

PHIUS HRV/ERV Certification Program

Version 0.8

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PHIUS *project* certification

With regard to PHIUS *project* certification, clause 4 of the current protocol is modified:

For units without **PHIUS**, HVI, AHRI or PHI certification, use the status quo – “manufacturer’s stated for efficiency (which is typically ASE), less 12 percentage points”.

PHIUS *product* certification [this program]

1. Overview

Though other third-party ratings for heat-recovery and energy-recovery ventilators are serviceable or adaptable for passive building energy modeling, each has some drawbacks. For modeling passive building projects, it is desirable that the thermal efficiency and the electrical efficiency are considered separately rather than combined. Also, the latent recovery efficiency of some ERVs may be quite different under cooling conditions than under heating conditions. Administratively, this program follows selected/applicable protocol of Energy Star Version 2.0 (Canada) requirements, and HVI 920, including verification and challenge, but with a revenue-dependent frequency so as to reduce the costs for lower-volume manufacturers.

Test, calculation, and reporting protocol follows CAN/CSA C439-09 with the following overrides:

- Test at One additional flow rate is required [as in AHRI 1060 – 100% and 75% of rated.]
- Heating mode test conditions are adjusted from 32 F / 75% RH to 35 F / 82% RH, to align with AHRI 1060 and U.S. Code of Federal Regulations for heat pump testing.
- Additional temperature conditions are required for vapor-compression-cycle units.
- An Adjusted sensible recovery efficiency and Adjusted total heat recovery efficiency are to be calculated and reported.
- Latent recovery is to be reported separately for the cooling mode test.
- Miscellaneous adjustments aligning with Energy Star Canada and HVI 920.

2. General provisions

2.1 Test labs

Must be independent 3rd party laboratory that is accredited by an accreditation body that is a signatory, in good standing, to a mutual recognition arrangement of a laboratory accreditation cooperation (i.e. ILAC, APLAC, etc.) that verifies, by evaluation and peer assessment, that its signatory Manufacturers are in full compliance with ISO/IEC 17011 and that their accredited laboratories comply with ISO/IEC 17025 or CAN-P-4E. Laboratories must be specifically qualified to carry out tests to determine whether H/ERVs meet key product criteria as outlined

in this document. A laboratory's Scope of Accreditation must reflect its specific competence to carry out the applicable test procedures referenced in CSA C439.

2.2 Certification of base-derived or similar products

PHIUS will not certify product based on the ratings of another product unless the differences between the two products are limited to those that do not adversely affect product performance. Examples of acceptable differences include but are not limited to color, finish, and nameplate.

2.3 Membership requirements

PHIUS does **not** require that a party seeking product certification be a member of PHAUS or the PHIUS Industry Advisory Council. Product verification and challenge testing only requires that the product has been certified by the organization.

2.4 Business practices

Manufacturers are required to inform PHIUS in a timely way of changes which may affect its ability to conform to the certification requirements. Examples of changes include, but are not limited to, the following:

1. The legal, commercial, organizational status or ownership;
2. Organization and management (e.g., key managerial, decision-making or technical staff);
3. Modifications to the product or the production method;
4. Contact address and production sites (components manufacturing as well as final assembly sites);
5. Major changes to the quality management system.

If a manufacturer misrepresents a product's certified ratings in its literature or abuses PHIUS Certification through its marketing or sales collateral, website or promotions, PHIUS can require the manufacturer to cease distribution of such literature and information, and/or require the manufacturer to correct such misrepresentation.

3. Mandatory Requirements for Certification

The product must be tested for performance and the results reported as described in Section 5 below.

3.1 Reserved for future commissionability requirements.

3.2 Warranty

Manufacturer shall provide a minimum one-year warranty.

3.3 Inclusion of Installation Instructions

Picture diagram-type installation instructions shall be included with each certified H/ERV. The instructions shall indicate the following:

How to properly seal the openings to the exterior of the thermal envelope of the building with caulk or other similar material to inhibit air leakage.

Recommended ductwork installation including type, impact of elbows, terminations, sealants, and lengths that will minimize static pressure losses and promote adequate airflow.

