Appendices: Assessment of One-way Valve Efficiency in the OptiChamber Diamond VHC During Exhalation

These appendices have been produced to provide further results from the Philips Respironics white paper: "Assessment of One-way Valve Efficiency in the OptiChamber Diamond VHC During Exhalation" by Eric Lieberman. The appendices show the remaining valve leakage results for the AeroChamber Plus Z-Stat, AeroChamber FLOWSIGnal and ACE VHCs, as well as the full set of results for the AeroChamber Plus Flow-Vu VHC. These appendices should be read in conjunction with the main report.

Appendix A

AeroChamber Plus Z-Stat VHC results with the other breathing patterns tested:

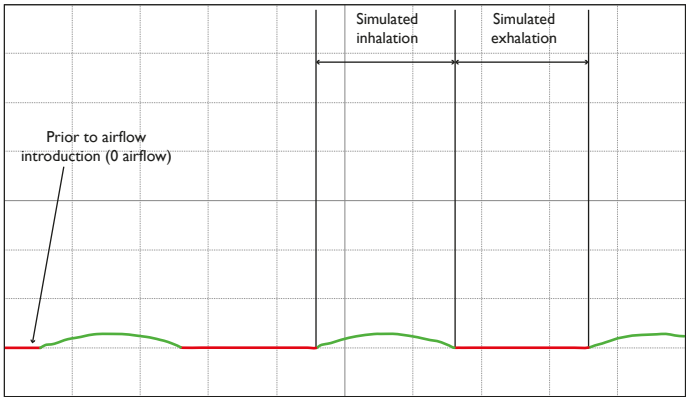

Figure A1. Flow rate through the AeroChamber Plus Z-Stat VHC, during inhalation ■ and exhalation ■, at a rate of 15 BPM and with a tidal volume of 0.1 L. The Y axis represents airflow and the X axis represents time.

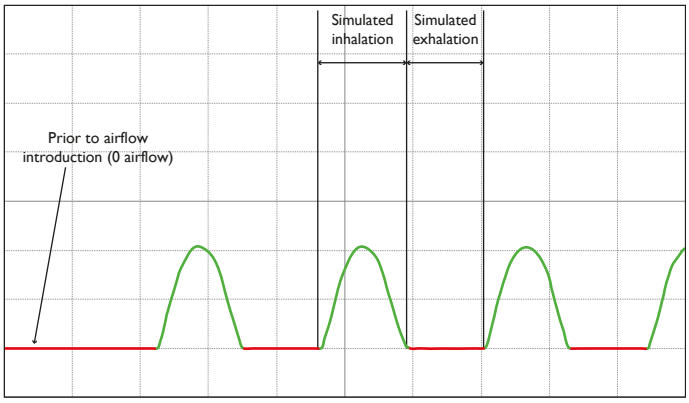

Figure A2. Flow rate through the AeroChamber Plus Z-Stat VHC, during inhalation ■ and exhalation ■, at a rate of 25 BPM and with a tidal volume of 0.5 L. The Y axis represents airflow and the X axis represents time.

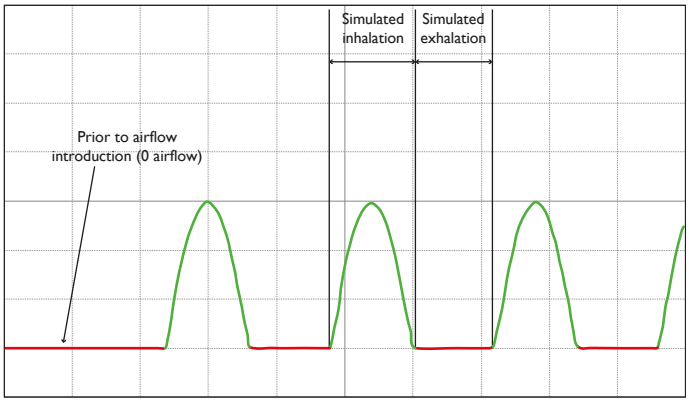

Figure A3. Flow rate through the AeroChamber Plus Z-Stat VHC, during inhalation and exhalation, at a rate of 25 BPM and with a tidal volume of 0.75 L. The Y axis represents airflow and the X axis represents time.

