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Philips Respironics
Update on PE-PUR Testing Results and Conclusions Available to Date

Updated: June 28, 2022

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Update on the test and research program in connection with the June 2021 recall notification/field safety notice* for specific CPAP, BiPAP and mechanical ventilator devices

I. Introduction

On June 14, 2021, Philips Respironics, initiated a voluntary recall notification/field safety notice* for certain sleep and respiratory care products to address potential health risks related to the polyester-based polyurethane (PE-PUR) sound abatement foam in these devices.

At the time the recall notification/field safety notice* was issued, Philips Respironics relied on an initial, limited data set and toxicological risk assessment. Since then, together with certified testing laboratories and other qualified third-party experts, Philips Respironics has been conducting a comprehensive test and research program on the PE-PUR foam to better assess and scope the potential patient health risks related to possible emission of particulates from degraded foam and volatile organic compounds.

This Philips Respironics update is intended to provide healthcare providers, patients, and other stakeholders with updated information on the testing results and third party confirmed conclusions to date on results and findings from testing PE-PUR foam used in recalled devices for volatile organic compounds (VOCs), particulate matter (PM), and other testing such that healthcare providers have additional information to make informed decisions regarding the risk of continued use of recalled products. ***The overall guidance for healthcare providers and patients in the most recent version of the recall notification/field safety notice* remains unchanged at this time.*** Philips Respironics remains fully committed to addressing all devices affected by the recall notification/field safety notice* and continues to work with the relevant competent authorities to further optimize the remediation plan.

Philips continues to advise patients using affected CPAP/BiPAP devices to contact their physician or care provider before making any changes to their prescribed therapy, and together with the physician/care provider, to determine if the benefit of continuing therapy with the device outweighs the possible risks identified in the field safety notice.

Moreover, patients are advised to follow Philips Respironics' instructions and recommended cleaning and replacement guidelines for their CPAP machine and accessories. Ozone and UV light cleaning products are not currently approved cleaning methods for sleep apnea devices or masks and should not be used.

For more information on the recall notification/field safety notice*, as well as instructions for customers, patients and physicians, affected parties may contact their local Philips representative or visit https://www.usa.philips.com/healthcare/e/sleep/communications/src-update.

* *Voluntary recall notification in the U.S. / field safety notice outside the U.S.*

II. Testing Methods

Testing results and conclusions to date are grouped by device air path design (see **Tables 2-6**). Within each device type, testing was performed on one of three categories of devices/PE-PUR foam.

- **New:** pristine devices/foam tested after manufacturing, prior to use by patients;
- **Used:** devices/foam tested after patient use; years of use, environmental factors, and conditions of devices vary: used devices with varying levels of degradation were tested;
- **Lab Aged:** devices/foam tested after exposure to significantly elevated temperature and humidity (e.g. 90 °C and 95% relative humidity) to intentionally induce hydrolytic degradation of PE-PUR foam.

Visual assessments are performed on used and lab aged devices to assess the presence of visual degradation in the foam.

In addition to visual assessment, three categories of testing can generally be described in assessing potential patient risk: (A) VOC testing to identify and quantify organic compounds that may be inhaled during device use, (B) Particulate Matter (PM) testing to determine concentrations of airborne particles as it relates to inhalation risks and established health thresholds, and (C) additional physical, chemical and biological testing related to patient risks if patients were in contact with PE-PUR foam material. These categories are described in more detail below.

Testing remains ongoing. The results of this testing will be evaluated to assess potential acute and chronic toxicological risks related to patient health. As new finalized testing results/analyses become available, Philips Respironics will update this summary, including **Tables 2-6**.

II.A. VOC Testing at Device Level

VOC testing according to ISO 18562-3:2017 (Biocompatibility evaluation of breathing gas pathways in healthcare applications – Part 3: Tests for emissions of volatile organic compounds) was performed on the devices containing PE-PUR foam to (1) quantify VOC emissions from devices, and (2) assess the toxicological risk associated with exposure to the quantified concentrations of those VOCs. This testing is performed on the entire device, not just the PE-PUR foam component. The purpose of this test is to determine if a detected and quantified VOC is likely to be associated with a toxicological risk based upon exposure during use of the device. For each detected and quantified compound, a worst-case estimate of daily exposure is determined and compared to a tolerable intake, which is the total amount of a compound that is considered to be without appreciable harm to health. This comparison is presented as a Margin of Safety (MOS) factor with an MOS value greater than 1.0, indicating the compound's worst-case estimate is below the compound's tolerable intake, and therefore suggests no appreciable harm to health.

II.B. Particulate Matter (PM) Testing at Device Level

PM testing according to ISO 18562-2:2017 (Biocompatibility evaluation of breathing gas pathways in healthcare applications – Part 2: Tests for emissions of particulate matter) was performed on the devices containing PE-PUR foam to (1) quantify the particulate matter emitted from devices, and (2) assess whether the concentration detected is less than thresholds provided in the standard. This testing is performed on the entire device, not just the PE-PUR foam component. Specifically, ISO 18562-2 defines limits for airborne particles of sizes less than or equal to 2.5 µm in diameter (referred to as $PM_{2.5}$ with a limit of 12 $\mu g/m^3$) and those less than or equal to 10 µm in diameter (referred to as PM_{10} with a limit of 150 $\mu g/m^3$). As described in ISO 18562-2, these limits are taken from the US EPA National Ambient Air Quality Standards (40 § CFR Part 50). Particles greater than 10 µm in diameter are not evaluated in ISO 18562-2 testing (see **Section IV, General Testing Limitations** for more details).

II.C. Foam Level and Additional Device Level Testing

Additional testing is being performed in accordance with ISO 10993 (Biological evaluation of medical devices) to facilitate a toxicological risk assessment. This testing includes: chemical characterization (i.e. what chemicals may potentially extract or leach from the foam and have direct contact with body tissues and/or fluids), *in vitro* assessment (i.e. tests performed in a test tube, dish, etc. outside the body), and *in vivo* assessment (i.e. animal testing) of new, lab aged and/or used PE-PUR foam. In these tests, PE-PUR foam material is directly tested according to the ISO 10993 standards, unlike testing according to the ISO 18562 standards, which is performed on the entire device. Some additional testing has been completed on new and lab-aged foam, and the available results are reported in the Tables below, but additional testing is still ongoing (see **Section IV, General Testing Limitations**).