Proper installation of vibration deadening materials such as short pieces of flexible duct.

Proper installation of thermal insulation and connecting ducts to minimize heat loss and gain.

3.4 Consumer Information

For units with *maximum rated air flow of 500 cfm or less*, Manufacturers must include the following information on the product or in product literature, and on the Manufacturer's Web site:

"To ensure quiet operation of HRV/ERVs, each product should be installed using sound attenuation techniques appropriate for the installation."

"The way that your Heat/Energy-recovery ventilator is installed may make a significant difference to the electrical energy that you will use. To minimize the electricity use of the Heat/Energy-recovery ventilator, a stand-alone fully ducted installation is recommended. If you choose a simplified installation that operates your furnace airhandler for room-to-room ventilation, an electrically efficient furnace that has an electronically commutated (EC) variable speed blower motor will minimize your electrical energy consumption and operating cost."

"Installation of a user-accessible control with your product will improve comfort and may significantly reduce the product's energy use."

Every PHIUS-Certified product shall have a production date code. The date code is usually the same one as safety listing organizations already require on every product. PHIUS shall verify compliance with this provision and remind and/or enforce it at appropriate opportunities including verification and challenge. If there is a question of when a product was produced, such as in connection with a Verification or Challenge, the date code on the product shall be used to determine date of manufacture by PHIUS and by competitors. If the date code is in a cryptic style that would defeat the intent of this requirement, the translation of the code shall be provided to PHIUS for the product and period in question.

The following information shall be shown in a conspicuous place on the equipment:

- Name or trade name of manufacturer.
- Manufacturer's model number.
- Heat transfer fluid (where appropriate).

4. Recommendation criteria

Units that have been tested and meet the mandatory requirements are Certified, units that meet the conditions in Table 1 are also Recommended. The minimum COP requirement must be met under at least one of the required test conditions.

Table 1. Performance criteria for recommendation.

Zone	Very low temperature test required	Cooling mode test required	Minimum COP	Minimum Heating mode ASE [%]	Minimum cooling mode total recovery efficiency [%]
Subarctic	Yes	No	TBD	94	None
Very Cold	Yes	No	TBD	93	None
Cold	No	No	15	91	None
Mixed-Humid	No	Yes	15	89	None
Marine	No	No	15	85	None
Hot-Dry / Mixed-Dry	No	Yes	TBD	84	48
Hot-Humid	No	Yes	TBD	83	48

5. Certification test, calculation, and reporting

PHIUS Certification of HRVs and ERVs is based on testing both airflow and energy recovery performance generally in accordance with CAN/CSA C439-09, *Standard Laboratory Methods of Test for Rating the Performance of Heat/Energy-Recovery Ventilators*. This section describes exceptions to C439.

5.1 Air flow rates

Regarding Clause 10.3.2: Testing is required at one additional airflow rate: 75% of the maximum rated air flow.

5.2 Temperature conditions

Regarding Clause 10.4.5: Supply air (Station 1) for the heating mode test shall be at 35 F and 82 % relative humidity (33 F wet-bulb), instead of 32 F and 75 % RH.

See also section 5.5.

For vapor-compression-cycle units:

- Additional heating-mode tests are to be performed with the supply air at 17 F dry-bulb / 15 F wet-bulb, and 47 F dry-bulb / 43 F wet-bulb.
- An additional cooling-mode test is required at 95 F dry-bulb / 78 F wet-bulb.
- The compressor shall be operated either at its maximum speed / duty-cycle, or the speed / duty-cycle which causes t_5 to equal t_3 (apparent sensible effectiveness of 1), whichever is lower.

5.3 Adjusted sensible recovery efficiency and adjusted total recovery efficiency

Regarding clause 9.3.3.1 and equation 12: Calculate an adjusted SRE for winter performance by adding back the fan power to the SRE equation (add supply fan and compressor energy to the numerator, deduct exhaust fan energy from the denominator). Note that the supply air pre-heat portion of Q_{SH} , remains as a numerator deduction.