Appendix B

AeroChamber FLOWSIGnal VHC results with the other breathing patterns tested:

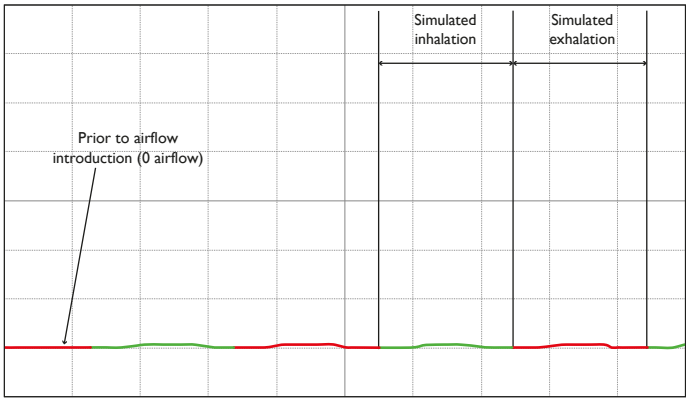

Figure B1. Flow rate through the AeroChamber with FLOWSIGnal VHC, during inhalation and exhalation, at a rate of 15 BPM and with a tidal volume of 0.1 L. The Y axis represents airflow and the X axis represents time.

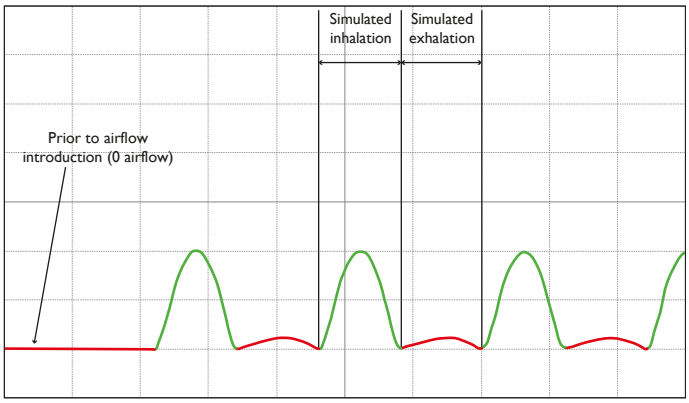

Figure B2. Flow rate through the AeroChamber with FLOWSIGnal VHC, during inhalation and exhalation, at a rate of 25 BPM and with a tidal volume of 0.5 L. The Y axis represents airflow and the X axis represents time.

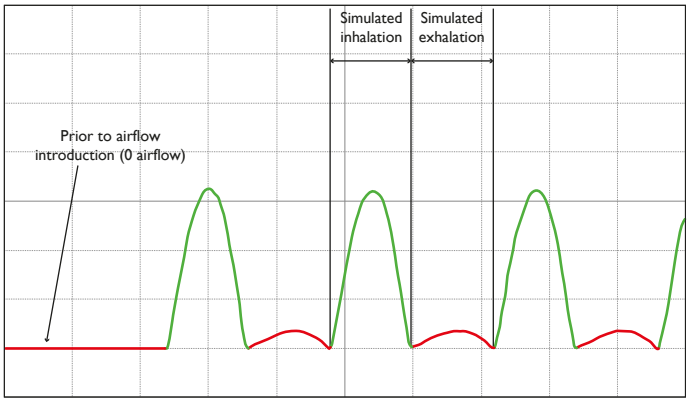

Figure B3. Flow rate through the AeroChamber with FLOWSIGnal VHC, during inhalation ■ and exhalation ■, at a rate of 25 BPM and with a tidal volume of 0.75 L. The Y axis represents airflow and the X axis represents time.

Appendix C

ACE VHC results with the other breathing patterns tested:

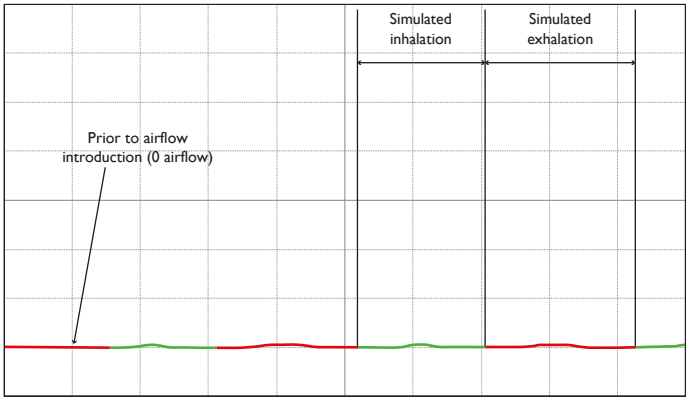

Figure C1. Flow rate through the ACE VHC, during inhalation ■ and exhalation ■, at a rate of 15 BPM and with a tidal volume of 0.1 L. The Y axis represents airflow and the X axis represents time.