A chemical evaluation of new, used, and lab-aged PE-PUR foam is being conducted by identifying and quantifying chemicals that may be extracted or leached from the PE-PUR foam. The worst-case estimate of daily exposure will be informed by experiments to assess the amount of PE-PUR foam that can potentially be emitted from the device and contact the patient. A toxicological risk assessment on the extracted or leached chemicals will then be conducted in general accordance with ISO 10993 Biological evaluation of medical devices Part 17: Establishment of allowable limits for leachable substances, and Part 18: Chemical characterization of medical device materials within a risk management process. For each quantified compound extracted or leached from the PE-PUR foam, the worst-case estimate of daily exposure is determined and compared to a tolerable intake, which is the total amount of a compound that is considered to be without appreciable harm to health. This comparison is presented as a Margin of Safety (MOS) factor with an MOS value greater than 1.0, indicating the compound's worst-case estimate is below the compound's tolerable intake, and therefore suggests no appreciable harm to health. This chemical evaluation and toxicological risk assessment is currently in progress.

In vitro and *in vivo* assessments are conducted according to ISO 10993 Biological evaluation of medical devices Part 3: Tests for genotoxicity, carcinogenicity and reproductive toxicity, Part

5: Tests for *in vitro* cytotoxicity, and Part 10: Tests for irritation and skin sensitization. These tests are evaluated against *a priori* acceptance criteria to determine if the PE-PUR foam has "Passed" the test.

III. Background – PE-PUR VOCs and Foam Degradation

Origins of VOCs and Particulates

Like most plastic materials, PE-PUR foams can emit volatile organic compounds (VOCs) with characteristic emission profiles. The three possible sources are [1-3]:

- VOCs associated with the production process of the PE-PUR foam; VOC emission typically decays as a function of time;
- Absorption of VOCs by the foam from its environment and subsequent emission; VOC emission from absorption typically decays as a function of time if absorption is not persistent;
- VOCs as a result of foam degradation; VOC emission may be persistent.

Foam degradation may also result in foam volume reduction and the formation of particulates.

Foam Degradation

The polyester polyurethane (PE-PUR) sound abatement foam is an open-cell foam with a polyester-polyol building block based on diethylene glycol (DEG) and adipic acid (AA) and a polyurethane building block based on toluene di-isocyanate (TDI).

Literature [4] and experimental data to date suggest that the degradation mechanism for PE-PUR foam within the affected devices – when the devices are used according to the instructions for use – is hydrolysis, primarily of the ester groups within the foam.

The hydrolytic degradation product of an ester bond, such as that present in PE-PUR foam (see Figure 1), produces an alcohol-containing oligomer and an acid-containing oligomer. Further hydrolytic degradation of PE-PUR foam can then produce a di-alcohol (specifically DEG) and a di-acid (specifically adipic acid (AA)). Literature demonstrates that this reaction is autocatalytic, in that the acidic byproduct of an ester bond can increase the rate of hydrolysis, generating more degradation of ester bonds [4]. Moreover, the hydrolytic degradation products DEG and AA are hygroscopic (i.e., attract water).

The hydrolytic degradation product of the urethane bond produces a toluene diamine containing oligomer and further hydrolytic degradation can produce toluene diamine (TDA).

Ozone is a strong oxidant. PE-PUR foams are also susceptible to oxidation especially if they contain ether-groups [5], which is the case for foam types A and B.

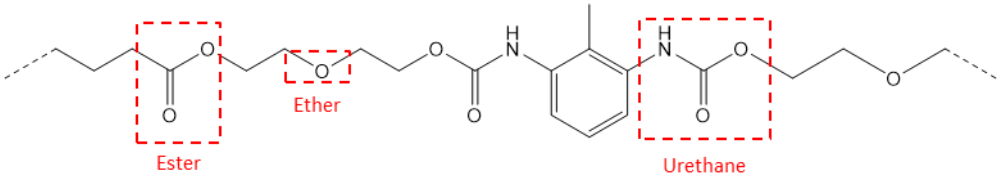

Figure 1: Chemical structure of the main building block of the PE-PUR foam (types A and B).

References:

[1] Lattuati-Derieux, A., Thao-Heu, S. & Lavédrine, B.; Assessment of the degradation of polyurethane foams after artificial and natural ageing by using pyrolysis-gas chromatography/mass spectrometry and headspace-solid phase microextraction-gas chromatography/mass spectrometry; J. Chromatogr. A 1218, 4498–4508 (2011).
[2] Characterizing Polyurethane Foam as a Sink for or Source of Volatile Organic Compounds in Indoor Air; Zhao, D.; Little J.C.; and Cox, S.S.; Journal of Environmental Engineering. Volume 130 Issue 9 - September 2004 (983 - 989).
[3] Aldehyde Emissions from Flexible Molded Foam; Al-Rashid, J., Panitzch T., Su, J., Lal, G., and Adamczyk, A.; October 2015; American Chemistry Council Center for the Polyurethanes Industry (CPI) Technical Conference.
[4] Szycher's handbook of Polyurethanes; Second edition; 2013 CRC Press; International Standard Book Number-13: 978-1-4398-6313-8.
[5] Ozone Reactions with Aliphatic Ethers in CCl4. Kinetics and Mechanism; Rakovsky, S.; Cherneva, D.; Deneva, M.; International Journal of Chemical Kinetics, 1995 (27); 153-165, 1995.

Degradation and Changes in Volume

The density of the PE-PUR foam (0.06 g/mL for foam Type A and 0.03 g/mL for foam Type B, see **Table 7**) is low, based on the open cell structure of the foam. For comparison, solid PE-PUR has a density of approximately 1 g/mL. Degradation of the foam is expected to result in collapsing of the open cell structure and a significant reduction of the material volume. For example, the total volume of foam type A in Dreamstation 1 of approximately 80 mL, theoretically can reduce to approximately 5 mL (a teaspoon) if the open cell structure collapses.

Degradation and Changes in Mass

Philips Respironics has and is continuing to investigate the correlation between degradation and changes in foam mass. Based on the preliminary results to date, mass measurements have not been shown to be a reliable indicator of foam degradation. In the absence of humidity (in lab conditions), mass loss does correlate with thermal degradation of PE-PUR foam. In the presence of humidity (such as in field use conditions), PE-PUR foam becomes hygroscopic (i.e. absorbs moisture) with degradation and thus the mass is expected to increase. This is consistent with preliminary observations that negligible mass loss was measured in degraded foam and moreso, even small mass increases were observed due to absorption of water. For these reasons, it appears that mass measurements may not be a reliable indicator of foam degradation. However, additional analyses are ongoing to better understand the correlation between foam degradation and the change in mass.

Foam Degradation Products

As discussed above, TDI, TDA, DEG, and AA are potential degradation products of PE-PUR material, depending on the degradation mechanism (e.g., due to high temperature) and the extent of degradation.

