PERMEABILITÀ ALL'ACQUA SU CAMPIONI DI FACCIATE DI EDIFICI	
Documents Submitted:	UNIRC01-appb-000001.pdf	35094
	(ITA-Descrizione.pdf)	
	UNIRC01-appb-000002.pdf	15670
	(ITA-Rivendicazioni.pdf)	
	UNIRC01-appb-000003.pdf	12593
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	UNIRC01-appb.xml	867
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	UNIRC01-poat-000001.xml	1950
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/Geneva, RO/IB/

PCT REQUEST

Print Out (Original in Electronic Form)

0	For receiving Office use only	
0-1	International Application No.	PCT/IB2016/050011
0-2	International Filing Date	04 January 2016 (04.01.2016)
0-3	Name of receiving Office and "PCT International Application"	RO/IB
0-4	Form PCT/RO/101 PCT Request	
0-4-1	Prepared Using	ePCT-Filing Version 3.2.003 MT/FOP 20151028/0.20.5.24
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	International Bureau of the World Intellectual Property Organization (RO/IB)
0-7	Applicant's or agent's file reference	UNIRC01
I	Title of Invention	APPARECCHIATURA PER PROVE DI PERMEABILITÀ ALL'ACQUA SU CAMPIONI DI FACCIATE DI EDIFICI
II	Applicant	
II-1	This person is	Applicant only
II-2	Applicant for	All designated States
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II-6	State of nationality	IT
II-7	State of residence	IT
II-10	e-mail	ing.perrotta@lp1srl.it
II-10(a)	E-mail authorization The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application:	as advance copies followed by paper notifications

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III-1	Applicant and/or inventor	
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IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	Agent
IV-1-1	Name (LAST, First)	PERROTTA, Aldo
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IV-1-5(a))	E-mail authorization The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application:	exclusively in electronic form (no paper notifications will be sent)
IV-1-6	Agent's registration No.	IT BM 467
V	DESIGNATIONS	
V-1	The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.	
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	31 December 2014 (31.12.2014)
VI-1-2	Number	CS2014A000035
VI-1-3	Country or Member of WTO	IT
VI-2	Incorporation by reference : where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.	
VII-1	International Searching Authority Chosen	European Patent Office (EPO) (ISA/EP)

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VII-2	Request to use results of earlier search; reference to that search		
VII-2-1	Filing date	31 December 2014 (31.12.2014)	
VII-2-2	Application Number	CS2014A000035	
VII-2-3	Country (or regional Office)	IT	
VII-2-4	Statement (Rule 4.12(ii)):	This international application is the same, or substantially the same, as the application in respect of which the earlier search was carried out except, where applicable, that it is filed in a different language.	
VII-2-5	Documents are available to the ISA in a form and manner acceptable to it and therefore do not need to be submitted by the applicant to the ISA (Rule 12bis.1(f)):	A copy of any document cited in the results of the earlier search	
VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	—	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	—	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	—	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	—	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	—	
IX	Check list	Number of sheets	Electronic file(s) attached
IX-1	Request (including declaration sheets)	5	✓
IX-2	Description	8	✓
IX-3	Claims	2	✓
IX-4	Abstract	1	✓
IX-5	Drawings	2	✓
IX-7	TOTAL	18	
	Accompanying Items	Paper document(s) attached	Electronic file(s) attached
IX-8	Fee calculation sheet	—	✓
IX-9	Original separate power of attorney	—	✓
IX-20	Figure of the drawings which should accompany the abstract	1	
IX-21	Language of filing of the international application	Italian	

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X-1	Signature of applicant, agent or common representative	/A.Perrotta/
X-1-1	Name (LAST, First)	PERROTTA, Aldo
X-1-3	Capacity (if such capacity is not obvious from reading the request)	Agent

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10-1	Date of actual receipt of the purported international application	04 January 2016 (04.01.2016)
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/EP
10-6	Transmittal of search copy delayed until search fee is paid	

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11-1	Date of receipt of the record copy by the International Bureau	
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Date

17.08.17

Reference	Application No./Patent No. 16707945.8 - 1559
Applicant/Proprietor Università Degli Studi "Mediterranea" Di Reggio Calabria	

Notification of the data mentioned in Rule 19(3) EPC

In the above-identified patent application you are designated as inventor/co-inventor.
Pursuant to Rule 19(3) EPC the following data are notified herewith:

DATE OF FILING : 04.01.16

PRIORITY : IT/31.12.14/ ITA CS20140035

TITLE : APPARATUS FOR TESTING OF WATER PERMEABILITY OF
SAMPLES OF BUILDING FACADES

DESIGNATED STATES : AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE
IS IT LI LT LU LV MO MK MT NL NO PL PT RO RS SE SI SK SM
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For the Examining Division

