

Patient Exhalation Simulator PES

For the evaluation of inhaler misuse conditions and device robustness

Exhalation into the mouthpiece of an inhaler prior to the inhalation step is a commonly reported error in patient technique, particularly for dry powder inhaler (DPIs). The consequence of this poor technique may be insufficient drug delivery for effective administration and ultimately, inadequately controlled respiratory disease and/or an over-reliance on emergency medication.

The **Patient Exhalation Simulator (PES)** accurately replicates the effects of a patient exhaling into the device mouthpiece prior to the inhalation step. The warm, humid air generated by the PES can be set at flow rates representative of different human exhalation profiles.

The PES enables developers to assess how device misuse impacts the critical quality attributes of the inhaler, empowering device design optimisation to ensure robust drug delivery. Investigating the impact of exhalation through a device complements current EMA/ISO guidance on understanding device robustness and evaluating performance under conditions simulating patient use.



Simple to set-up and easy-to-use



Adjustable air flow temperature and flow rate



Ideal for assessing a range of patient profiles



Low maintenance



Works with existing Copley mouthpiece adapters



Qualification tools are available



Key Features: Patient Exhalation Simulator PES

Timed exhalations can be performed by directing the air flow to 'Waste' at the start and end of an exhalation simulation



Waste exhaust

Air flow direction

Qualification tools are available for air flow temperature and relative humidity verification

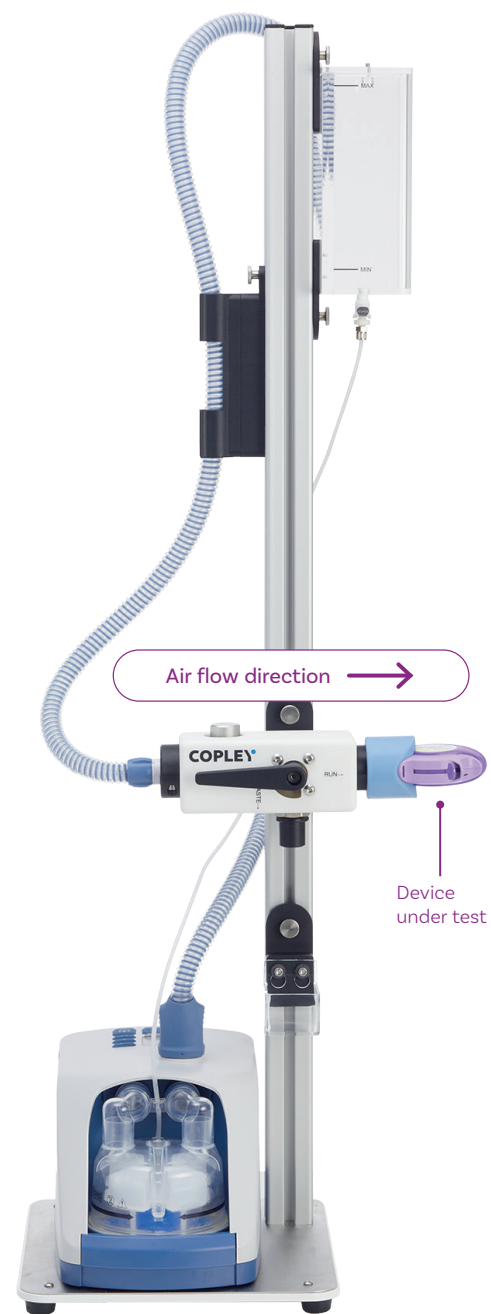


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Air flow **temperature** and **flow rate** are adjustable via a digital display



37 °C 30 L/min



PES Technical Specifications	
Temperature set-points	31°C, 34°C, 37°C
Relative humidity	Always saturated
Flow rate range	10 – 60 L/min
Water reservoir capacity	850 mL
PES Performance	
Tested at set-points:	Temperature: 37°C ± 1.5°C
• 34°C, 60 L/min	
Under ambient conditions:	Relative humidity: 85% RH ± 5% RH
• 22°C, 45% RH	
Dimension (w x d x h)	225 x 300 x 1030 mm

Qualification & Maintenance	
• Comprehensive IQ/OQ documentation package available	
• Extended warranty available	

Patient Exhalation Simulator PES	
Cat. No.	Description
9120	Patient Exhalation Simulator - Model PES
9126	Qualification Tools for Patient Exhalation Simulator
9130	IQ/OQ Documentation for Patient Exhalation Simulator PES
1076	PES Extended Warranty - 1 year
1077	PES Extended Warranty - 2 years