- TDI is a known degradation product at high temperatures, well above the anticipated use conditions of the recalled devices. Based on this, TDI is not expected to be a degradation product under normal use (consistent with the instructions for use) for the recalled devices. Further, TDI has not been detected in testing related to the recalled devices/PE-PUR sound abatement foam.
- TDA has not been detected as a VOC but was detected in one test as an extractable/leachable chemical in a lab degraded foam (Foam Type A, see **Table 7**, used in DreamStation 1, DreamStation Go, BiPAP A-Series/ and OmniLab, and System One). The associated third party toxicological risk assessment determined that the amount of TDA detected as an extractable/leachable chemical had a MOS value greater than 1.0, indicating no appreciable harm to health (see **Table 2 Row 12**, **Table 3 Row 7**, **Table 5 Row 9** and **Table 6 Row 7**, all based on the same testing result).
- DEG was detected as a VOC in multiple tests and as an extractable/leachable chemical, but all associated third party toxicological risk assessments indicated that the amount of DEG detected had a MOS value greater than 1.0, indicating no appreciable harm to health.
- AA has not been detected as a VOC of concern or found as an extractable/leachable chemical in testing completed to date (see **Table 2 Row 12**), but additional testing is ongoing.

Key hazards related to inhalation or ingestion of TDI, TDA, DEG, or AA include: TDI – respiratory sensitization and irritation, asthma, and carcinogenicity; TDA – skin sensitization, liver toxicity, reproductive toxicity, genotoxicity, and carcinogenicity; DEG – kidney toxicity and liver toxicity; AA – respiratory irritation. As testing is ongoing to assess to what extent PE-PUR particulates may contact patients based upon the level of degradation, Philips Respironics cannot confirm that health risks for patients do not exist for potential degradation products, and as such, ***the overall guidance for healthcare providers and patients in the most recent version of the recall notification/field safety notice* remains unchanged at this time.***

IV. General Testing Limitations

Healthcare providers and patients are advised that certain limitations exist regarding the current results presented herein and that these limitations are still being addressed with ongoing testing and evaluations. For example, ISO 18562-2 testing of devices quantifies the concentration of particles based only on their size range (2.5 µm to 10 µm in diameter), but does not include chemical characterization of these particles, or the detection of larger particles that may be emitted from the device (i.e., >10 µm PE-PUR foam particles). As such, passing an ISO 18562-2 test does not indicate 'no health risk' of PE-PUR foam particulates being emitted from the device. Additional testing is ongoing for chemical characterization and to identify the health risk of larger PE-PUR foam particles that are potentially emitted.

Toxicological risk assessments require an understanding of patient PE-PUR foam exposure (i.e., how much PE-PUR foam can contact a patient), and therefore, this assessment cannot yet be fully completed until sufficient data has been collected.

Another limitation in the presented results is the number of used devices that have finished VOC testing. For example, 5 used DreamStation 1 devices were selected for testing (refer to Table 2) based on the devices exhibiting varying degrees of visibly degraded PE-PUR foam, and based on visual inspection to date, devices with this level of degradation represent a small percentage of devices in the market. While the VOCs measured in these devices suggested no appreciable harm to health, additional testing of used devices and lab aged devices is being performed to more comprehensively evaluate "worst-case" degradation.

With regard to testing on lab-aged foam, lab aging (elevated temperature and humidity) is being used to induce various levels of foam degradation to compare to levels of degradation in field used devices. The purpose and advantage of lab aging are to generate devices with different levels of degradation in controlled conditions without contamination from the environment. Each lab aged device is then used for testing to determine the overall health risk associated with that level of degradation. Testing is ongoing to determine which lab-aging parameters correlate most closely with the foam condition in used devices. Notably, visual inspection of used DreamStation 1 devices has not identifed a direct correlation with increased device use and increased foam degradation.

As presented below in **Section V.A.2**, lab-aged foam (foam Type A) failed genotoxicity testing under the laboratory conditions of the Ames assay, but the implications of this result on overall patient health risk are still being assessed through additional testing (including the amount of foam that may contact a patient based upon the level of degradation). Per ISO 10993, a positive Ames result triggers a required follow-up evaluation including identification of potential confounding factors, and a weight of evidence assessment to determine a confirmed conclusion on potential risks for patients under expected usage of the device. Similarly, lab aged foam also failed cytotoxicity and skin irritation (intracutaneous) testing, but again like Ames testing and per the ISO 10993 standard, these results cannot standalone and require further analysis. To support the assessment of genotoxicity, cytotoxicity, and irritation risks, chemical characterization of PE-PUR foam as well as experiments to assess the amount of PE-PUR foam that can potentially contact the patient are being conducted.

Considering these collective limitations, Philips Respironics advises caution in interpretation of any one test result (pass or fail) as reflective of the overall patient risk.

The overall guidance for healthcare providers and patients in the most recent version of the recall notification/field safety notice* remains unchanged at this time.

V. Summary Overview of Testing Status and Results by Platform

Specific conclusions regarding available testing results and third party confirmed conclusions reported to date for the three described categories listed above are contained in **Tables 2-6**,

which are organized by device family. **Table 7** lists the type of PE-PUR foam used in each device (Type A or Type B). **Table 8** lists all acronyms and abbreviations.

- Current Status of VOC testing: Philips provided an update on December 23, 2021 that exposure to the level of VOCs identified to date for the first-generation DreamStation (DreamStation 1) devices is not typically anticipated to result in long-term health consequences for patients; however, some additional VOC testing for DreamStation is ongoing (e.g., for devices exposed to ozone) and final conclusions will be provided after that testing is complete. Additional VOC testing for other devices affected by the recall is ongoing, and conclusions regarding exposure risks related to VOCs for those other devices will be provided when complete.
- Current Status of PM testing and additional testing (ISO 10993): **Tables 2-6** provide available testing results and third party confirmed conclusions reported to date for all affected devices. Comprehensive risk assessments of testing in all categories are ongoing for each device affected by the recall, and Philips Respironics will continue to provide updates on findings from these assessments.

It is important to note that, to date, only preliminary testing has been conducted on devices/foam that were exposed to ozone cleaning, which is not an approved cleaning agent. Therefore, a comprehensive risk assessment on the impact of ozone cleaning has not been performed. Further, devices may be made with one or more types of PE-PUR foam and certain foam types are used in multiple device platforms as indicated in **Table 7**. Therefore, foam testing may be applicable to multiple device platforms and is indicated as such in the tables below. Unless otherwise noted in the tables, all testing and conclusions were performed at one or more certified third-party laboratories and/or confirmed by third-party qualified experts.

V.A. First-generation DreamStation devices

V.A.1. Device Level Testing

Visual Inspection of Used/Returned Devices

A visual assessment was performed for used/returned first-generation DreamStation devices as part of the repair process to determine the prevalence of visible degradation in the PE-PUR sound abatement foam and foam particles, as well as other findings (e.g., discoloration and other debris). For this assessment, the device is disassembled to permit access to the blower box (where the PE-PUR foam is located) and other parts of the device air path. The blower was also removed from the blower box to allow for full visual inspection. In addition, photographs were taken of the blower box with and without the blower for use in further assessing whether any visible degradation occurred and, if so, where any foam particles accumulated within the blower box.

