

## An Outline of operation of VAC-VI Gas Permeability Tester

Abstract: This paper expands on the actual operation of VAC-V1 to test the gas permeability of film.

Key words: film, differential-pressure method, VAC-V1

Labthink(Languang) introduced its vacuum differential pressure permeability instrument -VAC-V1 Auto Gas Permeability Tester in the second half of 2004. Over a short span of several months, this instrument has achieved remarkable sales record and will export to Southeast Asia soon. Before that, Labthink has already made successful achievement in the data comparison of international permeability testing. All these have promoted Labthink's position in international market of permeability instruments.

Based on international testing principle of differential pressure, VAC-V1 auto gas permeability tester is manufactured according to the standards of GB 1038, ISO 2556, ISO15105-1 and ASTM D1434. It can be operated full automatically with the support of its powerful operating software. In order to help the users better understanding and operating this instrument, this text is attempt to provide the detailed procedures for film permeability testing of VAC-V1.

### 1 Test preparation

Test preparation is of great significance for VAC-V1 testing, which includes test gas preparation, vacuum pump connection, specimen sampling and operating software parameter setting.

#### 1.1 Test gas

Prepare one bottle of 99.9% purity test gas and one relief valve that matches the gas source. VAC-V1 has no special choice for test gas, if the test gas is nontoxic and non-corrosive. For permeability testing of special gas, the lab should be furnished with ventilating system.

#### 1.2 Vacuum pump

Vacuum connection, which will directly influence the vacuuming operation of lower and upper chambers, must be performed according to specifications provided by Labthink. To ensure the normal proceeding of testing, using it for other purpose when vacuum pump is not in use is not permitted. (For detailed requirements please refer to the instruction book)

#### 1.3 Prepares and clamp specimen

Normally, specimen preparing and clamping can be divide into the following six steps: 1 sampling with specimen cutter 2rotate handwheel to lift the upper testing chamber 3apply vacuum grease on specified area of lower testing chamber4put filter paper in the central hole of lower chamber5place the specimen 6Rotate the handwheel to ensure the lower and upper chambers joint each other closely.

VAC-V1 has a series of subassemblies to facilitate the above procedures: specimen cutter, ester spread ring and localizer loop.

##### 1.3.1 Specimen cutter

Operators can make specimen of 97 mm easily by specimen cutter. Moreover, with the specimen cutter, surface

state of specimen is maintained effectively without being influence by sampling operation.

### 1.3.2 Ester spread ring

The applying of vacuum grease on non-transmission area of lower testing chamber before placing specimen forms a vital part of specimen attachment. Vacuum grease can effectively prevent specimen edge leaking and can level lower testing chamber during the specimen attachment.

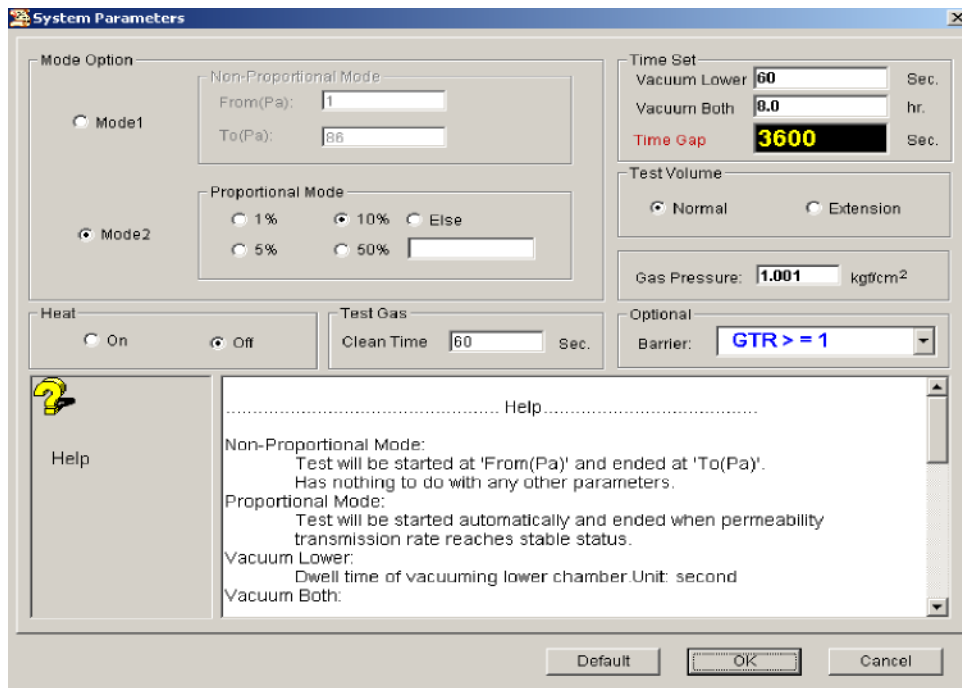
This procedure must be carefully operated because vacuum grease being applied in gas transmission area, which is difficult to remove, will contaminate the testing area and influence testing results. Users can use the ester spread ring as assistant tool to apply vacuum grease uniformly in specified area. The vacuum grease being choose should be of good quality. Otherwise, the specimen surface may be impaired by minute grain contained in poor quality vacuum grease.

It is true that only using ester spread ring to prevent edge leaking is not enough. To achieve a better sealing effect, two edge O rings are used in VAC-V1 to facilitate specimen sealing.

### 1.3.3 localizer loop

After completing vacuum grease applying, set fitter paper in the central counterbored hole of lower chamber. Keep its edge from vacuum grease. Then use localizer loop to put the specimen in the center of lower testing chamber.

### 1.4 Parameter setting



Operators can set all the parameters in system parameter setting interface (See fig. 1) of VAC-V1 operating software.

VAC-V1 has provided two testing modes: Non-proportional mode and proportional mode. Users can choose their mode in the mode interface. Normally, proportion mode can meet the requirements except when the specimen is of very

good permeability. In terms of testing, there is no essential difference between proportional mode and Non-proportional mode; the only difference is that the choosing of appropriate mode can improve working efficiency.

Outgassing time setting includes the setting of lower chamber as well as the setting of lower and upper chambers. The outgassing period of lower chamber is not a vital parameter but it cannot be zero. Maintaining the system default setting of 60 seconds is recommended unless there is special requirement. Outgassing time of lower and upper chambers is a key parameter that can influence the test results. Please refer to the recommended values by Labthink for parameter setting.

## 2 Testing

Testing operation is very simple and intelligent. By clicking 'test' icon in the main interface of operating software, the testing will automatically proceed without any manual operation. It has realized 24-hour all-whether working. Through the operating software, users can also see the testing data such as pressure-time curve, humidity-time curve, temperature-time curve and real time data.

## 3 Data processing

When the test finished, gas transmission rate (GTR), diffusion coefficient, solubility coefficient and permeability coefficient will be directly presented (under proportional mode). In addition, VAC-V1 has a series of powerful data processing functions including classified data saving (software prompting after testing), testing report printing, manual data processing (manual calculating test result), data fitting and data mirror and resume. Among that, the data-fitting function is very useful. Those who are interested can refer to the article [Method to Gain Film Permeability under Special Temperature - Permeability Parameter Fitting](#), which was updated on January the tenth, 2005 in Labthink Lab forum.

**Note: Unfinished matters should refer to the instruction book of VAC-V1 Auto Gas Permeability Tester.**