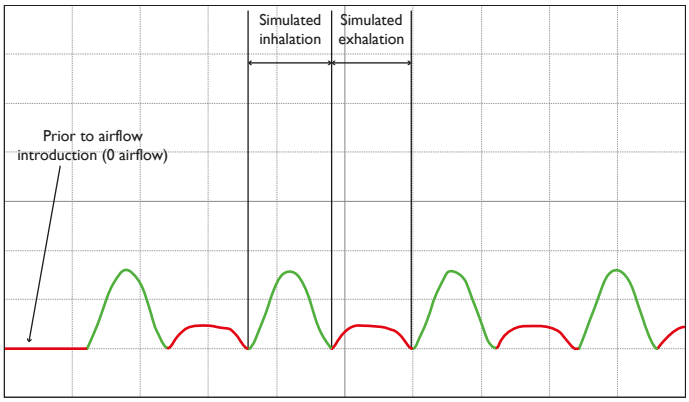

Figure C2. Flow rate through the ACE VHC, during inhalation ■ and exhalation ■, at a rate of 25 BPM and with a tidal volume of 0.5 L. The Y axis represents airflow and the X axis represents time.

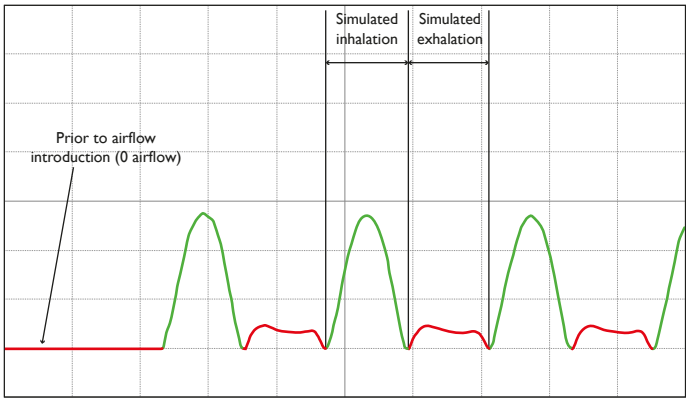

Figure C3. Flow rate through the ACE VHC, during inhalation ■ and exhalation ■, at a rate of 25 BPM and with a tidal volume of 0.75 L. The Y axis represents airflow and the X axis represents time.

Appendix D

AeroChamber Plus Flow-Vu VHC results with all the breathing patterns tested:

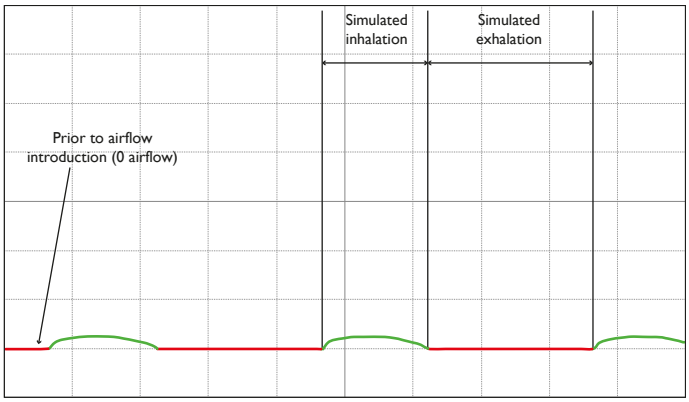

Figure D1. Flow rate through the AeroChamber Plus Flow-Vu VHC, during inhalation ■ and exhalation ■, at a rate of 15 BPM and with a tidal volume of 0.1 L. The Y axis represents airflow and the X axis represents time.

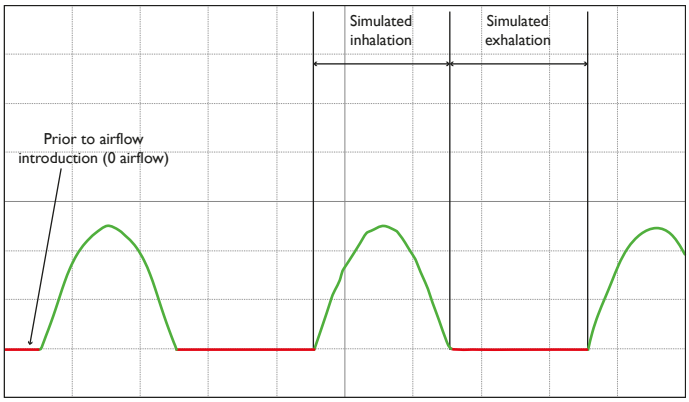

Figure D2. Flow rate through the AeroChamber Plus Flow-Vu VHC, during inhalation ■ and exhalation ■, at a rate of 15 BPM and with a tidal volume of 1.0 L. The Y axis represents airflow and the X axis represents time.