This visual inspection process was performed for 60,847 returned devices to date from the US and Canada. These devices included devices where the user reported no use of ozone

cleaning, the user reported use of ozone cleaning, and devices for which it was unknown whether ozone cleaning was used (see **Table 1**).

Table 1: Visual inspection of first-generation DreamStation devices from the US and Canada

	# inspected devices	# devices with visual foam degradation/ volume reduction
No use of ozone cleaning*	36,341	164
Use of ozone cleaning*	11,309	777
Unknown*	13,197	164
Total	**60,847**	**1,105**

* Self-reported by the user

As shown in **Table 1** above, 1,105 of the devices showed visual foam degradation/volume reduction, which corresponds to approximately 2% of the inspected devices. Devices for which the user self-reported ozone use were 14x more likely to have visible degradation (777 out of 11,309 or 7%) than those where the user reported no ozone use (164 out of 36,341 or 0.5%).

422 devices of the inspected 60,847 devices were linked to a foam degradation complaint, however only 18 out of the 422 (4%) showed visible foam degradation/volume reduction.

Type A PE-PUR foam, such as that used in the first-generation DreamStation devices (refer to **Table 7**), becomes hygroscopic (i.e. absorbs moisture) and sticky with degradation, loses significant volume and increases density as the structure changes from a foam to a viscuous liquid material, and can accumulate within the airpath inside the device: in the blower cavity prior to entering the blower, and within the blower itself.

Additionally, a visual assessment of the foam was also performed on a sample of 1,360 returned/used first-generation DreamStation devices from various countries in Europe and on a sample of 931 returned/used devices from Japan. None of the assessed devices from Europe or Japan showed significant visible degradation.

The observed accumulation of degraded foam within the airpath inside the device suggests that, even when Type A PE-PUR particulates are formed by degradation, they are likely to accumulate and may not be directly emitted by the device. This is also supported by the PM measurement results to date, as discussed below. However, additional testing is ongoing.

Volatile Organic Compounds (VOCs)

As previously provided in an update on December 23, 2021, exposure to the level of VOCs identified to date for the first-generation DreamStation devices is not anticipated to result in long-term health consequences for patients based on ISO 18562-3 testing and evaluation of

new, lab aged, and used devices (**Table 2**). It is important to note that these tested new and lab aged DreamStation devices were not exposed to ozone cleaning, in accordance with the instructions for use.

Particulate Matter (PM)

New devices (41) and used devices (75, including 8 having visible degradation) were tested and all were compliant with ISO 18562-2 allowable limits for PM emissions. Tested PM emissions of used devices with degradation (8 devices) were not statistically different than PM emissions without degradation (67 devices), suggesting that degradation did not contribute to appreciable elevated levels of respirable particles in the devices tested.

Used/returned devices were evaluated for cleanliness based on a visual inspection of the exterior of the device. For these devices, average particulate matter counts in devices classified as 'dirty' were significantly greater than those classified as 'clean'. Please note that cleanliness does not refer to foam degradation. This is a visual assessment based on the presence of environmental materials on the external surface of the device, such as the inlet filter location.

In separate testing, an additional 11 new and 21 used devices were tested and found to be compliant with ISO 18562-2 allowable limits for PM emissions.

V.A.2. Foam Level Testing

Biocompatibility testing of (degraded) PE-PUR foam according to ISO 10993 is relevant if (degraded) foam particulates can potentially reach the patient. As indicated above, this testing is ongoing.

New foam passed ISO 10993 irritation, sensitization, and Ames (genotoxicity) testing. For cytotoxicity, new foam passed the Agar diffusion test, and failed the MEM elution test. The difference in these cytotoxicity results is likely due to the different procedural aspects of both tests. For Agar diffusion the intact foam sample is applied directly to the surface of the agar with the cell culture, whereas for MEM elution, the foam sample is extracted in MEM solution, and then only the foam extract is tested on the cell culture. Per the ISO 10993 cytotoxicity standard, further evaluation is being conducted with an ongoing chemical characterization and risk assessment.

Lab-aged foam failed ISO 10993 genotoxicity testing, and therefore a weight of evidence assessment is ongoing to provide a confirmed conclusion on potential risks for patient under the expected usage. A preliminary non-exhaustive chemical characterization and toxicological risk assessment on lab-aged foam indicated all detected compounds had MOSs > 1.0. To support the full toxicological risk assessment, additional chemical characterization as well as experiments to assess the probability and amount of degraded PE-PUR foam that can potentially reach the patient are being conducted. Lab-aged foam passed ISO 10993 skin sensitization testing, and failed ISO 10993 intracutaneous skin irritation testing. Per the ISO

10993 irritation standard, a further toxicological analysis based on chemical characterization is being conducted to allow for risk assessment of human exposure.

Chemical characterization of **foam in used devices** is ongoing.

V.B. DreamStation Go

Testing includes VOC and PM testing on the entire device containing PE-PUR sound abatement foam, and the foam type is the same as DreamStation 1 (Type A).

V.B.1. Device Level Testing
One new device passed VOC and PM testing. Further testing of DreamStation Go is ongoing.

V.B.2. Foam Level Testing
Please refer to the foam testing of DreamStation 1.

V.C. System One

Testing includes VOC and PM testing on the entire device containing PE-PUR sound abatement foam, and the foam type is the same as DreamStation 1 (Type A).

V.C.1. Device Level Testing
One new device passed VOC and PM testing. Further testing is ongoing for lab-aged and used devices.

V.C.2. Foam Level Testing
Please refer to the foam testing of DreamStation 1.

V.D. Trilogy 100/200

Testing includes VOC and PM testing on the entire device containing PE-PUR sound abatement foam, and investigational materials characterization of the foam. Trilogy 100/200 contains Type B PE-PUR foam.

V.D.1. Device Level Testing
Three new Trilogy devices tested according to standards available prior to the acceptance of ISO 18562 passed VOC and PM testing. Additionally, three new Trilogy devices passed ISO 18562-2 and ISO 18562-3 testing. Further testing of Trilogy is ongoing.

V.D.2. Foam Level Testing
New foam (Type B) passed ISO 10993 cytotoxicity, irritation and sensitization testing, and genotoxicity testing is ongoing. Testing on lab-aged and used foam is ongoing. Preliminary foam material testing suggested that PE-PUR shows measurable degradation with exposure to high temperature and high humidity.

V.E. BiPAP A-Series and OmniLab

Testing includes VOC and PM testing on the entire device containing PE-PUR sound abatement foams. Each device contains foam Types A and B, one is the same as the PE-PUR foam in DreamStation 1 (Type A) and another one is the same as PE-PUR foam in Trilogy (Type B).