The sensible heat-recovery efficiency shall be calculated as follows:

$$E_{SHR} = \frac{\left(\sum_{i=1}^n M_{s,i} \times C_p \times (t_{s,i} - t_{1,i}) \times \Delta\theta \right) - Q_{SH} - Q_C - Q_D - Q_L}{\left(\sum_{i=1}^n M_{max,i} \times C_p \times (t_{3,i} - t_{1,i}) \times \Delta\theta \right) + Q_{EH}}$$

Regarding clause 9.3.3.2 and equation 13: make a similar adjustment as for equation 12, i.e., do not subtract supply fan and compressor power from the numerator nor add exhaust fan power to the denominator.

5.3.1 Coefficient of Performance

The COP is calculated as the adjusted numerator of the ESHR formula [Btu/h] divided by: the electrical power [Watts] consumed (at the given test condition) multiplied by 3.412 to convert Watts to Btu/h.

5.4 Reporting

Regarding Clause 11 and Figure 8: Report the net moisture transfer for the cooling-mode test as well as the heating-mode test. Report the sensible recovery efficiency, adjusted sensible recovery efficiency, apparent sensible effectiveness, net moisture transfer, and other data per C439 on a form similar to that shown in Figure 1.

5.5 Very Low temperature test

The very low temperature test shall be performed with a supply air temperature of -25 C / -13 F. Regarding Clause 10.6, 10.7, 11(b): The SRE and net ventilation rate for the very low temperature test shall be determined from measurements taken during the final 60 hours of the 72-hour nominal test period. The 60h period shall be extended as necessary to allow for analysis of an integral number of complete operating/defrost cycles, e.g., if the HRV/ERV is in a defrost at the end of the 72h test.

5.6 Non-ducted devices

Regarding clause 8.1.1: Ceiling/wall insert HRV and ERV products are tested for energy using pickup boxes on the grille openings. [as in HVI 920.]

5.7 Minimum thermal performance

Clause 12 is not applicable (no minimum performance by SRE.)

HRV/ERV SPECIFICATION SHEET									
Testing agency: _____					Model: _____				
Date tested: _____					Serial number: _____				
Manufacturer: _____					Options installed: _____				
Address: _____					_____				
Telephone: _____					Electrical requirements: _____ Volts _____ Amps				
VENTILATION PERFORMANCE									
Maximum continuous rated airflows: _____ L/s @ _____ °C					Maximum continuous rated airflows: _____ °C				
_____ L/s @ -25 °C					Low-temperature ventilation reduction during test at -25 °C: _____ %				
Airflow range for multispeed units:					Maximum unbalanced airflow during test at -25 °C: _____ L/s				
High speed _____ L/s Low speed _____ L/s					Exhaust air transfer ratio: _____				
External static pressure		Net supply airflow		Gross airflow				Power	
Pa	in. WC	L/s	cfm	Supply		Exhaust		W	
25	0.1								
50	0.2								
75	0.3								
100	0.4								
125	0.5								
150	0.6								
175	0.7								
200	0.8								
225	0.9								
NOTE: FAN CURVE PERFORMED ON HIGH SPEED									
ENERGY PERFORMANCE									
	Supply temperature		Net airflow		Supply/exhaust flow ratio	Average power, W	Sensible recovery efficiency	Apparent sensible effectiveness	Net moisture transfer
	°C	°F	L/s	cfm					
Heating	I	0	32						
	II	0	32						
	III	0	32						
	IV								
	V	-25	-13						
Cooling	VI	35	95				*		
	VII								
<div style="border: 1px solid black; width: 100%; height: 100%; margin-top: 10px;"></div>									Reference report: Sample no:
*Indicates the Supply/Exhaust Flow Ratio at 22°C prior to the start of the 72 Hour Cold Weather Test ** Indicates Total Recovery Efficiency, not Sensible Recovery Efficiency Δ Indicates that the calculation is based on last 60 hours of the 72 hour Cold Weather Test 250 Pascals = 1" of Water : 0.472 L/s = 1 cfm									

Figure 1. HRV/ERV specification sheet.