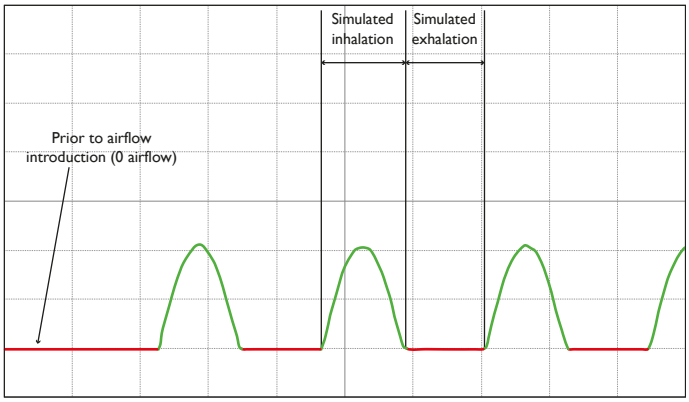

Figure D3. Flow rate through the AeroChamber Plus Flow-Vu VHC, during inhalation ■ and exhalation ■, at a rate of 25 BPM and with a tidal volume of 0.5 L. The Y axis represents airflow and the X axis represents time.

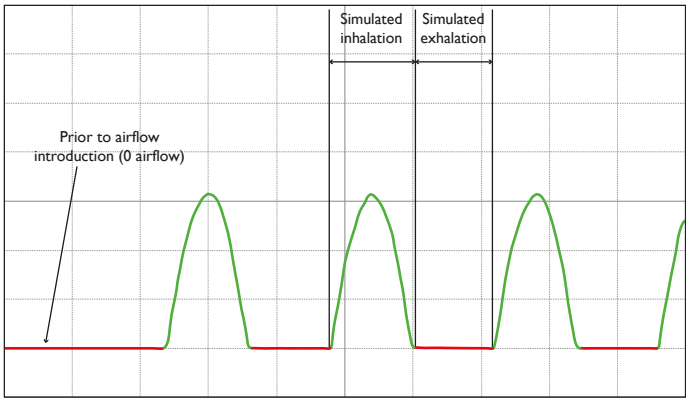

Figure D4. Flow rate through the AeroChamber Plus Flow-Vu VHC, during inhalation ■ and exhalation ■, at a rate of 25 BPM and with a tidal volume of 0.75 L. The Y axis represents airflow and the X axis represents time.

Appendix E

Equipment specifications for all VHCs tested:

OptiChamber Diamond
- *Manufacturer*: Respironics Respiratory Drug Delivery (UK) Ltd, a business of Philips Electronics UK Limited, Chichester, UK
- *Lot #*: 11011011
- *Valve Type*: Duckbill

AeroChamber Z-Stat
- *Manufacturer*: Monaghan Medical Corp, Plattsburgh, NY, USA
- *Lot #*: 4964-02
- *Valve Type*: Doughnut-shaped

AeroChamber Plus Flow-Vu
- *Manufacturer*: Monaghan Medical Corp, Plattsburgh, NY, USA
- *Lot #*: 203021
- *Valve Type*: Doughnut-shaped

AeroChamber with FLOWSIGnal
- *Manufacturer*: Monaghan Medical Corp, Plattsburgh, NY, USA
- *Lot #*: 2320-01
- *Valve Type*: Flap

ACE
- *Manufacturer*: Smiths Medical International Limited, Hythe, Kent, UK
- *Lot #*: 2422728
- *Valve Type*: Duckbill

Appendix F

Equipment specifications for the laboratory equipment used:

TSI Flow Meter
- *Manufacturer*: TSI Inc., Shoreview, MN, USA
- *Tool Calibration #*: TCN-0228
- *Calibration Due Date*: November 30, 2013
- *Serial #*: 40430749005
- *Model*: 4043 E

Pneumotach
- *Manufacturer*: Hans Rudolph Inc., Kansas City, MO, USA
- *Tool Calibration #*: TCN-0196
- *Calibration Due Date*: October 1, 2013
- *Serial #*: 381-9990
- *Model*: 4813

Flow/Volume Simulator
- *Manufacturer*: Hans Rudolph Inc., Kansas City, MO, USA
- *Serial #*: 112-024
- *Series*: 1120
- *Reference*: 113266
- *Software Version*: 4.9.4

Oscilloscope
- *Manufacturer*: Teledyne Lecroy, NY, USA
- *Tool Calibration #*: TCN-0152
- *Calibration Due Date*: October 27, 2013
- *Serial #*: LCRY0607M12644
- *Model*: WR44XI

Online interactive page can be accessed via this [OptiChamber Diamond Valve link], or by scanning the QR code below.

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