V.E.1. Device Level Testing

One new device passed VOC and PM testing. One new Omnilab device and three used Omnilab devices passed ISO 18562-3 testing with all detected VOCs having MOSs > 1.0. Further testing is ongoing for lab-aged and used devices.

V.E.2. Foam Level Testing

Please refer to the foam testing described above for DreamStation 1 and Trilogy 100/200. Further testing on lab-aged and used foam is still ongoing.

VI. Independent clinical analysis: Philips Respironics CPAP devices not associated with increased cancer risk

Independent of Philips Respironics, in December 2021, an analysis was published in the American Journal of Respiratory and Critical Care Medicine that **found no significant difference in the risk of incident cancer** among obstructive sleep apnea (OSA) patients who used a Philips Respironics PAP device as compared with OSA patients who used a PAP device from other manufacturers, or OSA patients without treatment. The analysis and conclusion were based on data from a large multicenter cohort study involving 6,903 OSA patients on PAP devices between 2012 and 2020, including 1,220 Philips Respironics PAP users, with a median follow-up time of 7.5 years.

More recently, and also independent of Philips Respironics, an analysis was published online in the European Respiratory Journal in May 2022 that concluded that sustained and adherent CPAP therapy of OSA using Philips Respironics devices, compared with other manufacturers' devices, was **not associated with an increased risk of cancer**. The analysis and conclusion were based on data from a large multicenter cohort study involving 4,447 OSA patients on CPAP devices between 2007 and 2018, including 1,648 Philips Respironics CPAP users, with a median follow-up time of 7.2 years.

Table 2. List of Testing Results for DreamStation 1

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
				New Devices		
DreamStation 1 (Foam Type A)	1	New [Entire Device]	4	Indoor Air Quality Evaluation for VOC and PM	Pass	All VOC emissions and particulates were below established limits. Testing conducted on standards available prior to ISO 18562.
	2	New [Entire Device]	11	PM (ISO 18562-2)	Pass	$PM_{2.5}$ and PM_{10} below ISO 18562-2 thresholds.
	3	New [Entire Device]	12	VOCs (ISO 18562-3)	Pass	All detected VOCs had MOSs > 1.0.
	4	New [Entire Device]	1	VOCs (ISO 18562-3)	Pass	DD and phenol stabilizer were identified initially as compounds of potential concern; Follow up toxicological risk assessment on phenol stabilizer suggests no risk concern for adverse health effects in patients. Additional analysis on DD indicates DD was misidentified during initial characterization.
	5	New [Entire Device]	1	PM (ISO 18562-2) and VOCs (ISO 18562-3)	Pass	$PM_{2.5}$ and PM_{10} below ISO 18562-2 thresholds. All detected VOCs had MOSs > 1.0.
	6	New [Foam A]	3 tests	ISO 10993-5: Agar diffusion ISO 10993-10: GPMT, skin irritation	Pass	Negative for cytotoxicity, sensitization, and skin irritation under laboratory conditions
	7	New [Foam A]	6 tests (3 pre-treatment conditions[c], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Pass	Negative for genotoxicity under laboratory conditions
	8	New [Foam A]	1	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[b]	Pass	All detected compounds had MOSs > 1.0

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
	9	New [Foam A]	3 tests	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Pass	Positive for cytotoxicity under laboratory conditions.[d] Negative for skin sensitization under laboratory conditions. Negative for skin irritation under laboratory conditions.
				Lab Aged		
	10	Lab Aged [Entire Device]	3 aging timepoints	VOCs (ISO 18562-3)[b]	Pass	All detected VOCs had MOSs > 1.0. Testing included devices with foam previously aged for 1 week, 2 weeks, or 3 weeks at 90°C and 95% relative humidity.
	11	Lab Aged [Foam A]	24 tests (4 aging timepoints, 3 pre-treatment conditions[c], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Fail/AI	Positive for genotoxicity under laboratory conditions for all foam aged at 90°C 95% RH for ≥2 weeks, and 1/6 foam samples aged at 90°C and 95% RH for 1 week. Associated toxicological risk assessment **ongoing.**[e]
	12	Lab Aged [Foam A]	3 aging timepoints	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[b]	Pass	All detected compounds had MOSs > 1.0 Testing included devices with blower box containing foam previously aged for 1 week, 2 weeks, or 3 weeks at 90°C and 95% RH.
	13	Lab Aged [Foam A]	3 tests (2 aging timepoints)	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Fail/AI	Positive for cytotoxicity under laboratory conditions for foam aged at 90°C 95% RH for 4 weeks. Foam aged at 2 weeks was negative for cytotoxicity under laboratory conditions. Negative for skin sensitization under laboratory conditions for all aging timepoints. Positive for skin irritation under laboratory conditions for all aging timepoints (2 and 4 weeks at 90°C 95% RH). Associated toxicological risk assessment **ongoing**.[f]
				Field Use		

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
	14	Field Use [Entire Device]	5	PM (ISO 18562-2) and VOCs (ISO 18562-3)	Pass	$PM_{2.5}$ and PM_{10} below ISO 18562-2 thresholds. All detected VOCs had MOSs > 1.0. Used devices were selected based on varying levels of degradation with four devices having visible degradation.
	15	Field Use [Entire Device]	16	PM (ISO 18562-2)	Pass	$PM_{2.5}$ and PM_{10} below ISO 18562-2 thresholds for 16 devices.[g]
	16	Field Use [Entire Device]	60,847	Visual Inspection [h]	N/A	Devices returned from patients were inspected for visual degradation. Of 60,847 inspected devices, 1,105 devices showed visual degradation (~2%). For devices not linked to a complaint that were inspected (60,425), approximately 2% (1,087) showed visual degradation. For devices linked to a complaint that were inspected (422), approximately 4% (18) showed visual degradation. Devices inspected for which the user self-reported ozone use were 14x more likely to have degradation than those without self-reported ozone use. For 659 devices inspected at random, 13 showed severe visual degradation (i.e. a portion of the foam is degraded/reduced in volume). Of the 13 devices, 11 had self-reported ozone use, and 2 had unknown ozone use. With degradation, the foam becomes hygroscopic (absorbs moisture) and sticky, loses significant volume and increases density as the structure becomes more like a liquid material, and can accumulate within the airpath inside the device (in the blower cavity prior to entering the blower, and within the blower itself). Higher degradation risk exists with devices that have increased use; however, data to date suggests that there is not a direct correlation that would indicate degradation occurs after a certain amount of device use.
				Combined Device Experiments		
	17	Field Use [Entire Device] w/ New [Entire	75 (Field Use) 41 (New)	Particulate matter (PM) testing in general accordance with ISO 18562-2[i]	Pass	PM_3 and PM_{10} below ISO 18562-2 thresholds for all 116 tested devices (41x new and 75x used). PM_3 and PM_{10} of used devices with degradation (8 total devices) were not statistically different than measured PM_3

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
		Device] for comparison				and PM_{10} of used devices without degradation (67 devices), suggesting that degradation did not contribute to appreciable elevated levels of respirable particles in the devices tested. When devices were classified based on cleanliness, average particulate counts in devices classified as 'dirty' were significantly greater than those classified as 'clean'.[j] Comparing the PM_3 and PM_{10} levels from new DS1 devices to used devices with and without degradation did not show a statistically significant difference in probability distribution.