6. Verification Requirements and Procedures [like HVI]

When a Certified product is selected for verification, all certified ratings shall be verified.

Approximately fifty percent of high-volume HRV/ERV manufacturers will be subject to product verification for HRVs and ERVs each year; as a general rule, each high-volume manufacturer will be selected for HRV/ERV verification once in a two-year period.

A manufacturer with annual unit sales volume of 7500 or more, averaged over the last three years, is considered “high-volume”. Lower-volume manufacturers are subject to verification less often, see section 6.1.

PHIUS shall conduct at least one verification cycle each year.

In addition to annual verification, PHIUS shall conduct special verification when PHIUS deems it necessary to demonstrate the continuing validity of Certification, or to uphold or enforce the Certification programs. Such verification requires the approval of the PHIUS Technical Committee.

Verification testing is conducted according to the most current version of this program document in effect at the time each testing cycle is begun.

Procedure and schedule for normal PHIUS verification. The following procedure is to be followed annually.

The PHIUS-designated laboratory tests all units submitted, completing a test report for each one. Test procedures are the same as for initial certification (including accessories, test points, and set-up) except as follows: A sufficient number of photographs shall be taken to demonstrate test set-ups, product packaging, labeling, installation manuals, product specifications, and condition of the unit(s) tested.

6.1 Selection of HRV and ERV Products for Verification

PHIUS shall maintain a list of all base models that are certified as of January 1 of each year.

Any model on the list with a test report on file at PHIUS that is less than one year old shall be removed from the list.

Any model that has a passed verification test on file that is less than five years old shall be removed from the list.

Any model with a test report on file that is older than five years shall have a duplicate line entered in the list, doubling the probability that it will be selected for verification.

Each model on the list from a manufacturer who has had a failure of either verification or challenge test shall have a duplicate entry made on the list for the following two calendar years, doubling the probability that a model from that manufacturer will be selected for verification testing.

A random selection process will be used for selecting the first and each subsequent model selected for verification.

Unless a special testing frequency is approved by PHIUS, a high-volume manufacturer is normally subject to a verification test once every two years. The effect of the preceding requirements is that if a Manufacturer has a certification report less than one year old, or a passed verification test less than five years old, for every certified model, that Manufacturer will not be subject to a verification test in that round.

Lower-volume manufacturers face a lower probability of selection for verification, proportional to unit sales volume V_{su} , averaged over the last three years. This is implemented by duplicating the above described list 100 times and reducing the number of entries based on the manufacturer's overall sales volume, prior to the random selection. That is, the number of duplicate entries is 100 for manufacturers with $V_{su} \geq 7500$, and $100 * V_{su}/7500$ for manufacturers with $V_{su} < 7500$.

6.2 Shipment of Test Unit

When ordering, PHIUS shall instruct the source to ship the selected unit either on skids or properly crated to the PHIUS-designated verification test laboratory.

6.3 Schedule

The PHIUS-designated verification test laboratory shall inform manufacturers of the verification test schedules. Manufacturers must inform the laboratory and PHIUS if they wish to be present to witness the verification testing. The PHIUS-designated test laboratory shall make every attempt to schedule tests for the convenience of manufacturers who ask to witness the testing. The PHIUS-designated testing laboratory shall notify the manufacturer a minimum of seven calendar days before commencement of any test.

6.4 Receiving Inspection

When each verification test unit arrives at the PHIUS-designated testing laboratory, the laboratory shall inspect the unit for damage, missing components and manufacturing defects. The PHIUS-designated testing laboratory shall notify PHIUS if any of those problems are detected. Except in the case of obvious shipping damage, HRVs and ERVs are to be tested in the condition in which they arrive at the lab. If the unit is not capable of being tested, PHIUS shall decide to either re-sample the unit or, if possible, permit the manufacturer to repair the unit at the testing laboratory. If PHIUS authorizes the manufacturer to repair the unit, missing or damaged components shall be replaced out of the manufacturer's stock inventory. The manufacturer shall furnish documentation to PHIUS and the laboratory that any replacement

components are correct standard production parts for the test unit. No adjustments to the timing sequence on the defrost cycles are permitted by the manufacturers unless the adjustments are part of the start-up procedure as specified in the product's installation/operating manual.