[a] For reports that did not directly calculate a MOS, if the detected concentration or calculated dose was acknowledged as below the associated tolerable limit that is considered equivalent to MOS > 1.0.

[b] Analytical data collection, chemical characterization, and/or VOC identification performed internally; toxicological risk assessment provided by a qualified third party.

[c] Each aging condition tested one of three samples that were treated prior to aging as follows: (1) production equivalent foam/untreated, or (2) exposed to ozone, or (3) place in ventilated oven set at 60°C for a period of 24 hours prior to aging.

[d] For cytotoxicity, new foam passed the Agar diffusion test, and failed the MEM elution test. The difference in these cytotoxicity results is likely due to the different procedural aspects of both tests. For Agar diffusion the intact foam sample is applied directly to the surface of the agar with the cell culture, whereas for MEM elution, the foam sample is extracted in MEM solution, and then only the foam extract is tested on the cell culture. Per the ISO 10993 cytotoxicity standard, further evaluation is being conducted with an ongoing chemical characterization and risk assessment.

[e] Per the ISO 10993-3 standard, a positive result triggers a required follow-up evaluation including identification of potential confounding factors, and a weight of evidence assessment to determine a confirmed conclusion on potential risks for patient under the expected usage. This is currently ongoing.

[f] The ISO 10993 MEM elution, skin sensitization, and skin irritation tests only provide an indication of potential toxicity and cannot necessarily be determined to assess biocompatibility for a given clinical application. As these test results cannot standalone per the ISO 10993 standard, there is an ongoing toxicological risk assessment to determine if there is an appreciable health risk to patients.

[g] For one device, $PM_{2.5}$ was detected at 14 µg/m^3 for 0 -1 h and then detected <5 µg/m^3 for 1 – 4 h. Further analysis indicated the emission profile in its entirety would be compliant with US EPA 40 § CFR Part 50 (basis for ISO 18562-2:2017 allowable limits). ISO 18562-2:2017 allowable limits are based on the US EPA National Ambient Air Quality Standards (NAAQS; 40 CFR § 50.18). The ISO 18562-2:2017 $PM_{2.5}$ allowable limit for $PM_{2.5}$ is 12 µg/m^3 is based on a three-year annual average limit. The NAAQS also provide a 24-hr average limit for $PM_{2.5}$ of 35 µg/m^3.

[h] Visual inspection performed internally.

[i] Testing was performed at 75 LPM, however the optical particle counter (OPC) sampled at 28.3 LPM, such that a correction factor was applied for the non-isokinetic flow and for the funneling effect based on the sampling nozzle shape of the OPC. While the ISO18652-2 standard uses $PM_{2.5}$, the fixed size bin definition of the OPC was such that PM_3 is reported instead: Bin sizes of OPC: 0.3 – 0.5 – 1.0 – 3.0 – 5.0 – 10.0µm. For this analysis, PM_3 is considered to be

comparable to $PM_{2.5}$. The device was positioned vertically with the output flow of the DS1 above the optical particle counter funnel-shaped nozzle. Testing was performed internally.

[j] Cleanliness does not refer to foam degradation. This is a general observation based in part on the presence of environmental materials on the external surface of the device, such as the inlet filter location.

Table 3. List of Testing Results for DreamStation Go

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
DreamStation Go (Foam Type A)				**New**		
	1	New [Entire Device]	1	Indoor Air Quality Evaluation for VOC and PM	Pass	All VOC emissions and particulates were below established limits. Testing conducted on standards available prior to ISO 18562.
	2	New [Foam A][e]	3 tests	ISO 10993-5: Agar diffusion ISO 10993-10: GPMT, skin irritation	Pass	Negative for cytotoxicity, sensitization, and skin irritation under laboratory conditions
	3	New [Foam A][e]	6 tests (3 pre-treatment conditions[b], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Pass	Negative for genotoxicity under laboratory conditions
	4	New [Foam A][e]	1	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[c]	Pass	All detected compounds had MOSs > 1.0
	5	New [Foam A][e]	3 tests	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Pass	Positive for cytotoxicity under laboratory conditions.[d] Negative for skin sensitization under laboratory conditions. Negative for skin irritation under laboratory conditions.
				Lab Aged		

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
	6	Lab Aged [Foam A][e]	24 tests (4 aging timepoints, 3 pre-treatment conditions[b], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Fail/AI	Positive for genotoxicity under laboratory conditions for all foam aged at 90°C and 95% RH for ≥2 weeks, and 1/6 foam samples aged at 90°C and 95% RH for 1 week. Associated toxicological risk assessment **ongoing**[f]
	7	Lab Aged [Foam A][e]	3 aging timepoints	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[d]	Pass	All detected compounds had MOSs > 1.0 Testing included devices with blower box containing foam previously aged for 1 week, 2 weeks, or 3 weeks at 90°C and 95% RH.
	8	Lab Aged [Foam A][e]	3 tests (2 aging timepoints)	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Fail/AI	Positive for cytotoxicity under laboratory conditions for foam aged at 90°C 95% RH for 4 weeks. Foam aged at 2 weeks was negative for cytotoxicity under laboratory conditions. Negative for skin sensitization under laboratory conditions for all aging timepoints. Positive for skin irritation under laboratory conditions for all aging timepoints (2 and 4 weeks at 90°C 95% RH). Associated toxicological risk assessment **ongoing**.[g]

[a] For reports that did not directly calculate a MOS, if the detected concentration or calculated dose was acknowledged as below the associated tolerable limit that is considered equivalent to MOS > 1.0.

[b] Each aging condition tested one of three samples that were treated prior to aging as follows: (1) production equivalent foam untreated, or (2) exposed to ozone, or (3) place in ventilated oven set at 60°C for a period of 24 hours prior to aging.

[c] Analytical data collection, chemical characterization, and/or VOC identification performed internally; toxicological risk assessment provided by a qualified third party.

[d] For cytotoxicity, new foam passed the Agar diffusion test, and failed the MEM elution test. The difference in these cytotoxicity results is likely due to the different procedural aspects of both tests. For Agar diffusion the intact foam sample is applied directly to the surface of the agar with the cell culture, whereas for MEM elution, the foam sample is extracted in MEM solution, and then only the foam extract is tested on the cell culture. Per the ISO 10993 cytotoxicity standard, further evaluation is being conducted with an ongoing chemical characterization and risk assessment.