6.5 Inspection of Test Setups

The PHIUS-designated testing laboratory shall perform all test setups. The manufacturer shall be allowed to inspect the test unit and setup for each test, including airflow, cross leakage, and energy performance, both low temperature and air conditioning. The manufacturer shall be permitted to ensure that the test unit is properly set up, including the proper setting of the unit's controls and that the test installation is in accordance with the manufacturer's instructions. PHIUS shall be the final authority in the event of differences of opinion between the manufacturer and the laboratory.

6.6 Testing

Verification testing will be conducted in accordance with the testing procedures described in the most current version of this program document in effect at the time each testing cycle is begun.

6.7 Test Witnessing

The manufacturer shall be permitted to witness each test including the test data.

PHIUS will analyze the test reports for pass/fail, in accordance with tolerances listed in the Appendices. The basis for analysis is the certified rating, not the initial test report. PHIUS will notify the Manufacturer, enclosing a copy of the test report.

If the product passes, no further action is required.

If the product fails, all of its ratings are classed "probationary" and they must be resolved. If the failed model number is part of a product family, all models in the family are probationary. Even though probationary, for 90 days PHIUS shall answer inquiries with the regular ratings and not publicly reveal their probationary status, nor change the PHIUS-Certified Products Directory. The period of time is consistent with the 90 days the Manufacturer is given to describe corrective action (below).

6.8 Verification Test Failures

If a unit under test experiences a failure within the verification sequence, the PHIUS-designated testing laboratory shall notify PHIUS before proceeding with the next test in the sequence. PHIUS shall instruct the laboratory to terminate testing if it is obvious that remaining tests will fail, but will normally instruct the laboratory to continue the test sequence. PHIUS will notify the manufacturer of the foregoing.

Resolving failures in normal verification. Within 30 days of receiving notice of a test failure, the Manufacturer shall respond describing to PHIUS the corrective action selected. Options available to the Manufacturer include the following:

Option 1: If the unit failed due to a component failure, PHIUS will give the manufacturer the option of furnishing a replacement component for the laboratory to install (or for the manufacturer to install under lab oversight) and then ordering the unit re-tested at the manufacturer's expense. The manufacturer shall furnish verification to PHIUS that the replaced component is the correct stock replacement for the failed component. All verification test protocol applies to the re-test. The heat/energy recovery module and the blower/fan module do not constitute replaceable components and a failure of either of these modules requires acquiring a new complete unit from the marketplace for re-testing as applicable.

If a model fails verification, and the Manufacturer decides to re-test for re-certification, the Manufacturer shall provide a new unit directly to the testing lab within 30 days of receiving notice of the failure. The normal certification procedure is followed, and the model must ultimately be re-certified or withdrawn.

Option 2: The Manufacturer may submit a new Request for PHIUS Certification of a Product, with a new test report and all other attachments, requesting a new certification for the probationary model. PHIUS may decide to conduct immediately a special verification of the newly re-certified model.

Option 3: The Manufacturer may immediately accept the verification test data and request the product be certified at those ratings (appropriately rounded and presented).

Option 4: The Manufacturer may immediately withdraw the model from the market.

Option 5: The Manufacturer may submit to PHIUS a "plan of action" for correcting the model. The Plan shall describe the actions the Manufacturer will take to get the product into compliance within no more than 60 days. The plan of action shall be reviewed by PHIUS to determine that it can be reasonably expected to correct the problem. If so, PHIUS shall notify the Manufacturer that the plan is acceptable. A notice of completion shall be provided to PHIUS. Along with the notice of completion, the Manufacturer shall inform PHIUS how to tell the difference between old and new products on the outside of the carton so they may be procured. PHIUS will normally procure and test a unit after receiving the notice of completion, following procedures similar to the Verification procedures described above, and using Manufacturer information to be sure revised product is being tested.

Whenever a manufacturer fails to meet the deadline for verification resolution, the failed model(s) within a product family will be automatically delisted from the PHIUS-Certified Products Directory.

PHIUS-Certified Products Directory. PHIUS will publish appropriate changes to certified ratings at its next issuance.

6.9 Costs of Verification

PHIUS will bill each Manufacturer, in advance and/or afterward, for all verification costs, including purchase, shipping and testing. PHIUS will add a standard fee for its administrative costs associated with verification.

6.10 Repeated verification tests

The preceding describes situations that indicate a need to procure a new unit and repeat a verification test. Among those reasons are: unit damaged in transit, unit is defective or has incorrect part(s), and/or the Manufacturer disagrees with the procedure. The need for repeated testing may be determined by PHIUS and/or the Manufacturer. In either case, the Manufacturer shall be responsible for associated costs.

6.11 Tolerances for Verification and Challenge

Maximum Net Supply Air Flow: 85% minimum
Maximum Net Exhaust Air Flow: 85% minimum
Rated Air Flow: Not to be verified or challenged
Energy recovery parameters: 90% minimum
Energy (electricity) to run fans: 115% maximum

7. Challenge – Requirements and Procedures

The purpose of the Challenge is to strengthen the PHIUS-Certified ratings program and to provide for resolving a documented dispute between Manufacturers regarding PHIUS-Certified Ratings. The dispute may involve certified ratings and/or performance, or the presentation of ratings to the marketplace.

The procedure for Challenge contains several deadlines. If a challenged Manufacturer misses those deadlines or chooses to ignore the challenge process, PHIUS may summarily withdraw the PHIUS Certification of a model number, notifying both challenger and challenged Manufacturer. In such cases, the model number shall be removed from the PHIUS-Certified Products Directory and PHIUS shall answer inquiries by stating that the model is not PHIUS-Certified.

The challenge process is carried out confidentially unless a model number fails a challenge, in which case results may become known as described below.

During the normal course of a challenge, neither the challenger nor the challengee shall disseminate publicly nor within its distribution chain information about it or about its existence.

In the event a product fails a challenge, that fact may be disseminated upon receipt of the report.

Where this section requires that a Manufacturer's literature (catalog) be changed, the Manufacturer's website shall also be changed. The time allotted for changing the website shall be not more than 15 days.

In Procedure for PHIUS Challenge, below, there are points where PHIUS may determine it is necessary to conduct a verification test in order to enforce and/or uphold the PHIUS Certification process. PHIUS shall identify such points and conduct verification whenever PHIUS considers it appropriate.

The cost of a challenge shall include the procurement costs, transportation costs, laboratory testing fees and PHIUS administration costs. All of PHIUS' costs associated with a challenge must be covered.

Informal challenges shall be received by PHIUS, especially with respect to possible misrepresentation of a certified product's performance in literature and/or website. PHIUS may receive such a challenge in the form of a formal letter from any source. PHIUS shall investigate and take action to protect its certification program. Depending on the scope of the allegations, informal challenges may not be required to follow steps of the challenge procedure described in this section.

Challenge testing is conducted according to the most current version of this program document in effect at the time each challenge is initiated.

7.1 Procedure for Challenge

When an PHIUS Manufacturer has reason to believe another Manufacturer's model number is not meeting its PHIUS-Certified ratings, or the ratings are being misrepresented, the first Manufacturer may initiate an PHIUS challenge.

The Representative of the Manufacturer company considering a challenge shall contact PHIUS to verify the certified rating(s) of the model number in question and to get an estimate of the cost of the challenge.

At the time of the pre-challenge inquiry the inquiring Manufacturer should ask PHIUS whether the model number is part of a family of models, and if so, request that PHIUS provide full base and derived information.

If the model number that is the subject of the inquiry is already being challenged by another Manufacturer, PHIUS shall explain the challenge in detail to the inquiring Manufacturer's representative, who will be guided by the information, but will not publicize it.

After verifying ratings, the representative of the inquiring Manufacturer may initiate the challenge by writing a letter to PHIUS. A challenge is considered to be initiated only when all of the following items are received by PHIUS:

Identification of the challenged model number.