[e] Foam Type A testing reported in this table is also reported in Table 2.
[f] Per the ISO 10993-3 standard, a positive result triggers a follow-up evaluation including identification of potential confounding factors, and a weight of evidence assessment to provide a confirmed conclusion on potential risks for patient under the expected usage. This is currently ongoing.
[g] The ISO 10993 MEM elution, skin sensitization, and skin irritation tests only provide an indication of potential toxicity and cannot necessarily be determined to assess biocompatibility for a given clinical application. As these test results cannot standalone per the ISO 10993 standard, there is an ongoing toxicological risk assessment to determine if there is an appreciable health risk to patients.

Table 4. List of Testing Results for Trilogy

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information
Trilogy 100/200 (Foam Type B)				**New**		
	1	New [Entire Device]	3	Indoor Air Quality Evaluation for VOC and PM	Pass	All VOC emissions and particulates were below established limits. Testing conducted on standards available prior to ISO 18562.
	2	New [Foam B]	3 tests	ISO 10993-5: Elution test ISO 10993-10: GPMT, skin irritation	Pass	Negative for cytotoxicity, sensitization, and skin irritation under laboratory conditions
	3	New [Entire Device]	3	PM (ISO 18562-2) and VOCs (ISO 18562-3)	Pass	$PM_{2.5}$ and PM_{10} below ISO 18562-2 thresholds. All detected VOCs had MOSs > 1.0.
				Combined New, Lab-Aged and Field-Use Experiments		
	4	New, Lab Aged and Field Use [Foam B]	4 tests/various conditions	pH, conductivity, FTIR, DSC[a]	N/A	PE-PUR foam shows measurable degradation with exposure to high temperature and high humidity. Testing included foam previously aged for 1, 4, 7, 11 or 14 days at 90°C and 100% RH, as well as 2 field return customer complaint foams

[a] Analytical data collection performed internally.

Table 5. List of Testing Results for BiPAP A30/A40/V30 and OmniLab

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
BiPAP A30/A40/V30; OmniLab (Foam Types A and B)				**New**		
	1	New [Entire Device]	1	Indoor Air Quality Evaluation for VOC and PM	Pass	All VOC emissions and particulates were below established limits. Testing conducted on standards available prior to ISO 18562.
	2	New [Foam A] [f]	3 tests	ISO 10993-5: Agar diffusion ISO 10993-10: GPMT, skin irritation	Pass	Negative for cytotoxicity, sensitization, and skin irritation under laboratory conditions
	3	New [Foam B] [f]	3 tests	ISO 10993-5: Elution test ISO 10993-10: GPMT, skin irritation	Pass	Negative for cytotoxicity, sensitization, and skin irritation under laboratory conditions
	4	New [Foam A] [f]	6 tests (3 pre-treatment conditions[b], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Pass	Negative for genotoxicity under laboratory conditions
	5	New [Foam A] [f]	1	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[e]	Pass	All detected compounds had MOSs > 1.0
	6	New [Entire Device]	1	VOCs (ISO 18562-3)	Pass	All detected VOCs had MOSs > 1.0[h]
	7	New [Foam A] [f]	3 tests	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Pass	Positive for cytotoxicity under laboratory conditions.[c] Negative for skin sensitization under laboratory conditions. Negative for skin irritation under laboratory conditions.
				Lab Aged		

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
	8	Lab Aged [Foam A] [f]	24 tests (4 aging timepoints, 3 pre-treatment conditions[b], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Fail/AI	Positive for genotoxicity under laboratory conditions for all foam aged at 90°C and 95% RH for ≥2 weeks, and 1/6 foam samples aged at 90°C and 95% RH for 1 week. Associated toxicological risk assessment **ongoing**[d]
	9	Lab Aged [Foam A] [f]	3 aging timepoints	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[e]	Pass	All detected compounds had MOSs > 1.0 Testing included devices with blower box containing foam previously aged for 1 week, 2 weeks, or 3 weeks at 90°C and 95% RH.
	10	Lab Aged [Foam A] [f]	3 tests (2 aging timepoints)	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Fail/AI	Positive for cytotoxicity under laboratory conditions for foam aged at 90°C 95% RH for 4 weeks. Foam aged at 2 weeks was negative for cytotoxicity under laboratory conditions. Negative for skin sensitization under laboratory conditions for all aging timepoints. Positive for skin irritation under laboratory conditions for all aging timepoints (2 and 4 weeks at 90°C 95% RH). Associated toxicological risk assessment **ongoing**.[g]
	Field Use					
	11	Field-Use [Entire Device]	3	VOCs (ISO 18562-3)	Pass	All detected VOCs had MOSs > 1.0[h]
	Combined New, Lab-Aged and Field-Use Experiments					
	12	New, Lab Aged and Field Use [Foam B] [f]	4 tests/various conditions	pH, conductivity, FTIR, DSC[i]	N/A	PE-PUR foam shows measurable degradation with exposure to high temperature and high humidity. Testing included foam previously aged for 1, 4, 7, 11 or 14 days at 90°C and 100% RH, as well as 2 field return customer complaint foams

[a] For reports that did not directly calculate a MOS, if the detected concentration or calculated dose was acknowledged as below the associated tolerable limit that is considered equivalent to MOS > 1.0

[b] Each aging condition tested one of three samples that were treated prior to aging as follows: (1) production equivalent foam untreated, or (2) exposed to ozone, or (3) place in ventilated oven set at 60°C for a period of 24 hours prior to aging.

[c] For cytotoxicity, new foam passed the Agar diffusion test, and failed the MEM elution test. The difference in these cytotoxicity results is likely due to the different procedural aspects of both tests. For Agar diffusion the intact foam sample is applied directly to the surface of the agar with the cell culture, whereas for MEM elution, the foam sample is extracted in MEM solution, and then only the foam extract is tested on the cell culture. Per the ISO 10993 cytotoxicity standard, further evaluation is being conducted with an ongoing chemical characterization and risk assessment.

[d] Per the ISO 10993-3 standard, a positive result triggers a follow-up evaluation including identification of potential confounding factors, and a weight of evidence assessment to provide a confirmed conclusion on potential risks for patient under the expected usage. This is currently ongoing.

[e] Analytical data collection, chemical characterization, and/or VOC identification performed internally; toxicological risk assessment provided by a qualified third party.

[f] Foam Type A and B testing reported in this table is also reported in Tables 2 and 4 respectively.

[g] The ISO 10993 MEM elution, skin sensitization, and skin irritation tests only provide an indication of potential toxicity and cannot necessarily be determined to assess biocompatibility for a given clinical application. As these test results cannot standalone per the ISO 10993 standard, there is an ongoing toxicological risk assessment to determine if there is an appreciable health risk to patients.

[h] Devices were OmniLab with a selected test duration of 16 hours based on device use duration.

[i] Analytical data collection performed internally.

Table 6. List of Testing Results for SystemOne, Dorma, REMstar, C-series BiPAP

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
SystemOne; Dorma; REMstar; C-series BiPAP (Foam Type A)				**New**		
	1	New [Entire Device]	1	Indoor Air Quality Evaluation for VOC and PM	Pass	All VOC emissions and particulates were below established limits. Testing conducted on standards available prior to ISO 18562
	2	New [Foam A][e]	3 tests	ISO 10993-5: Agar diffusion ISO 10993-10: GPMT, skin irritation	Pass	Negative for cytotoxicity, sensitization, and skin irritation under laboratory conditions
	3	New [Foam A][e]	6 tests (3 pre-treatment conditions[b], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Pass	Negative for genotoxicity under laboratory conditions
	4	New [Foam A][e]	1	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[c]	Pass	All detected compounds had MOSs > 1.0
	5	New [Foam A][e]	3 tests	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Pass	Positive for cytotoxicity under laboratory conditions.[d] Negative for skin sensitization under laboratory conditions. Negative for skin irritation under laboratory conditions.
				Lab Aged		
	6	Lab Aged [Foam A][e]	24 tests (4 aging timepoints, 3 pre-treatment conditions[b], 2 labs)	Genotoxicity test ISO 10993-3: Ames	Fail/AI	Positive for genotoxicity under laboratory conditions for all foam aged at 90°C and 95% RH for ≥2 weeks, and 1/6 foam samples aged at 90°C and 95% RH for 1 week. Associated toxicological risk assessment **ongoing**[f]

Device	Row	Device Category	# of Tests/Devices Tested	Testing Description	Result	Conclusion(s) and Additional Information[a]
	7	Lab Aged [Foam A] [e]	3 aging timepoints	Preliminary chemical characterization by ISO 18562-4/ISO 10993-18 (non-exhaustive)[d]	Pass	All detected compounds had MOSs > 1.0 Testing included devices with blower box containing foam previously aged for 1 week, 2 weeks, or 3 weeks at 90°C and 95% RH.
	8	Lab Aged [Foam A] [e]	3 tests (2 aging timepoints)	ISO 10993-5: MEM elution ISO 10993-10: GPMT, skin irritation	MEM Elution: Fail/AI GPMT: Pass Skin irritation: Fail/AI	Positive for cytotoxicity under laboratory conditions for foam aged at 90°C 95% RH for 4 weeks. Foam aged at 2 weeks was negative for cytotoxicity under laboratory conditions. Negative for skin sensitization under laboratory conditions for all aging timepoints. Positive for skin irritation under laboratory conditions for all aging timepoints (2 and 4 weeks at 90°C 95% RH). Associated toxicological risk assessment **ongoing**.[g]

[a] For reports that did not directly calculate a MOS, if the detected concentration or calculated dose was acknowledged as below the associated tolerable limit that is considered equivalent to MOS > 1.0

[b] Each aging condition tested one of three samples that were treated prior to aging as follows: (1) production equivalent foam untreated, or (2) exposed to ozone, or (3) place in ventilated oven set at 60°C for a period of 24 hours prior to aging.

[c] Analytical data collection, chemical characterization, and/or VOC identification performed internally; toxicological risk assessment provided by a qualified third party.

[d] For cytotoxicity, new foam passed the Agar diffusion test, and failed the MEM elution test. The difference in these cytotoxicity results is likely due to the different procedural aspects of both tests. For Agar diffusion the intact foam sample is applied directly to the surface of the agar with the cell culture, whereas for MEM elution, the foam sample is extracted in MEM solution, and then only the foam extract is tested on the cell culture. Per the ISO 10993 cytotoxicity standard, further evaluation is being conducted with an ongoing chemical characterization and risk assessment.

[e] Foam Type A testing reported in this table is also reported in Table 2.

[f] Per the ISO 10993-3 standard, a positive result triggers a follow-up evaluation including identification of potential confounding factors, and a weight of evidence assessment to provide a confirmed conclusion on potential risks for patient under the expected usage. This is currently ongoing.

[g] The ISO 10993 MEM elution, skin sensitization, and skin irritation tests are for screening hazard identification, and do not determine the risk of that hazard occurring in a patient via the relevant route(s) of exposure. An ongoing toxicological risk assessment is being conducted to determine if there is an appreciable health risk to patients.

Table 7. Sound abatement foam type per device

Devices	Foam Type	Foam Material	Foam Density (g/mL)	Percentage of Registered Devices
DreamStation 1	**A**	PE-PUR	0.06	68%
DreamStation Go	**A**	PE-PUR	0.06	1%
SystemOne; Dorma; REMstar; C-series BiPAP	**A**	PE-PUR	0.06	26%
Trilogy 100/200	**B**	PE-PUR	0.03	3%
BiPAP A30/A40/V30; OmniLab	**A and B**	PE-PUR for both	0.06 0.03	2%

The total amount of foam in the devices varies from 1 g to 10 g, depending on the device airpath design and configuration. As indicated in **Table 7** above, there are two main types of PE-PUR foam used in the recalled devices – referred to as "Type A" and "Type B." The known differences between the Type A and Type B foams are that Type B foam can be used with an acrylic pressure sensitive adhesive, has a lower density, has a different thickness, and also contains certain an additive to reduce potential flammability.

Table 8. Acronyms and Abbreviations

AI	Additional Information
°C	Celsius
CFR	Code of Federal Regulations
DD	Dimethyl diazene
DSC	Differential Scanning Calorimetry
EPA	U.S. Environmental Protection Agency
FDA	U.S. Food and Drug Administration
FTIR	Fourier Transform Infrared Spectroscopy
GC-MS	Gas Chromatography-Mass Spectrometry
GPMT	Guinea Pig Maximization Test
HHE	Health Hazard Evaluation

In vitro	Experimental studies conducted in biological material, e.g. cells in a test tube, outside the body
In vivo	Experimental studies conducted in animal model
ISO	International Organization for Standardization
MOS	Margin of Safety
PE-PUR	Polyester-Polyurethane
Phenol Stabilizer	Phenol, 2,6-bis(1,1-dimethylethyl)-4-(1-methylpropyl)
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter with a diameter of 2.5 micrometers or less
PM_{10}	Particulate Matter with a diameter of 10 micrometers or less
RH	Relative Humidity
VOC	Volatile Organic Compounds
Wks	Weeks
MEM	Minimum essential medium
GPMT	Guinea pig maximization test
$\mu g/m^3$	Micrograms per cubic meter
LPM	Liters per minute