Identification of the challenged parameter(s) and the basis for challenging them.

Payment deposited with PHIUS for the estimated cost of the challenge.

Within one week after receiving a challenge letter, PHIUS shall notify the challenged Manufacturer (challengee) and provide them a copy of the challenger's correspondence.

Within three weeks after PHIUS notification of the challenge, the challengee shall respond to PHIUS in writing, providing the names of at least six outlets where the product may be procured, and choosing one of the following alternatives. (This is the first decision the challengee is required to make.)

Accept the challenge. PHIUS will proceed with Challenge Testing, described below.

Apply for a rating that is sufficiently adjusted to satisfy the challenger. PHIUS shall act as mediator to arrive at a mutually acceptable rating. If not successful in one week, PHIUS will proceed with Challenge Testing as described below.

Withdraw the model number. If the challengee chooses to withdraw the model number, the Manufacturer must immediately cease producing that model and change all literature at the next printing. The model number will be removed from the PHIUS-Certified Home Products Directory and inquiries will be answered that the model number is not PHIUS-Certified.

Submit a "plan of corrective action" that recognizes the deficiency and corrects the model number's performance so it meets requirements as soon as possible, but in no more than 60 days. The challengee shall immediately cease producing the model number and inform PHIUS of the schedule and of how to differentiate between old and new product on the outside of the carton. Within one week, PHIUS will forward a copy of the challengee's plan of corrective action to the challenger. Within one week, the challenger will notify PHIUS whether or not the response from the challengee is acceptable. If the challenger is satisfied with the corrected rating or the plan of action, and if both the challengee and PHIUS agree, the challenge may be dropped and the unused portion of the challenger's deposit will be returned. If not, the challenge proceeds.

7.1.1 Challenge Testing

Within three weeks, PHIUS shall procure the product, and have it tested at the PHIUS-designated laboratory in accordance with PHIUS Verification Test procedures. PHIUS shall notify both parties of results within two days of the test. PHIUS shall retain a copy of the test report in the product's file and send a copy of the test report and a pass/fail notice to both the challenger and challengee. The test report is confidential and shall not be disseminated by the

challenger in any way. (The pass/fail analysis shall be based on the certified rating, not the initial test report.)

Pass. If the product is determined to have passed the challenge test, the ratings have been confirmed and are in good standing.

Fail. If the challenged product has failed, the model number's ratings, and all products in the family are classed "probationary" and they must be resolved. See: Resolution of Challenge Test Failure, described below.

Even though probationary, for 90 days PHIUS shall answer inquiries with the regular ratings and not publicly reveal their probationary status, nor change the PHIUS-Certified Home Products Directory. The period of time is consistent with the 90 days the Manufacturer is given to describe corrective action (below).

In the event the challenged Manufacturer disputes a test failure based on a laboratory set-up or process, they may ask PHIUS to order a re-test at that Manufacturer's expense. The challenged Manufacturer may request permission to witness the re-test. PHIUS shall permit such witnessing, coordinate the test timing with the laboratory, and present the challenger the opportunity to witness the re- test with the challengee.

7.1.2 Resolution of Challenge Test Failure

Within one week, the challengee shall choose one of the following actions. (This is the second decision the challengee may be required to make.)

Immediately accept the ratings from the challenge test, mark the product with the new ratings, and change all literature at the next printing. The challenge test report then becomes the test report for the model number and its family of model numbers.

Immediately drop the product from the market and modify literature at the next printing.

Immediately obtain a new certification from PHIUS, satisfying all requirements, including a new test report and information on how to differentiate between old and new product on the outside of the carton. If this option is chosen, PHIUS shall promptly verify performance of the new product through marketplace pickup.

PHIUS shall immediately notify the challenger of the challengee's choice, including the means of differentiating between old and new product, if applicable.

7.1.3 Costs

If the product passes the challenge, an invoice of actual costs less initial deposit will be sent to the challenger. If the product fails the challenge test, and/or if repeated tests are considered

necessary, the challengee is responsible for costs. A final invoice of actual costs will be sent to the challengee and the challenger's initial deposit will be refunded.